

Mrs Angie Motshekga, Minister of Basic Education



Mr Enver Surty, Deputy Minister of Basic Education

These workbooks have been developed for the children of South Africa under the leadership of the Minister of Basic Education, Mrs Angie Motshekga, and the Deputy Minister of Basic Education, Mr Enver Surty.

The Rainbow Workbooks form part of the Department of Basic Education's range of interventions aimed at improving the performance of South African learners in the first six grades. As one of the priorities of the Government's Plan of Action, this project has been made possible by the generous funding of the National Treasury. This has enabled the Department to make these workbooks, in all the official languages, available at no cost.

We hope that teachers will find these workbooks useful in their everyday teaching and in ensuring that their learners cover the curriculum. We have taken care to guide the teacher through each of the activities by the inclusion of icons that indicate what it is that the learner should do.

We sincerely hope that children will enjoy working through the book as they grow and learn, and that you, the teacher, will share their pleasure.

We wish you and your learners every success in using these workbooks.

Rainbow WORKBOOKS

MATHEMATICS IN ENGLISH
GRADE 7 – BOOK 1
TERMS 1 & 2
ISBN 978-1-4315-0218-9

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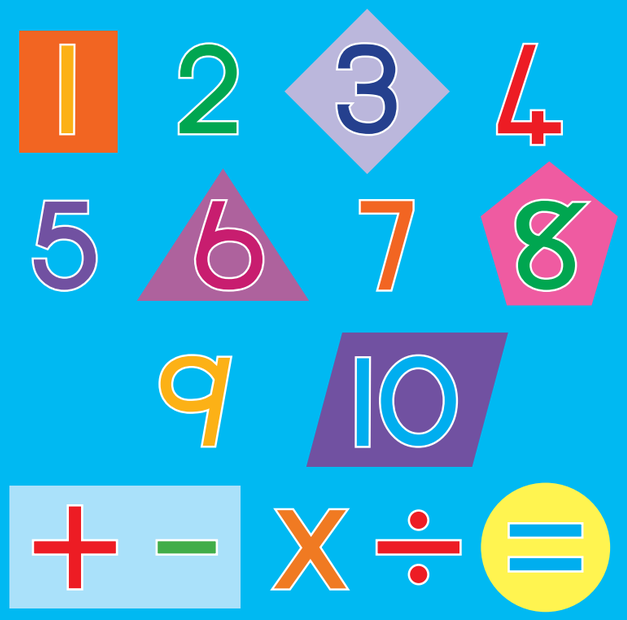

MATHEMATICS IN ENGLISH – Grade 7 Book 1

ISBN 978-1-4315-0218-9



Grade 7

Name:

Class:

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Department:
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REPUBLIC OF SOUTH AFRICA

MATHEMATICS IN ENGLISH

Book 1

Terms 1 & 2



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3 x 4 = 12

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180
10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220
12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260
14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280
15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340
18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360
19	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380
20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400



Grade 7

Rainbow WORKBOOKS

Mathematics in ENGLISH



ENGLISH Book 1

Name:

0 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

1 Represent nine-digit numbers



Type a nine–digit number into your calculator. Do not use zeros. Then, one by one, change each of the following to zero, the:

- hundred thousands
- units
- millions
- ten thousands
- tens
- ten millions
- hundreds
- thousands



I wonder how many digits a cellphone calculator can take?

1. What is the value of the underlined digit?

Example: **7 6̲3 104**

60 000

Say how many digits each number has.



a. 340 78̲4

b. 512 97̲3 715

c. 1 5̲17 451

d. 4̲76 123 000

e. 451 783 21̲5

f. 998 9̲99 999

2. Write the following in expanded notation:

Example: **942 576**

= 900 000 + 40 000 + 2 000 + 500 + 70 + 6

a. 154 798 105

b. 592 562

c. 4 978 879

d. 77 666

e. 549 327

f. 4 000 009

3. What is the value of 5 in each of the following numbers?

Example: 532 789
500 000

a. 154 289 _____

b. 5 834 974 _____

c. 45 869 _____

d. 413 978 950 _____

e. 563 008 _____

f. 8 382 705 _____

4. Complete the following:

Example: 297 654 – 50 = 297 604

a. 378 457 ____ = 308 457 _____

b. 421 873 ____ = 401 873 _____

c. 887 114 ____ = 887 100 _____

d. 316 522 ____ = 96 522 _____

e. 124 893 ____ = 100 893 _____

f. 737 896 ____ = 732 096 _____

5. Complete the table. Always add and subtract from the number given in the first column.

	Add 10	Subtract 10	Add 100	Add 100	Add 1 000	Subtract 1 000	Add 10 000
a. 475 021							
b. 835 296							
c. 789 123							
d. 336 294							
e. 428 178							
f. 164 228							

Problem solving



Find five–digit numbers in a newspaper. What does each one mean?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

2 Compare and order whole numbers



Things to know and to discuss!

What do the following symbols mean?

> < =



Give an example of each using numbers.

1. Arrange these numbers in ascending order on the number line:
17 235, 17 347, 18 212, 17 922, 17 211, 17 678.

17 211 — 18 212

a. What is the difference between the fourth and sixth number on the number line? _____

b. What is halfway between the third and fifth interval on the number line?
_____

c. Write a whole number bigger than the fourth number, but smaller than the fifth number. _____

d. Which is the smallest number? _____

e. Which is the biggest number? _____

2. Arrange these numbers in ascending order on this number line:
1 782, 2 342, 1 699, 1 571, 2 102, 1 999

a. What is the smallest number? _____

b. What is the biggest number? _____



c. What is the difference between the two numbers?

d. Give one whole number smaller than the smallest number.

e. Give one whole number bigger than the biggest number.

f. What is the sum of the second number and the fourth number on this number line?

3. Arrange these numbers in ascending order on the number line:
34 289, 34 288, 34 287, 34 286, 34 285, 34 284

a. What is the smallest number?

b. What is the biggest number?

c, What is the difference between the biggest and smallest numbers?

d. Give one whole number smaller than the smallest number.

e. Give one whole number bigger than the biggest number.

f. What is the sum of the third number and the fourth number on this number line?

4. Fill in the missing numbers:

									30 000
						37 000			
				45 000					
	52 000								
									70 000

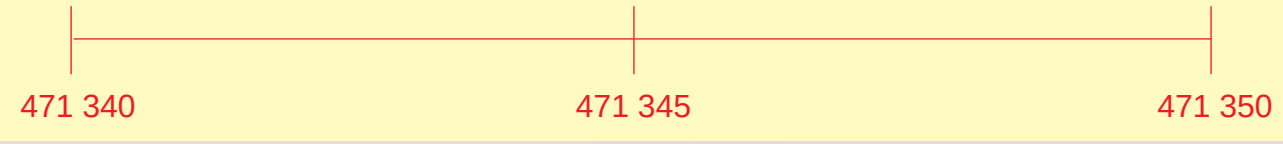
continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

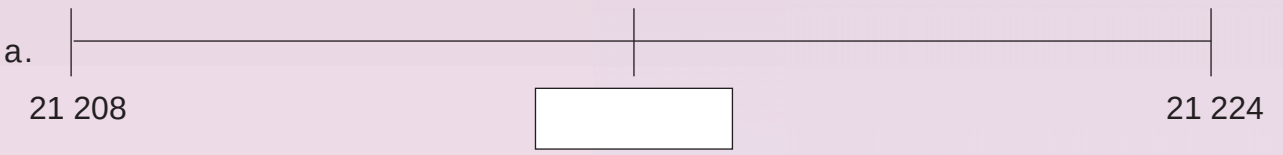
2b Compare and order whole numbers
continued

5. Which number is halfway?

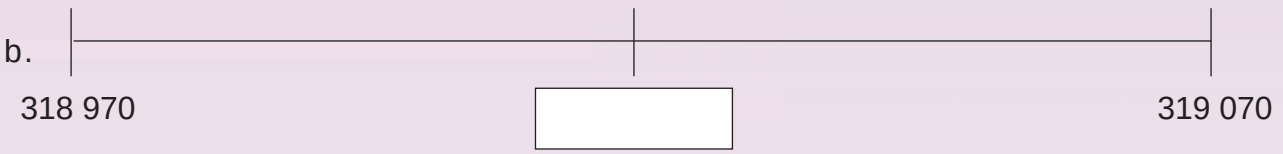
Example:



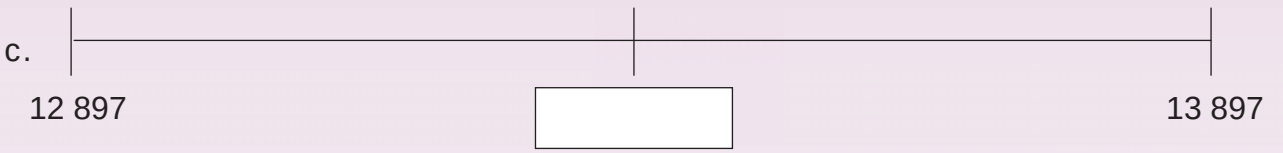
a.



b.



c.



6. Which number comes next?

Example: 593 485, 593 486, 593 487, 593 488, 593 489

299 999, 299 998, 299 997, _____

a. 331 344; 331 345; 331 346; 331 347; 331 348; _____

b. 549 327; 549 326; 549 325; 549 324; _____

c. 508 609; 508 610; 508 611; 508 612; 508 613; _____

7. Write in ascending order:



Example: 289 541, 289 540, 289 539, 289 542, 289 538

289 538, 289 539, 289 540, 289 541, 289 542

a. 421 178; 421 182; 421 180; 421 183; 421 179; 421 181

_____



b. 543 688; 543 691; 543 689; 543 690; 543 687

c. 903 675; 903 678; 903 676; 930 679; 903 677

8. Write in descending order:



Example: 289 541; 289 540; 289 539; 289 542; 289 538

289 542; 289 541; 289 540; 289 539; 289 538

a. 564 743; 564 747; 564 745; 564 744; 564 746

b. 907 569; 907 566; 907 570; 907 568; 907 567

c. 352 701; 352 699; 352 703; 352 700; 352 702

9. Fill in >, < or =:

Example: 375 894 < 375 984

a. 564 746 ____ 751 023

b. 191 756 ____ 460 207

c. 697 059 ____ 699 059

d. 979 509 ____ 939 509

e. 563 435 ____ 560 640

f. 925 860 ____ 925 680

10. Fill in >, < or =:

Example: 300 000 + 5 < 300 500

a. 75 001 + 9 ____ 75 100

b. 3 838 ____ 3 888 – 50

c. 2 800 – 800 ____ 2 008

d. 50 000 + 3 ____ 50 300

e. 5 556 ____ 5 655 – 100

f. 200 000 + 50 ____ 200 050 + 50

Problem solving

Use each of the following digits only once to make the biggest nine–digit number possible, and then the smallest nine–digit number possible.

1 5 6 2 9 8 3 7

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

3 Prime numbers

Which numbers smaller than 100 can only be divided by one by the number?



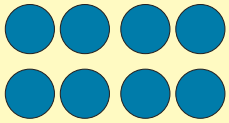


A **prime number** can be divided evenly only by 1 or itself. It has two, and only two, factors – 1 and itself. A prime number must be greater than 1.

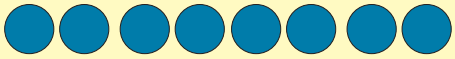
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Use drawings to show that the following numbers are not prime numbers but composite numbers.

Example: 8 can be divided by 1, 2, 4 and 8



2 x 4



1 x 8

a. 9

b. 18

c. 155

d. 57

e. 39

f. 68

2. Identify all the prime numbers from 1–100.

3. How would you write the following numbers in as a product of prime numbers?

Example: 12

The number 12 can be made by multiplying using the prime numbers 2 and 3.

12 = 2 x 2 x 3

(2 and 3 are prime numbers because 2 = 2 x 1 and 3 = 3 x 1)

a. 36

b. 60

c. 105

d. 420

e. 48

f. 1800

4. What numbers are these? Why?

2	3	5	7	11	13	17	19	23	29	31	37	41	43	47	53	59	61	67
71	73	79	83	89	97	101	103	107	109	113	127	131	137	139	149	151	157	163
167	173	179	181	191	193	197	199	211	223	227	229	233	239	241	251	257	263	269
271	277	281	283	293	307	311	313	317	331	337	347	349	353	359	367	373	379	383
389	397	401	409	419	421	431	433	439	443	449	457	461	463	467	479	487	491	499
503	509	521	523	541	547	557	563	569	571	577	587	593	599	601	607	613	617	619
631	641	643	647	653	659	661	673	677	683	691	701	709	719	727	733	739	743	751
757	761	769	773	787	797	809	811	821	823	827	829	839	853	857	859	863	877	881
883	887	907	911	919	929	937	941	947	953	967	971	977	983	991	997			

Problem solving

How many three–digit **prime numbers** are there less than 1 000.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

4 Rounding off to the nearest 5, 10, 100 and 1 000

Your friend missed the lesson on rounding off. Use the number lines to explain how to round off these numbers.

4 528	4 523
6 891	6 828
2 189	2 620
643	649

Round off

To the nearest 10



To the nearest 100



To the nearest 1 000



To the nearest 5



1. What is the symbol for rounding off? _____

2. Round off to the nearest 10.

Example: 789 ≈ 790

a. 7 ☐ b. 4 ☐ c. 78 ☐

d. 61 ☐ e. 328 ☐ f. 451 ☐

3. Round off to the nearest 100.

Example: 789 ≈ 800

a. 3 ☐ b. 54 ☐ c. 28 ☐

d. 765 ☐ e. 938 ☐ f. 1 764 ☐

4. Round off to the nearest 1 000.

Example: 789 ≈ 1 000

a. 176 ☐ b. 324 ☐ c. 1 924 ☐

d. 8 639 ☐ e. 14 342 ☐ f. 67 285 ☐



5. Complete the table.

	Round off to the nearest 10	Round off to the nearest 100	Round off to the nearest 1 000
a. 7 632			
b. 8 471			
c. 9 848			
d. 5 737			
e. 9 090			

6. Round off to the nearest five.

Example: 4 ≈ 5

a. 7 ____ b. 3 ____ c. 472 ____

d. 589 ____ e. 2 372 ____ f. 3 469 ____

7. Complete the table.

	Round off to the nearest 10	Round off to the nearest 100	Round off to the nearest 1 000
a. 2			
b. 7			
c. 48			
d. 781			
e. 345			
f. 2 897			

8. Why do we round off? Give five examples from everyday life where we round off.

Example from every day life.



Problem solving

You have a five–digit number. After you round it off to the nearest thousand, you get a six–digit number. What was your first number? (e.g. 99 999 ≈ 100 000.)You have a four–digit number. After you round it off to the nearest five you get 3 895. What was your original number?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

5 Calculating whole numbers

What are the four basic operations in maths?

+ − X ÷

To **add** or **subtract** large numbers, list them in columns. Then **add** or subtract only those digits that have the same **place value**. You do this column by column.

To **multiply** two large numbers, write the numbers vertically with the larger number being multiplied by the smaller number below, which is called the multiplier.

How would you divide large numbers?

We give you some examples but you can use a method of your own choice.



1. Solve the sums. You can use the method of your choice.

Example 1:

278 467 + 197 539

= 200 000 + 100 000 + 70 000 + 90 000 + 8 000 + 7 000 + 400 + 500 + 60 + 30 + 7 + 9

= 300 000 + 160 000 + 15 000 + 900 + 90 + 16

= 300 000 + 100 000 + 60 000 + 10 000 + 5 000 + 900 + 90 + 10 + 6

= 400 000+ 70 000 + 5 000 + 900 + 100 + 6

= 400 000 + 70 000 + 5 000 + 1 000 + 6

= 400 000 + 70 000 + 6 000 + 6

= 476 006

Example 2:

	2	7	8	4	6	7	
+	1	9	7	5	3	9	
					1	6	(7 + 9)
					9	0	(60 + 30)
				9	0	0	(400 + 500)
		1	5	0	0	0	(8 000 + 7 000)
	1	6	0	0	0	0	(70 000 + 90 000)
	3	0	0	0	0	0	(200 000 + 100 000)
	4	7	6	0	0	6	

a. 87 382 + 12 213

b. 65 479 + 32 599

c. 178 673 + 145 568

d. 237 634 + 199 999

2. Calculate the sums. You can use a method of your own choice.

Example 1:

	4	7	6	0	0	6	
–	1	9	7	5	3	9	
						7	(16 – 9)
					6	0	(90 – 30)
				4	0	0	(900 – 500)
			8	0	0	0	(15 000 – 7 000)
		7	0	0	0	0	(16 000 – 9 000)
+	2	0	0	0	0	0	(300 000 – 100 000)
	2	7	8	4	6	7	

a. 68 763 –29 552 =

b. 83 254 – 25 368

c. 426 371 – 231 528

d. 532 764 – 299 999

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Calculating whole numbers continued

3. Solve the sums. You can use the method of your own choice.

Example 1:

543 x 798

= (500 x 700) + (500 x 90) + (500 x 8) + (40 x 700) + (40 x 90) + (40 x 8) + (3 x 700) + (3 x 90) + (3 x 8)

= 350 000 + 45 000 + 4 000 + 28 000 + 3 600 + 320 + 2 100 + 270 + 24= 300 000 + 50 000 + 40 000 + 5 000 + 4 000 + 20 000 + 8 000 + 3 000 + 2 000 + 600 + 300 + 100 + 200 + 20 + 70 + 20 + 4

= 300 000 + 90 000 + 9 000 + 20 000 + 13 000 + 1 200 + 110 + 4

= 300 000 + 110 000 + 9 000 + 10 000 + 3 000 + 1 000 + 200 + 100 + 10 + 4

= 300 000 + 100 000 + 10 000 + 10 000 + 13 000 + 300 + 10 + 4

= 400 000 + 30 000 + 3 000 + 300 + 10 + 4

= 433 314

Example 2:

			5	4	3	
x			7	9	8	
			2	4		(3 x 8)
		2	7	0		(3 x 90)
	2	1	0	0		(3 x 700)
		3	2	0		(40 x 8)
		3	6	0	0	(40 x 90)
	2	8	0	0	0	(40 x 700)
		4	0	0	0	(500 x 8)
	4	5	0	0	0	(500 x 90)
3	5	0	0	0	0	(500 x 700)
4	3	3	3	1	4	

a. 243 x 89

b. 579 x 73

c. 241 x 137

d. 896 x 476

4. Solve the sums. You can use the method of your own choice.

Example 1:

$$\begin{array}{r} 26 \\ 25\overline{)650} \\ -\ 500 \\ \hline 150 \\ -\ 150 \\ \hline 0 \end{array} \qquad \begin{array}{l} \\ \\ 25 \times 20 \\ \\ 25 \times 6 \end{array}$$

$$\begin{array}{r} 26 \\ 25\overline{)654} \\ -\ 500 \\ \hline 154 \\ -\ 150 \\ \hline 4 \end{array} \qquad \begin{array}{l} \text{rem } 4 \\ \\ 25 \times 20 \\ \\ 25 \times 6 \end{array}$$

a. $2\overline{)2\,254}$

b. $12\overline{)1\,407}$

c. $25\overline{)2\,890}$

Problem solving

1. We cycled 2 455 m on the first day and 3 650 m on the second day. How many kilometres did we travel?
2. I jogged 1 550 m and my friend jogged 2 275 m. How much further did my friend jog than I did?
3. The bakery bakes 2 450 biscuits on one day. How many did they bake during March? Note that they only bake six days of the week.
4. My mother bought 3 850 m of string. She has to divide it into 25 pieces. How long is each piece?

6 Factors and multiples

Discuss this and give five more examples of each.



Multiple: A number that is the result of multiplying together two other numbers, e.g. 3 x 2 = 6. Six is a multiple of 2 and 3. Examples of multiples of six are 6, 12, 18, 24.

Prime numbers have only two different factors. The one factor is 1. The other factor is the prime number itself. 2 is a prime number, e.g. 1 x 13 = 13. There are only two factors: 1 and 13.

Factors: Factors are the numbers you multiply together to get another number, e.g. 3 and 4 are factors of 12, because 3 x 4 = 12.

Composite numbers have three or more different factors, e.g. 21 is composite.
1 x 21 = 21, 3 x 7 = 21.
So 21 has four factors: 1, 21, 3 and 7.

1. Write down the multiples of the following numbers, and circle the multiples shared by the two numbers.

a. 2 _____

6 _____

b. 3 _____

9 _____

c. 4 _____

7 _____

d. 5 _____

8 _____

e. 4 _____

5 _____

2. Look at the examples above. What is the lowest common multiple for each pair of numbers?

a. _____ b. _____ c. _____ d. _____ e. _____

We use the abbreviation LCM for the lowest common multiple.



3. Write down the factors for the following, and circle the common factors for each pair of numbers.

a. 12 _____

24 _____

b. 28 _____

21 _____

c. 15 _____

18 _____

d. 24 _____

60 _____

e. 18 _____

81 _____

4. Look at your answers above. What is the highest common factor for the each pair of numbers?

a. _____ **b.** _____ **c.** _____ **d.** _____ **e.** _____

5. Complete the following:

Number	Factors	How many factors?	Prime or composite
a. 12	1, 2, 3, 4, 6, 12	6	Composite
b. 41			
c. 63			
d. 77			
e. 33			
f. 121			

6. Express each of the following odd numbers as the sum of 3 prime numbers:

a. 29 3 + 7 + 19

b. 83 _____

c. 55 _____

d. 53 _____

e. 99 _____

Problem solving

Which number between 1 and 100 has the most factors?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

7 Fractions

Fractions are used every day by people who don't even realise that they are using fractions. Name ten examples.

Read the definitions and give five examples of each.



The **numerator** is the top number in a common fraction. It shows how many parts we have.

The **denominator** is the bottom number in a common fraction. It shows how many equal parts the item is divided into.

Equivalent fractions are fractions which have the same value, even though they may look different.



Why do we need to know what LCM is when we add fractions?

1. Complete the fractions to make them equal.

a. $\frac{2}{4} \overset{\times 2}{\underset{\times 2}{}} = \frac{4}{8}$

b. $\frac{3}{5} = \frac{\square}{10}$

c. $\frac{2}{6} = \frac{\square}{12}$

d. $\frac{6}{7} = \frac{\square}{21}$

e. $\frac{2}{4} = \frac{\square}{2}$

f. $\frac{9}{15} = \frac{\square}{5}$

g. $\frac{5}{6} = \frac{\square}{18}$

h. $\frac{7}{9} = \frac{\square}{18}$

i. $\frac{6}{22} = \frac{\square}{11}$

j. $\frac{20}{25} = \frac{\square}{100}$

You need to explain your answers to a brother, sister or friend. Use diagrams to explain the answers.



2. What happens to the numerator and denominator? Extend the pattern.

a. $\frac{1}{3} \overset{\times 2}{\underset{\times 2}{}} = \frac{2}{6} \overset{\times 2}{\underset{\times 2}{}} = \frac{4}{12} \overset{\times 2}{\underset{\times 2}{}} = \frac{8}{24} \overset{\times 2}{\underset{\times 2}{}}$ _____

b. $\frac{1}{5} = \frac{3}{15} = \frac{9}{45} = \frac{27}{135}$ _____

3. Complete the pattern.

a. $\frac{5}{6} \overset{\times 2}{\underset{\times 2}{}} = \frac{10}{12} \overset{\times 2}{\underset{\times 2}{}} = \frac{20}{24} \overset{\times 2}{\underset{\times 2}{}} = \frac{\quad}{\quad} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

b. $\frac{3}{4} = \frac{9}{12} = \frac{27}{36} = \frac{\quad}{\quad} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

c. $\frac{9}{11} = \frac{18}{22} = \frac{27}{33} = \frac{\quad}{\quad} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

d. $\frac{1}{7} = \frac{5}{14} = \frac{25}{28} = \frac{\quad}{\quad} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$





You can use a calculator.

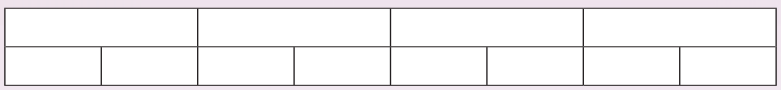
4. Fill in the empty boxes.

a. $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{\square}{4}$

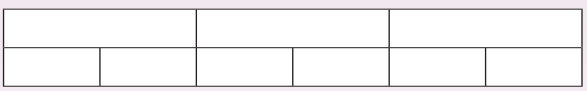
b. $\frac{2}{6} + \frac{1}{2} = \frac{\square}{12} + \frac{6}{12}$

5. Complete the fraction sums using the diagrams above and on the right.

a. $\frac{3}{4} = \frac{1}{8} + \frac{\quad}{\quad} =$



b. $\frac{3}{6} = \frac{1}{3} + \frac{\quad}{\quad} =$



6. Complete the sums.

a. $\frac{1}{2} = \frac{1}{8} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$

b. $\frac{1}{2} = \frac{1}{14} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$

7. Add and then subtract to test your answer.

a. $\frac{5}{7} \overset{\times 2}{\underset{\times 2}{}} + \frac{2}{14}$

$= \frac{\quad}{\quad}$

$= \frac{\quad}{\quad}$

Test:

b. $\frac{7}{9} + \frac{1}{27}$

$= \frac{\quad}{\quad}$

$= \frac{\quad}{\quad}$

Test:

continued

7b Fractions continued

8. Calculate the following:

a. $\frac{1}{3} + \frac{3}{4}$

Multiples of 3:

_____

Multiples of 4:

_____

LCM: _____

_____

_____

b. $\frac{4}{5} + \frac{1}{6}$

Multiples of 5:

_____

Multiples of 6:

_____

LCM: _____

_____

_____

9. Add or subtract the following mixed numbers with the same denominators:

a. $2\frac{1}{3} + 5\frac{2}{4}$

b. $7\frac{1}{8} - 3$

10. Add or subtract the following fractions with different denominators.

a. $5\frac{1}{3} + 1\frac{2}{4}$

b. $4\frac{1}{8} - 3\frac{4}{6}$



11. 1,2 million goods are sold *per annum* (each year).

a. What is the total amount of goods sold per year?

b. What is $\frac{2}{12}$ of the total amount?

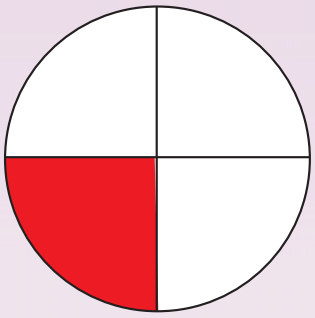
c. What is $\frac{6}{12}$ of the total amount?

d. What is $\frac{9}{12}$ of the total amount?

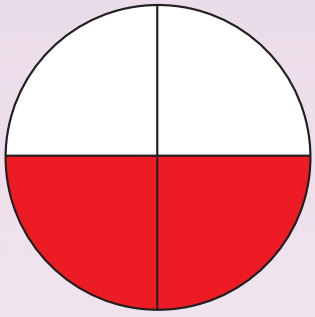
e. What is $\frac{11}{12}$ of the total amount?

12. What percentage of the circle is red?

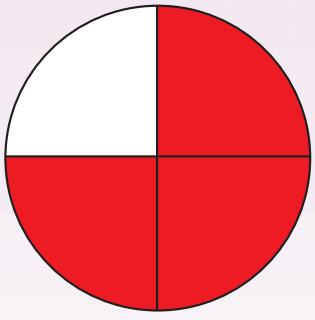
a. _____



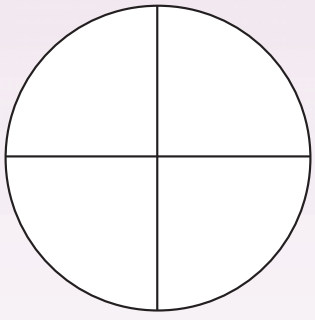
b. _____



c. _____



d. _____



Problem solving

I had $\frac{1}{12}$ of the cake.

My friend had $\frac{1}{4}$ of the cake.

How much cake did we have altogether?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

8 Decimals

How are the following linked? Give an example.

Common fractions

Decimal fractions

Percentages

When in ordinary life do we use:

- Common fractions?
- Decimal fractions?
- Percentages?



1. Complete the number lines below, using decimal fractions.

a.



i. What comes after 0 on the number line? _____

ii. What comes before 1 on the number line? _____

iii. What is half of the number line? _____

b.



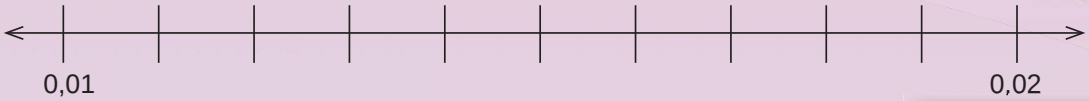
i. What comes after 0,2 on the number line? _____

ii. What comes before 0,1 on the number line? _____

iii. What is half of the number line? _____



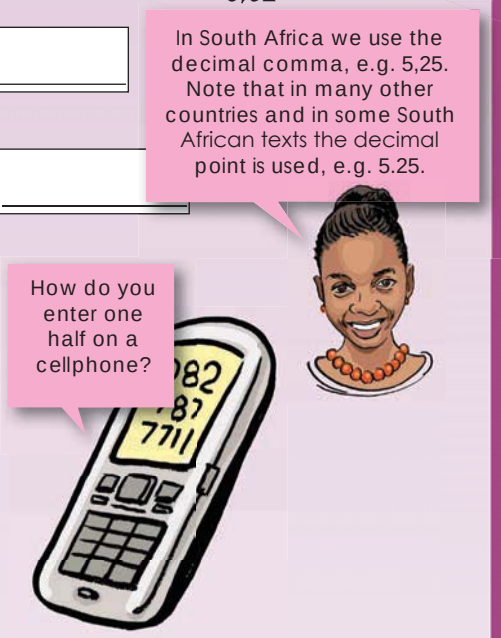
c.



i. What comes after 0,02 on the number line? _____

ii. What comes before 0,01 on the number line? _____

iii. What is half of the number line? _____



2. Complete the table below.

Number	Add 0,1	Add 0,01	Add 0,001	Subtract 0,1	Subtract 0,01	Subtract 0,001
a. 0,657	0,757					
b. 232,232						

3. Fill in the missing number:

a. 32,4 + _____ = 32,9

b. 8,452 + _____ = 8,492

4. Write the following in expanded notation:

a. 15,342 = 10 + 5 + 0,3 + _____

b. 456, 321 = _____

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

5. Calculate the following using any method.

a. 5,326 + 4,542 =

b. 4,349 + 1,874 =

c. 32,24 + 19,387 =

d. 7,63 – 4,476 =

6. Complete the table:

Decimal fraction	Common fraction
a. 5,879	
b. 18,005	

7. Answer the following:

a. What is 50% of R1,00?

b. What is 0,5 of R1,00?

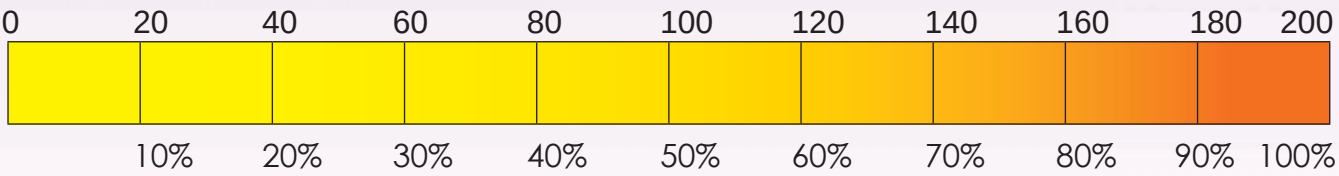
c. What is $\frac{1}{2}$ of R1,00?

d. What is 25% of R1,00?

e. What is 0,25 of R1,00?

f. What is $\frac{1}{4}$ of R1,00?

8. Look at the diagram and answer the following:



What is 40% of 200?

Problem solving

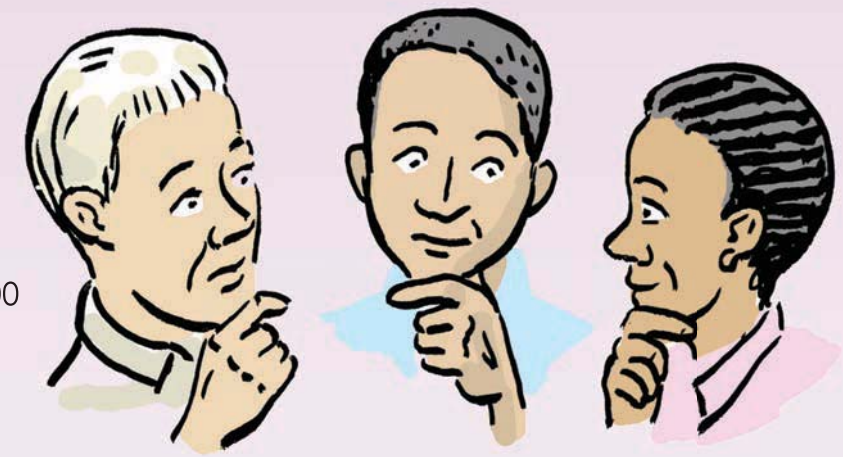
I bought trousers for R150 and then got 25% discount. What did I pay for my trousers?

9 Patterns

What will happen if I do these things? Give five examples of each.

- If I subtract the same number from a number.
- If I add two even numbers.
- If I multiply a number by 1.
- If I add five to a number.
- If I divide an even number by an odd number.
- If I add or subtract 0 from a number.
- If I add two prime numbers.
- If I subtract an odd number from an even number.
- If I multiply a number by 4 and divide it by 2.

1. Complete the following:



a. $4 - \square = 0$

b. $\square + 15 = 15$

c. $100\,000 \times \square = 100\,000$

d. $\square - 299\,999 = 0$

e. $\square \times 1 = 84\,934$

2. Replace each shape with a number.

a. ⬢ – ⬢ = 0

b. ■ x 1 = ■

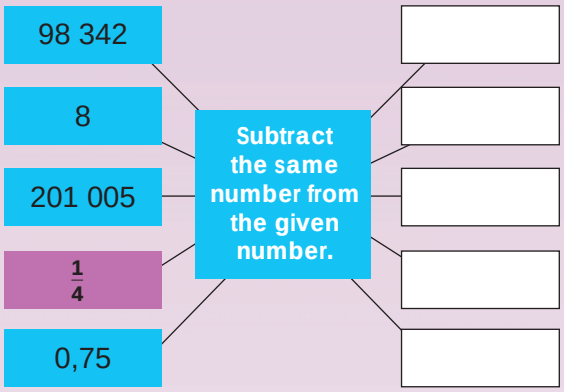
c. ⬢ + 0 = ⬢

d. ⬟ – ⬟ = 0

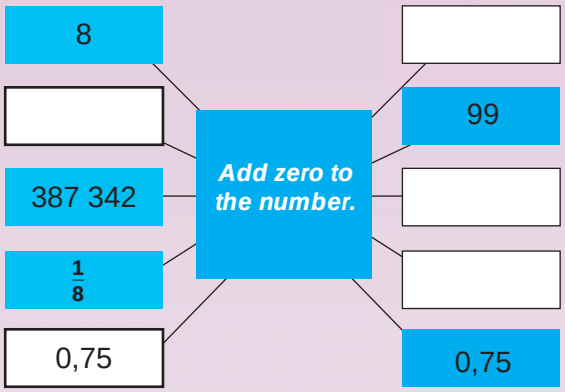
e. ▬ x 1 = ▬

3. Complete the spider diagram.

a.



b.



4. Create your own spider diagrams using these rules:

a. Add nine and multiply by two.

b. Divide by three and subtract one.

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

5. What is the value of ✗?

a. ✗ + 23 = 23 + 5 ✗ = _____

8 × 2,5 = ✗ × 8 ✗ = _____

c. (90 + 10) × 0,2 = 90 × ✗ + 10 × ✗ ✗ = _____

d. 999 999 + 0 = ✗ + 999 999 ✗ = _____

e. 2,5 + ✗ = 4,5 + 2,5 ✗ = _____

6. If a = 2, b = 3, and c = 10, complete and calculate the sums.

a. a + b = _____, b + a = _____

Is a + b = b + a? Yes/No _____

b. a x b = _____, b x a = _____

Is a x b = b x a? Yes/No _____

c. a x b x c = _____, c x b x a = _____

Is a x b x c = c x b x a? Yes/No _____

d. a + b x c = _____, c x b + a = _____

Is a + b x c = c x b + a? Yes/No _____

e. c x 1 = _____, 1 x c = _____

Is c x 1 = 1 x c? Yes/No _____

7. Follow the order of operation to calculate each of the following:

BODMAS stands for:

B brackets
O other (power and square roots)
D division and
M multiplication } (left–to–right)
A addition and
S subtraction (left–to–right)

The order in which we carry out a calculation is important.

a. $7 - 3 + 6 =$ ____

b. $87 + 29 - 16 =$ ____

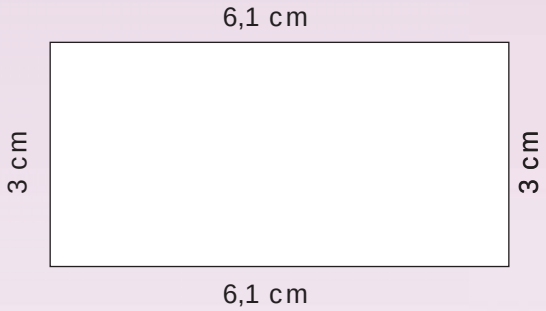
c. $(96 \div 16) \times 2 =$ ____

d. $35 \div 5 + (18 - 16) =$ ____

e. $14 \div (36 - 29) + 11 =$ ____

8. Use the properties of number to find the perimeter of each rectangle.





Problem solving

3	9				2			6
	5			8	6			
2								3
	3		7					
		1		6		8		
					1		9	
4								7
			4	3				
8			6				3	2

Sudoku fun

There are 9 rows and 9 columns in a Sudoku puzzle. Every row and column must contain the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9. There may not be any duplicate numbers in any row or column.

A region is a 3x3 box like the green one shown to the left. There are 9 regions in a traditional puzzle. Like the Sudoku rules for rows and columns, every region must also contain the numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9. Duplicate numbers are not allowed in any region.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

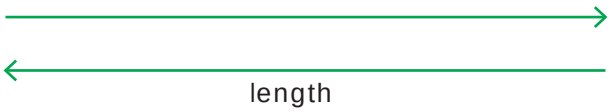
10 2–D shapes and 3–D objects

What is a 2–D shape?
What is a 3–D object?
Use the words below to guide you.

length volume area height width

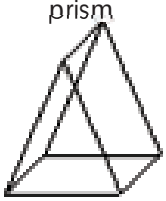
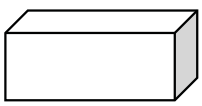
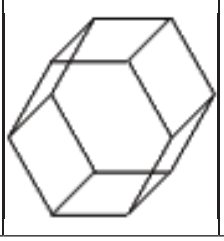


What is a 1–D shape?

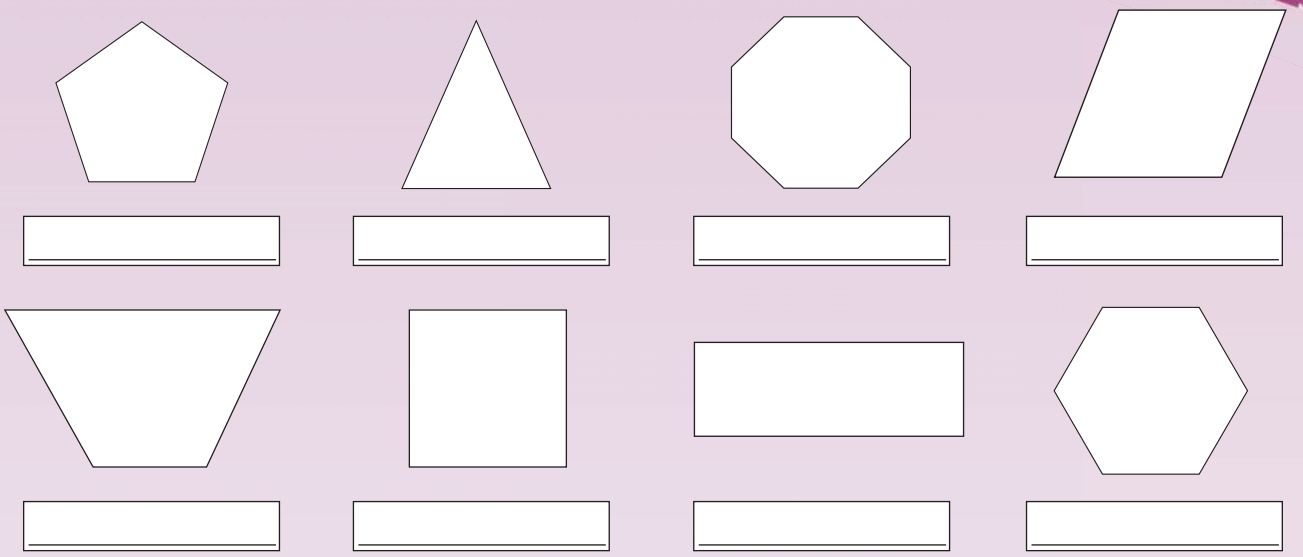


All 1–D shapes have only length. The only 1–D shape is a line, even a wavy one.

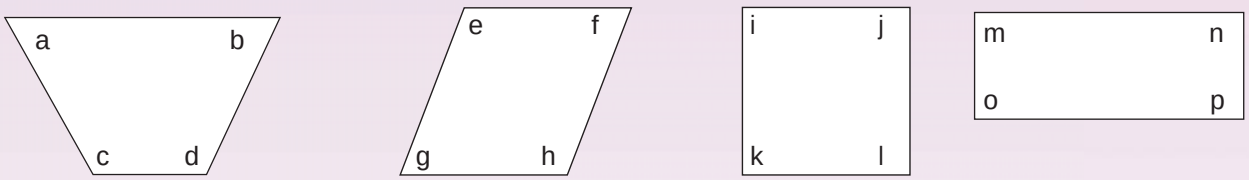
1. Complete the following table:

2–D shape within the 3–D object	Name the 3–D object	Draw the net	Number of faces	Number of vertices	Number of edges
2 triangles	Triangular prism 				
					
					
					

2. Name the polygons below. Tick all the quadrilaterals.



3. Name the quadrilateral and say whether the size of the angles equal 90º, is less than 90º or more than 90º.



a. _____ b. _____ c. _____

d. _____ e. _____ f. _____

g. _____ h. _____ i. _____

j. _____ k. _____ l. _____

m. _____ n. _____ o. _____

p. _____

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

4. Make a tick in the correct answer column.

This shape can have:	1 right angle	2 right angles	3 or more right angles	No right angles
Square				
Rhombus				
Triangle				
Hexagon				
Trapezium				
Quadrilateral				
Rectangle				
Octagon				

5. Answer the following questions:

You know the lengths of 3 sides of a parallelogram: 12,5 cm, 7,5 cm and 7,5 cm. Is that enough information to work out the length of the 4th side? If so, what is it? Make a drawing to support your answer.

6. You know the lengths of 4 sides of a pentagon: 2,5 cm, 4,2 cm, 3,5 cm and 6 cm. What will the 5th side be. Make a drawing to support your answer.

7. Draw the following:

a. A rectangle with sides of 5,5 cm and 145 mm.	b. A square with sides of 6,1 cm.
c. An irregular pentagon with one side that is equal to15 mm.	d. An irregular hexagon with all sides of different length.

Problem solving

Magazine or newspaper search

Find the following shapes in a magazine: quadrilateral, triangle and hexagon. Paste them here and describe their angles and sides.





11 Transformations

What does it mean when something transforms?

If a reflection is a transformation which has the same effect as a mirror, what effect will the following have?

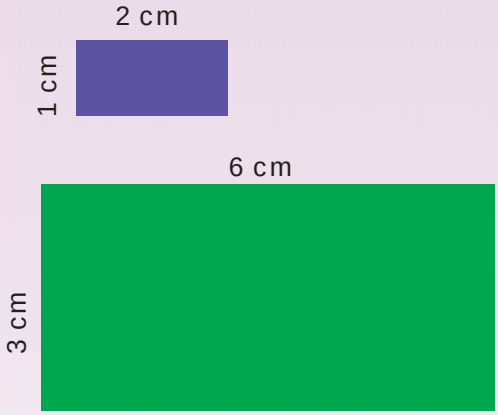
- rotation
- translation
- enlargement



A transformation is a change in form or shape according to certain rules. Common kinds of geometric transformations are reflections, rotations, translations and enlargements.



1. Answer the following questions:



Purple rectangle:

a. The length = _____

b. The width = _____

Green rectangle:

c. The length = _____

d. The width = _____

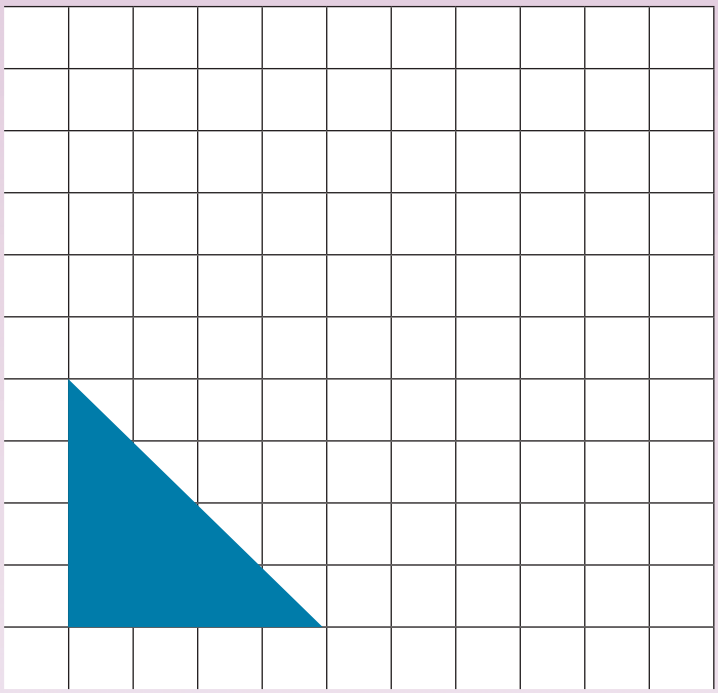
e. The green rectangle is enlarged _____ times.

2. Complete the table. Make drawings if needed.

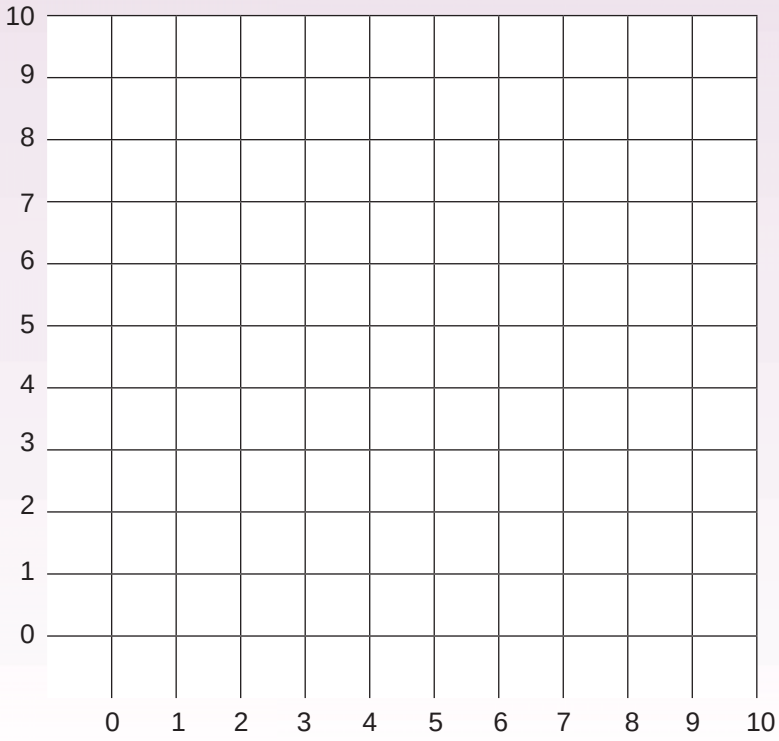
Rectangle	Perimeter	Area	Enlarge by:	Perimeter	Area
a. Length: 4 cm Width: 2 cm			2 times Length: Width:		
b. Length: 3 cm Width: 2 cm			3 times Length: Width:		
c. Length: 5 cm Width: 4 cm			4 times Length: Width:		
d. Length: 6 cm Width: 3 cm			2 times Length: Width:		
e. Length: 7 cm Width: 6 cm			3 times Length: Width:		



3. Slide the figure 4 right, 4 up



4. Plot the given points, then connect the points in order. Draw each slide, then give the coordinates of the slide image (9,9); (6,8); (6,5); (9,5). Slide 3 down and 2 left.



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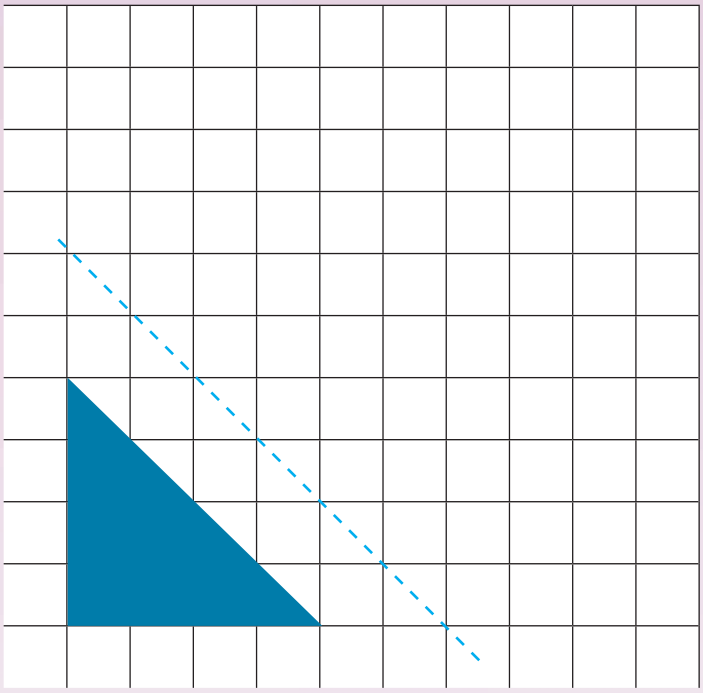
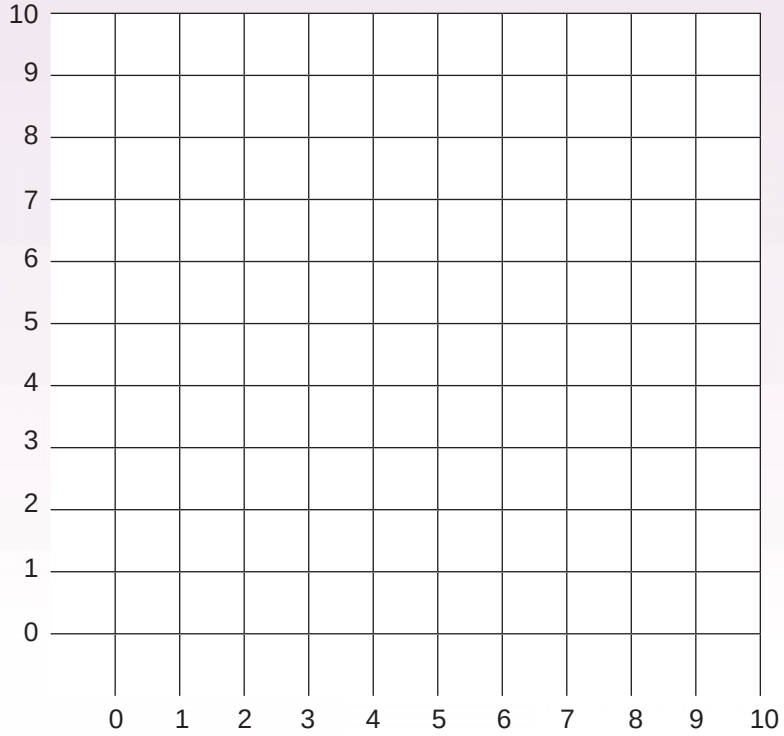
Transformations continued

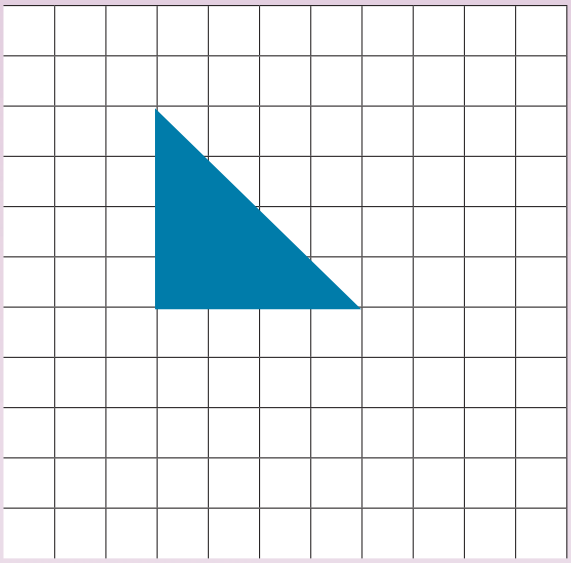
5. Reflect the figure.



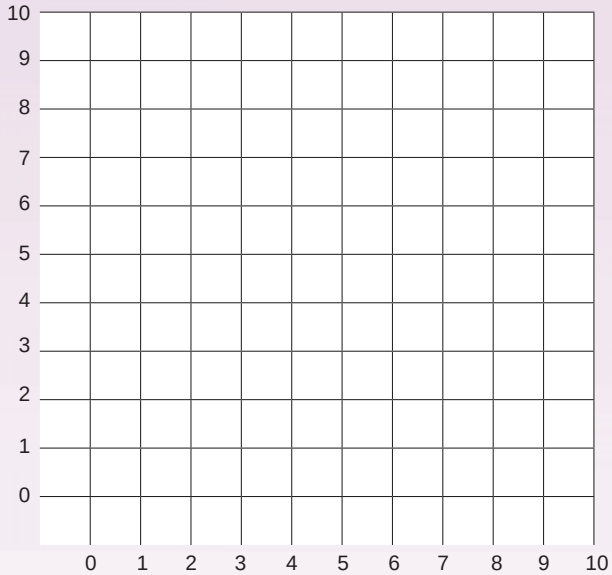
6. Draw the reflection of each figure, then write the coordinate of each new figure.
Draw a triangle with coordinates: (4,8); (1,5); (4,2). Then draw its reflections above a horizontal line? Write the coordinates of the new triangle.



7. Rotate the figure by a quarter of a revolution.



8. Draw a turn image of the figure: Triangle: (2,6); (2,1); (7,1). Write down the new coordinates.



9. When we reflect, rotate or translate a shape, does the size of the shape change?

_____

What about enlargement and reduction?

_____

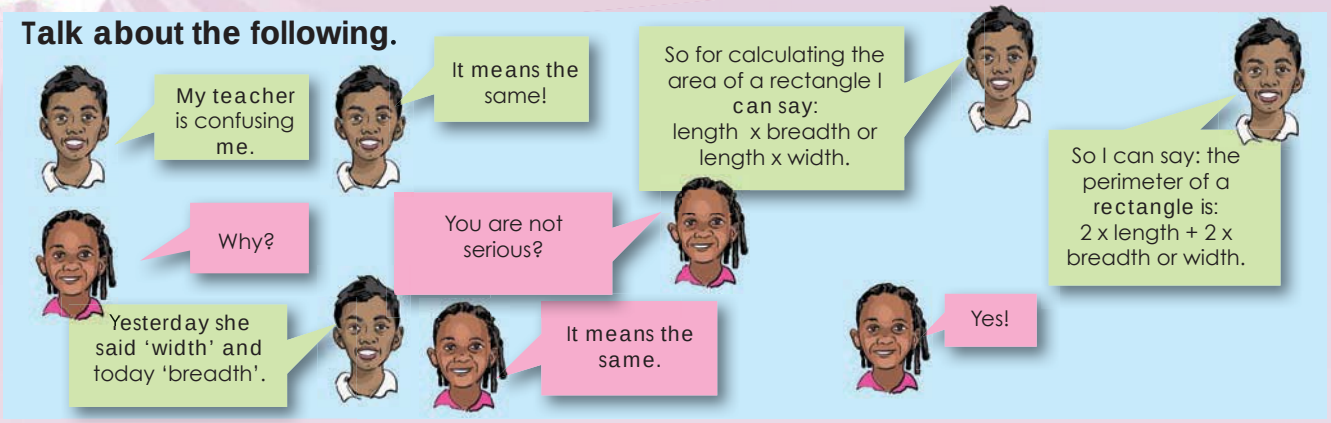
Problem solving

Draw a translation using reflection, rotation and translation on one graph showing the movement from one figure to the next.

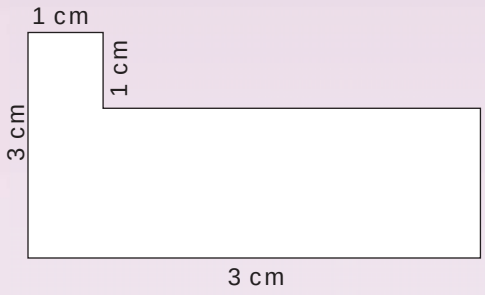
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

12 Area, perimeter and volume

Talk about the following.



1. Calculate the perimeter and area of the following polygons.



What will you do with the figure before you calculate the perimeter and area?

_____

_____

_____

_____

_____

Perimeter	Area
_____	_____
_____	_____
_____	_____
_____	_____

2. Calculate the perimeter and area of the following rectangles.

a. Length: 10 cm; Width: 8 cm

Perimeter	Area
_____	_____
_____	_____
_____	_____
_____	_____

b. Length: 10 cm; Width: 7,5 cm

Perimeter	Area
_____	_____
_____	_____
_____	_____
_____	_____



3. **If you have a rectangle with the following area, what could its length and breadth be. What is the perimeter.**

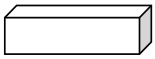
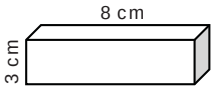
Area = 210 m^2

Perimeter	Area
_____	_____
_____	_____
_____	_____
_____	_____

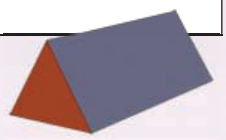
4. **Sipho and his father are building a deck because the old one is too small. The old deck was 2,5 m x 3 m. They are going to double the dimensions of the deck. They'll need to know how much railing and paint to buy. What will be the perimeter and area of the new deck? Show the calculations on a separate piece of paper.**
5. **If a rectangular prism has 36 cubic units, what might be the:**

a. Height? _____ b. Width? _____ c. Length? _____

6. **Complete the following table.**

	Length	Width	Height	Short way to calculate	Volume
				Length x width x height 2 cm x 6 cm x 3 cm	___ cm^2
					

7. **If you have a triangular prism with the following volume, what could the length, breadth and height be. Volume = 2 100 m^3.**



Length	Breadth	Height
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Problem solving

Investigate:

How many different ways can you draw a square and rectangles covering 64 square units? Show them.

- Do all of the above shapes have the same area?
- Do they all have the same perimeter?

Now try a similar activity with an object of 64 cubic units.

13 Time

Very important to remember this! Talk about it.

0,5 hours = 30 minutes,
not 50 minutes.



Decimals show fractions of tenths, hundredths, thousandths and so on. But minutes are measured in sixtieths of an hour. So a $\frac{1}{4}$ of an hour is 15 minutes and $\frac{1}{10}$ hour is 6 minutes.



1. This is how long I took to complete my maths homework this week. Help me to complete this table.

Maths homework	Hours	Minutes	Seconds	hh:mm:ss	I started my homework at:	I finished it at:
Monday	1	30	1	01:30:01	15:00	
Tuesday				01:15:25	15:30	
Wednesday	1	27	17		16:30	
Thursday	0	55	45		17:45	
Friday				01:15:09	14:50	

2. I visited my grandmother over the weekend. On Saturday, I arrived at her house at 10:57:02. I left on Sunday at 13:45:05. How long was my visit to my grandmother?

3. Complete the table.

Weeks	1	1,5	2	2,5	3	3,5	4	4,5	5	6,5	7
Days	7										
Hours	168										
Minutes											

4. Convert years to weeks and days.

a. 5 years = to weeks _____ and days _____

b. $25\frac{1}{2}$ years = to weeks _____ and days _____

5. Convert centuries to years.

a. 10 centuries

b. $5\frac{1}{4}$ centuries

6. Time zones:

a. How many time zones are there in the world? _____

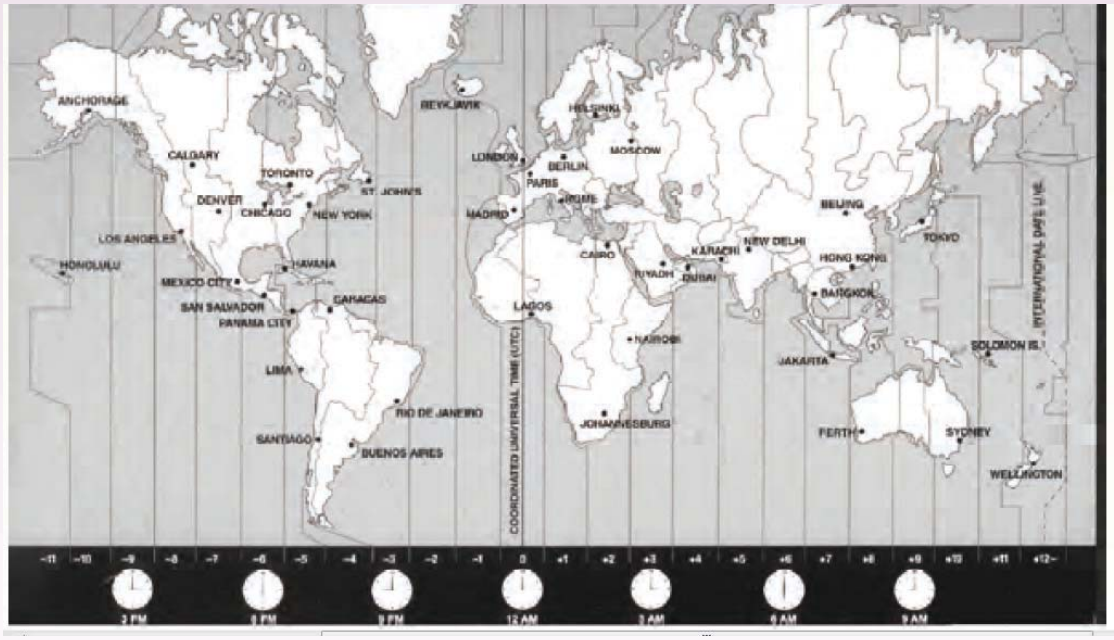
How do you know? _____

b. Name two other countries in the same time zone as South Africa.

_____

c. Name two other countries in a different time zone to South Africa.

_____



Problem solving

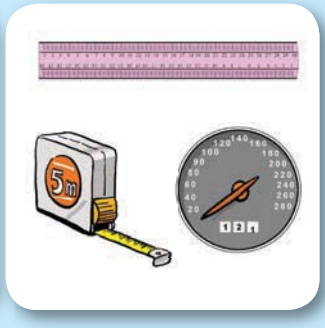
It took Sam 3 hours to travel 100 km. How many kilometres per hour did he travel? How long will it take him to travel 120 km? Give your answer in hours and minutes. What do you think he was travelling on at this speed?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

14 Temperature, length, mass and capacity

Give five real-life examples of why and where we use the following:



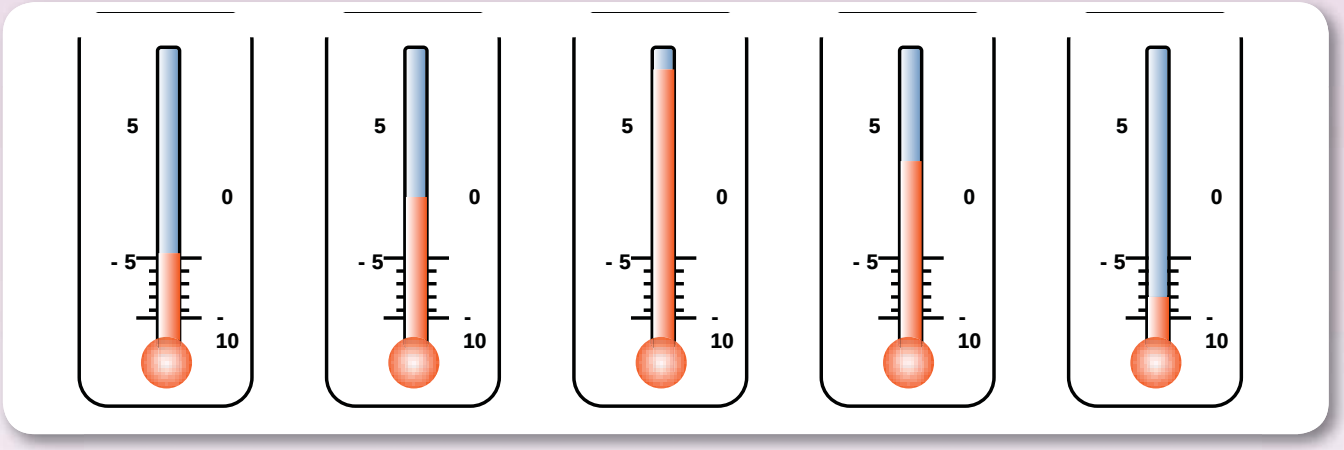






1. Write down each temperature.

a. _____ b. _____ c. _____ d. _____ e. _____



f. Which temperature is the coldest? _____

g. Which temperature is the warmest? _____

h. A temperature of –5° C is colder than –3° C as it is 2° C less than _____.

i. A temperature of –9° C is colder than –8° C as it is _____ less than _____.

2. What is the difference in temperature between:

a. **a** and **b** _____

b. **b** and **c** _____

c. **d** and **b** _____

d. **e** and **d** _____

e. **e** and **a** _____



3. Answer the following questions about length.

a. How many mm are there in a m? _____

b. How many cm are there in a m? _____

c. How many mm are there in a mm? _____

d. How many m are there in a km? _____

e. Convert the following in this table:

		mm	cm	m	km
i.	**9 cm**				
ii.	**3 m**				
iii.	**2 km**				
iv.	**10,5 m**				
v.	**3 600 mm**				

f. A man travelled 450 km on the first day and 565 000 m on the second day. The third day he travelled double the distance he travelled on the first day. On the fourth day he reached his destination, which was 2 500 km from his starting point.

How far did he travel on the fourth day?

14b Temperature, length, mass and capacity continued

4. Answer the following questions about mass.

a. How many g are there in a kilogram? _____

b. How many g are there in a tonne? _____

A tonne is equal to 1 000 kg.

c. How many mg are there in a gram? _____

d. How many mg are there in a kilogram? _____

e. Convert the following :

		mg	g	kg	t
i.	**3 500 g**				
ii.	**2 kg**				
iii.	**2,5 kg**				
iv.	**1 t**				
v.	**5 000 000 mg**				

f. An object weighs a quarter of a kilogram. I add one half of a kilogram to the object. I take 200 g off. I double the mass of the object. I add one tonne to the object and then half it. What is the mass of the object?

_____



5. Answer the following questions on capacity.

a. How many ml is in a litre? _____

b. How many l is in a kl? _____

c. How many ml is in a kl? _____

d. Convert the following:

		ml	l	kl	t
i.	**5 250 ml**				
ii.	**4,5 l**				
iii.	**3 kl**				
iv.	**9 999 ml**				
v.	**1,75 l**				

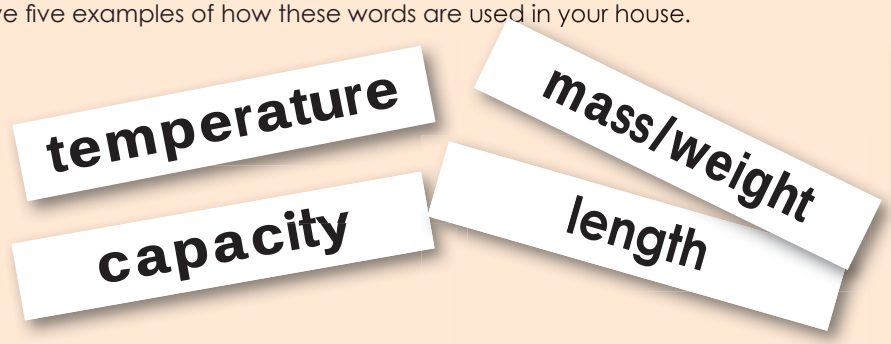
e. A swimming pool has the following dimensions: length 25 metres, width 10 metres and depth 1,5 metres. The volume is 25 m X 10 m X 1,5 m = 375 cubic metres. One cubic metre is equal to 1 000 litres.

Therefore the volume of the swimming pool is _____.

How many kilolitres is this? _____

Problem solving

Give five examples of how these words are used in your house.



What is the difference between capacity and volume?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

15 Probability

Look at the following pictures and ask yourself, "What is the probability that this will happen today?"

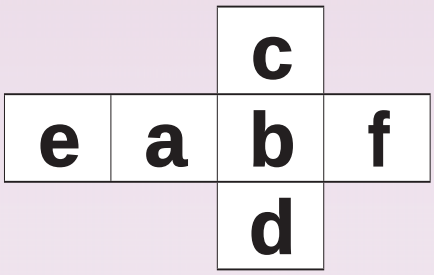


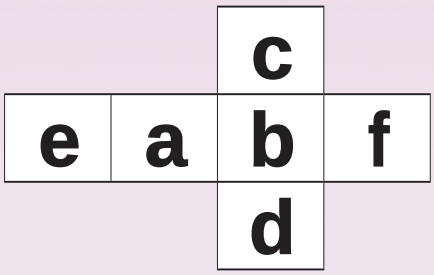




1. Draw and make.

a. Draw these two nets on card board, cut, fold and stick them to make two dice.





2. Write down all the combinations for these two dice in the table below. Roll the two dice 100 times. Use tallies to record your answers.

Letters on the dice	Times landed on the combination
aa	

3. Compare your answers with those of a friend. Are they the same? Why?

4. You need to prepare.



a. You need an empty bag.

You need to make a set of 10 cards using cardboard or paper. Each card should be a square 4 cm by 4 cm. Cut the ten cards and place them in the bag.

x	y	z	m	m
a	a	a	b	k

5. Draw a card from the bag and record it below. Place the card back into the bag. Do this 100 times.

Letter on the card	Times landed on the letter
x	
y	
z	
m	
a	
b	
k	

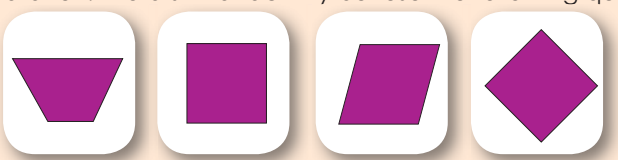
6. Compare your answers with those of your friend. Are they the same? Why?

7. Drawing a number X card from the bag has a probability of 1 out of 10. We can write it as $\frac{1}{10}$.

What is the probability of drawing card y? ____, card z? ____, card m? ____, card a? ____, card b? ____, and card k? ____

Problem solving

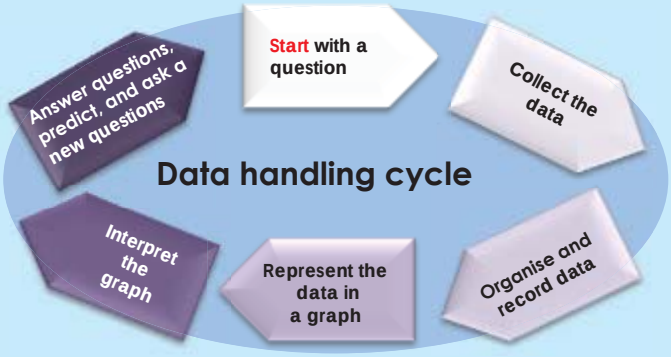
Card fun: Do a similar activity but use the following quadrilateral cards.



15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

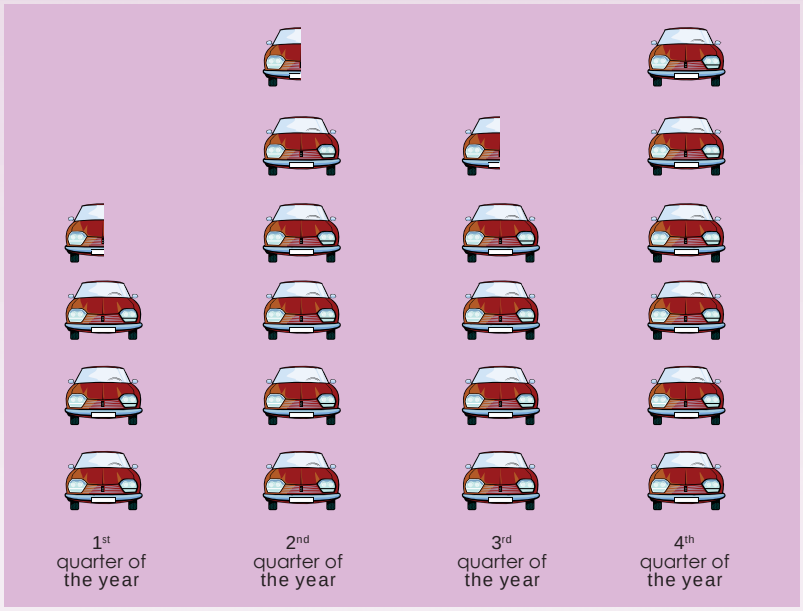
16 Data

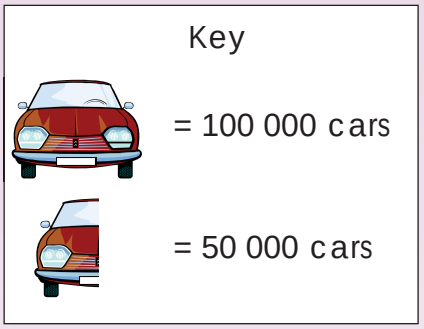
Look at this data-handling cycle and describe it.



1. Answer the question about the pictograph.

a. Cars sold in 2011





a. Complete the table. How many cars were sold in each quarter?

1st quarter Jan – March	2nd quarter April – June	3rd quarter July – September	4th quarter October – December
x			

b. Why do you think more cars were sold during the 4th quarter?

_____

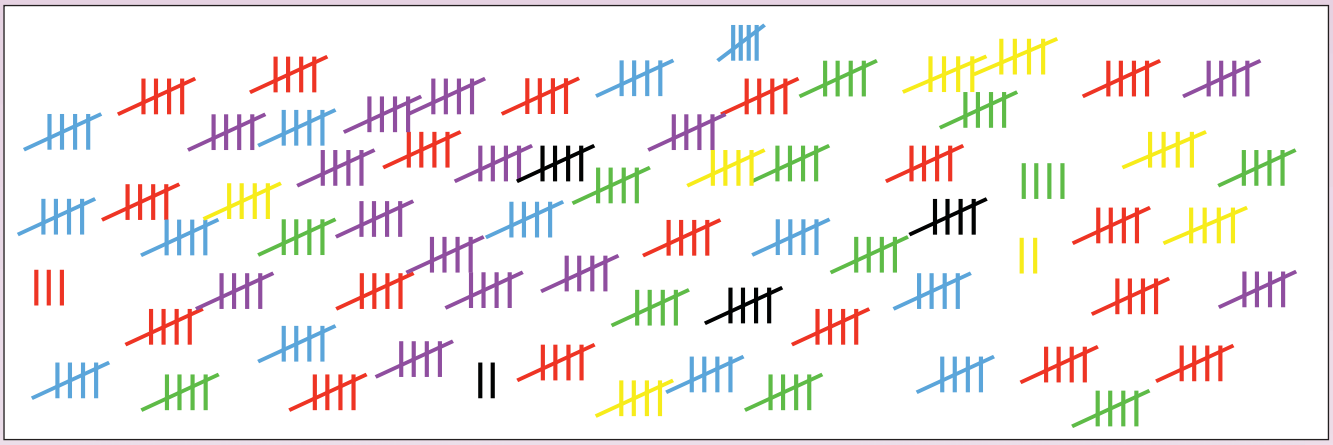
c. Look at the data-handling cycle. What happened before this pictograph? What will happen after the pictograph?

_____

2. Sort the data using the frequency table below.



I collected data from children about their favourite colour. I recorded their answers, using them I made tally marks on a piece of paper.

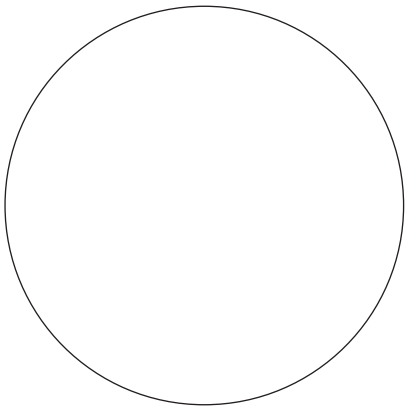


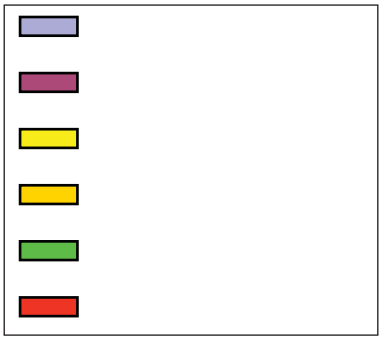
3. Complete this frequency table below using the data above.

Colour	Tally	Frequency
Red	𝍸 III	93

4. Use the information from the frequency table to draw and label this pie chart.

Title: _____





Problem solving

Collect data about cell phones usage in your class and draw a bar chart of your results. Explain what you need to do.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

17 Commutative property of addition and multiplication

Commutative property of addition and multiplication

Are the following true or false?
3 + 4 = 4 + 3
3 x 4 = 4 x 3
20 + 5 = 5 + 20
20 x 5 = 5 x 20
What do you notice?



The **commutative property of addition and multiplication** says that you can swap numbers around and still get the same answer when you add or multiply. The order in which you combine the numbers does not matter.

An **equation** says that two things are the same using an equal sign (=), e.g. 7 + 4 = 12 – 1

1. Use the commutative property of addition or multiplication to make the equations true.

Example: 5 + 1 = 1 + 5 (addition) and 5 x 1 = 1 x 5 (multiplication)

a. 13 + 2 =

13 + 2 = 2 + 13

b. 62 + 31 =

c. 4 x 5 =

d. 7 x 9 =

e. = 8 x 9

f. = 15 x 12

g. Make your own equations using the commutative property of addition and multiplication.

2. Use the commutative property of addition to make the equations true.

Example: f + e = e + f (addition) and f x e = e x f (multiplication)

a. a + b =

b. c x d =

c. . m x n =

d. = g + h

e. = p x 1

f. s x t =

g. Make your own equations using the commutative property of addition and multiplication.

3. Solve, if a = 2, b = 5 and c = 3, show that the questions are equal.

Example:

$a + b = b + a$ (addition)
$a + b = 2 + 5$ and $b + a = 5 + 2$
$= 7$ $= 7$
$\therefore a + b = b + a$

$a \times b = b \times a$ (addition)
$a \times b = 2 \times 5$ and $b \times a = 5 \times 2$
$= 10$ $= 10$
$\therefore a \times b = b \times a$

a. $c + a = c + a$

b. $c \times a = c \times a$

c. $b \times a = a \times b$

d. $b + a = a + b$

e. $b \times c = c \times b$

f. $b + c = c + b$

4. How do these diagrams illustrate the commutative property of multiplication?

a.



b.



c.



d.



Problem solving

If a = 25 and b = 30, show that the **commutative properties of addition and multiplication** apply and calculate the answers.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

18 Associative property of addition and multiplication

Are the following true or false?

5 + (3 + 2) = (5 + 3) + 2

9 x (2 x 3) = (2 x 3) x 9

(12 + 14) + 13 = 12 + (14 + 13)

(11 x 2) x 4 = 11 x (2 x 4)

What do you notice?



The **associative property of addition and multiplication** says that it doesn't matter how you group numbers when you add or multiply.

1. Use the associative property of addition or multiplication to make the statements true.

Example: (5 + 1) + 3 = 5 + (1 + 3) (addition)

(5 x 1) x 3 = 5 x (1 x 3) (multiplication)

a. (6 + 2) + 4 = (6 + 2) + 4 = 6 + (2 + 4)

Solve it: = 6 + 6 = 12

b. (7 + 3) + 1 =

c. 8 x (10 x 4) =

d. 4 x (5 x 2) =

e. (11 x 3) x 2 =

f. (12 x 2) x 4 =

2. Use the commutative property of addition to make the statements true.

Example: f + (g + h) = (f + g) + h (addition)

f x (g x h) = (f x g) x h (multiplication)

a. (a + b) + c = a + (b + c)

b. (m + n) + c =

c. (g x h) x i =

d. (c x d) x f =

e. (k x z) x d =

f. (a + d) + v =

g. (a x c) x d =

h. (k x l) x m =

i. (v + c) + r =

3. Solve if a = 2, b = 4 and c = 3, show that the associative properties hold and calculate the answers.

Example:

$a + (b + c) = (a + b) + c$	$a \times (b \times c) = (a \times b) \times c$
$a + (b + c)$ and $(a + b) + c$	$a \times (b \times c) = (a \times b) \times c$
$2 + (4 + 3) = (2 + 4) + 3$	$2 \times (4 \times 3) = (2 \times 4) \times 3$
$2 + 7 = 6 + 3$	$2 \times 12 = 8 \times 3$
$9 = 9$	$24 = 24$
$\therefore a + (b + c) = (a + b) + c$	$\therefore a \times (b \times c) = (a \times b) \times c$

a. $(c + a) + b = c + (a + b)$

b. $(b \times a) \times c = a \times (b \times c)$

c. $b \times (c \times a) = c \times (b \times a)$

d. $b + (c + a) = (b + c) + a$

4. If m = 1, n = 7 and q = 2, show that the equations are equal.

a. $(q + m) + n = q + (m + n)$

b. $(n \times m) \times q = m \times (n \times q)$

c. $n \times (q \times m) = q \times (n \times m)$

d. $n + (q + m) = (n + q) + m$

Problem solving

If a = 25, b = 30 and c = 10, write an **associative property of addition and multiplication** statement and solve it.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

19 Distributive property of multiplication over addition

2(3)	3(9)	4(100)
4(6)	7(8)	

What do the brackets mean?
Look at this statement:
2(3 + 2).
How do you think I will calculate this?





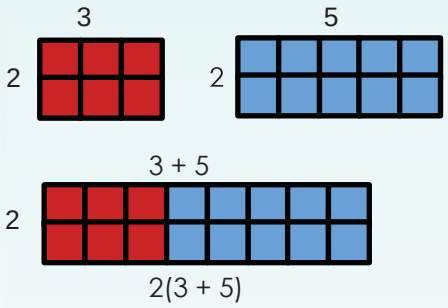
The distributive property lets you multiply a single number and two or more numbers between brackets.

2(3+2) = 2 x (3 + 2) = (2 x 3) + (2 x 2) = 6 + 4 = 10

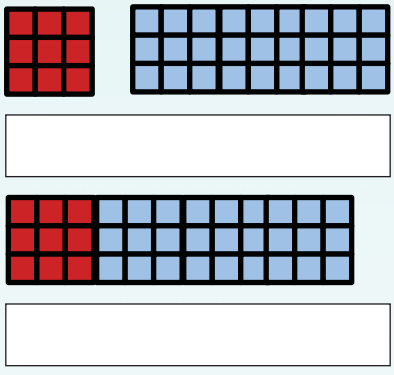
Usually we follow the rule that anything in brackets must be done first. In this example it would have been very easy to do this, 2(3+2) = 2(5) = 10. But the distributive property becomes very useful when what is inside the brackets is more complicated.

1. Write a sum and/or drawing for each diagram.

Example:



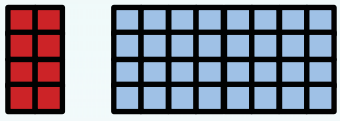
a.



b.



c.



d. Draw a diagram for:

i. 5(2 + 3)

ii. 6(1 + 4)

2. Use the distributive property of multiplication to make these statements true.

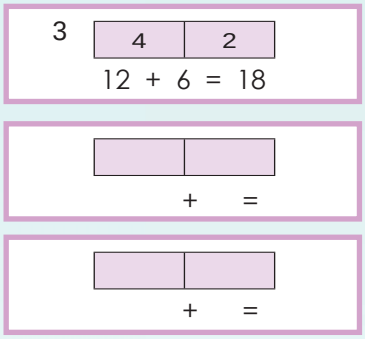
Example: 4(5 + 9) = 4 x 5 + 4 x 9 (4 x 5) + (4 x 9)

a. 3(4 + 2) = ☐

b. 10(2 + 3) = ☐

c. 5(3 + 1) = ☐

Calculate it:



3. Use the distributive property of multiplication to make these statements true.

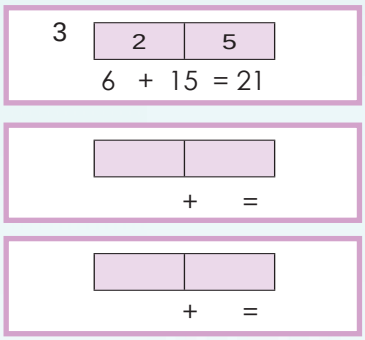
Example: 4 x 5 + 4 x 3 = (4 x 5) + (4 x 3) = 4(5 + 3)

a. 3 x 2 + 3 x 5 = ☐

b. 6 x 1 + 6 x 4 = ☐

c. 3 x 2 – 3 x 1= ☐

Calculate it:



4. If a = 3, b = 2 and c = 4, calculate the following:

Example: a(b + c) = a x b + a x c
3(2 + 4) = 3 x 2 + 3 x 4
3(6) = 6 + 12
18 = 18

a. b(a + c) ☐

b. c(b + a) ☐

c. a(c + b) ☐

Problem solving

If a = 5, b = 9 and c = 11, write a distributive property statement and calculate the answer.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

20 Zero as the identity of addition, one as the identity of multiplication, and other properties of numbers

What do you notice?

3 + 0 =	5 + 0 =	100 + 0 =
0 + 16 =	0 + 250 =	72 + 0 =

3 + 0 =	5 + 0 =	100 + 0 =
0 + 16 =	0 + 250 =	72 + 0 =



Zero as the identify of addition:
The sum of zero and any number is the number itself. The answer will always be the number that **zero** is **added** to.



One as the identify of multiplication:
The product of 1 and any number is always the number itself. The answer will always be the number that **one** is multiplied **by**.

1. Use zero as the identity of addition, or one as the identity of multiplication to write a sum for the following:

		Zero as the identity of addition	One as the identity of multiplication
a.	5	5 + 0 = 5	5 x 1 = 5
b.	7		
c.	9		
d.	100		
e.	34		
f.	2,5		

2. Use zero as the identity of addition, or one as the identity of multiplication to solve the following:

a. b x 0 = ☐
b + 1 = ☐

b. d x ☐ = d
d + ☐ = d

c. e x 1 = ☐
e + 0 = ☐

3. Choose the correct property of number, and complete the equation.

a. 4 + 5 =
4 + 5 = 5 + 4

b. 2(3 + 9) =

c. 3 + (4 + 8) =

d. 5(9 – 8) =

e. 9 + 12 =

f. (2 x 5) x 11 =



4. Say whether the following are true or false. If it is false, explain why it is false.

a. $9 + 2 = 2 + 9$

b. $5 - 4 = 4 - 5$

c. $4(2 + 1) = 4 \times 2 + 4 \times 1$

d. $3 + 0 = 3$

e. $8 - (3 - 2) = (8 - 3) - 2$

f. $2(5 - 4) = 2 \times 5 - 2 \times 4$

5. If a = 2, b = 5, c = 8, solve the following:

Example: $b + a = a + b$
$5 + 2 = 2 + 5$
$7 = 7$

a. $a + c = c + a$

b. $b + (c + a) = (b + c) + a$

c. $a + 0 =$

d. $b(a + c)$

e. $a(c - b)$

f. $b \times 1 =$

6. Match column A with column B

Column A	Column B
Associative property of numbers	$a \times 1 = a$
Commutative property of numbers	$(a + b) + c = a + (b + c)$
Distributive property of numbers	$a + 0 = a$
Zero as the identity of addition	$a + b = b + a$
One as the identity of multiplication	$a(b + c) = a \times b + a \times c$

Problem solving

- What should I add to a number so that the answer will be the same as the number?
- By what should I multiply a number so that the answer will be the same as the number?
- Write five statements that are true using the properties of number.
- Write five statements that are false using the properties of number. Explain your answer.

21 Multiples

How fast can you give me the first 12 multiples of 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s and 12s?



x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

1. Use the number board to complete the following:

Example: The multiples of 6 are 6, 12, 18, … 72, or

We can write it as: multiples of 6 {6,12,18, 24, 30, 36, 42, 48, 54, 60, 66, 72}

a. Multiples of 4 {_____}

b. Multiples of 7 {_____}

c. Multiples of 5 {_____}

d. Multiples of 8 {_____}

e. Multiples of 2 {_____}

f. Multiples of 9 {_____}

2. Write down the first 12 multiples of the numbers below. Circle all the common multiples and identify the lowest common multiple (LCM).

Example: Multiples of 2: 2, (4), 6, (8), 10, (12), 14, (16), 18, (20), 22, (24)

Multiples of 4: (4), (8), (12), (16), (20), (24), 28, 32, 36, 40, 44, 48

The LCM is 4.



a. Multiples of 5 {_____}
Multiples of 10 {_____}
LCM? _____

b. Multiples of 5 {_____}
Multiples of 6 {_____}
LCM? _____

c. Multiples of 9 {_____}
Multiples of 2 {_____}
LCM? _____

3. What is the LCM for the following?

Example: Multiples of 4 and multiples of 7
Multiples of 4: { 4, 8, 12, 16, 20, 24, (28) }
Multiples of 7: {7, 14, 21, (28) }

a. Multiples of 2 and multiples of 8

b. Multiples of 3 and multiples of 6

c. Multiples of 5 and multiples of 3

d. Multiples of 4 and multiples of 8

e. Multiples of 7 and multiples of 6

f. Multiples of 6 and multiples of 9

Problem solving

In our homes there are various things that come in multiples. Give five examples of multiples from your home.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

22 Divisibility and factors

Your little brother messed up your notes. Find the missing information.

A number is divisible by [redacted] if the number formed by the last three digits is divisible by 8.

A number is divisible by 3 if the sum of the digits is divisible by 3.

A number is divisible by 10 if the last digit is [redacted]

A number is divisible by [redacted] if the last digit is either 0 or 5.

A number is divisible by 4 if the number formed by the last two digits is divisible by [redacted]

A number is divisible by 9 if the sum of the digits is divisible by 9.

A number is divisible by [redacted] if the last digit is 0, 2, 4, 6 or 8.

A number is divisible by 6 if it is divisible by 2 and it is divisible by 3.

1. Tick whether the numbers are divisible by 2, 3, 4, 5 or 10. You can have more than one answer.

	2	3	4	5	10
a. 376	✔				
b. 7 232					
c. 9 050					
d. 6 312					
e. 2 355					

2. The following numbers are divisible by?

Example: 6 is divisible by 1, 2, 3 and 6.

a. 12 b. 36 c. 42 d. 24 e. 64

3. Which two numbers, when multiplied, give you this number?

Example: 6 = 2 x 3, 6 = 1 x 6

a. 12 b. 36 c. 42 d. 24 e. 64

4. What do you notice if you compare the answers to questions 2 and 3?



5. (i) Write as many multiplication sums as possible (with only two numbers) that will give you this answer:

(ii) Write down all the numbers you used in ascending order but do not repeat a number. (iii) These are the factors of ___

Example: i. 12: 1 x 12, 2 x 6, 3 x 4
ii. 1, 2, 3, 4, 6
iii. These are the factors of 12.
iv. Factors of 12 = {1, 2, 3, 4, 6}

a.	b.	c.
i. **18:** _____	i. **25:** _____	i. **36:** _____
ii. _____	ii. _____	ii. _____
iii. _____	iii. _____	iii. _____
iv. Factors of __ = _____	iv. F__ = _____	iv. F__ = _____

6. Complete the following, using the example to guide you.

Example: i. Factors of 12 are 1, 2, 3, 4, 6 and 12
Factors of 30 are 1, 2, 3, 5, 6, 10, 15 and 30
ii. The common factors are: 1, 2, 3, 6
iii. The highest common factor is 6.

The abbreviation for highest common fraction is HCF.



a. Factors of 8: {....}
Factors of 16: {....}

(i) ____
(ii) ____
(iii) ____

b. Factors of 3: {....}
Factors of 12: {....}

(i) ____
(ii) ____
(iii) ____

c. Factors of 3: {....}
Factors of 9: {....}

(i) ____
(ii) ____
(iii) ____

7. Complete the table.

	Words	Factors	Common factors	HFC
a. 4 and 8	Factors of 4 and Factors of 8	1, 2, 4, 1,2,4,8	1, 2, 4,	4
b. 9 and 12				
c. 4 and 28				
d. 12 and 36				

Find out!

Wheen in ordinary life do we use HCF?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

23 Ratio

Remember that a ratio is a comparison between two numbers.
Discuss the following:

There are 1 boy and 3 girls in the room. You could write the ratio as: 1:3

$\frac{1}{4}$ are boys	0,25 are boys	25% are boys
$\frac{3}{4}$ are boys	0,75 are girls	75% are girls

1. Write the following ratios as fractions. Use boys:girls for all your ratios.

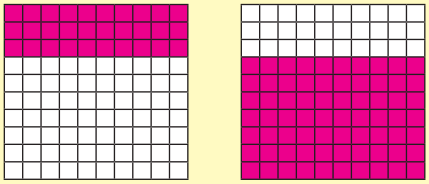
Example: 2 boys: 3 girls is the same as = $\frac{2}{5}$ are boys and $\frac{3}{5}$ are girls

a. 3:4 b. 5:7 c. 6:8

d. 3:9 e. 1:2 f. 7:9

2. Write the following ratios as percentages.

Example:
3:7
is the same as
$\frac{3}{10}$ and $\frac{7}{10}$
= 0,3 and 0,7
= 30% and 70%



a. 4:6 b. 2:8 c. 5:5

Now try these. You need to think carefully to write each one as a percentage.

d. 12:13 e. 20:30 f. 1:3

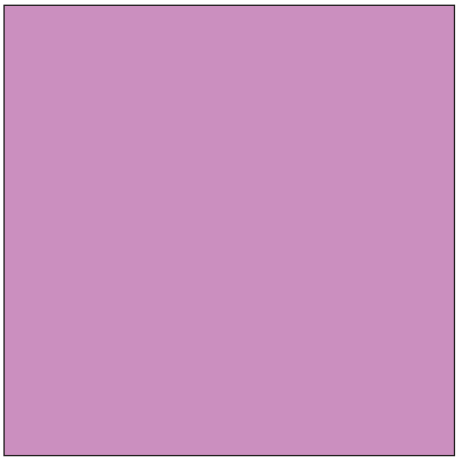


3. Solve the problems.

a. There were 6 cyclists with red mountain bikes and 4 with green mountain bikes at the race. What was the ratio? Write your answer as a common fraction, a decimal fraction and a percentage.

b. If the length of the side of a square is doubled, what is the ratio of the areas of the original square to the area of the new square? Also write you answers as a common fraction, a decimal fraction and a percentage.





Problem solving

There are 600 pupils in a school. The ratio of boys to girls in this school is 9:11. How many girls and how many boys are in this school?

24 Rate

Look at the ratio and rate examples. Give another 5 real–life examples.

Ratio and rate are used for solving many everyday problems that involve comparing different numbers.

A ratio compares the size, or magnitude, of two numbers **of the same kind.**

4:5
4 boys to 5 girls



A ratio that compares quantities of **different types** that are related to each other is called a rate.

R25 per kg



1. Find the unit rate (the unit rate describes how many units of the first type of quantity correspond to one unit of the second type of quantity).

Example: 50 hamburgers in 10 days = **5** hamburgers per day.

a. 24 orders in 3 days = _____ orders per day.

b. 36 cupcakes in 3 boxes = _____ cupcakes per box.

c. 12 newspapers in 2 piles = _____ newspapers per pile.

d. 16 slices from 2 cakes = _____ slices per cake.

e. 120 pages in 3 days = _____ pages per day.

Explain how you got the answer each time.



2. Find the unit rate for each.

Example: $\frac{600 \text{ kilometres}}{60 \text{ litres}} = \frac{10 \text{ kilometrers}}{1 \text{ litre}} = 10$ kilometres/litre

a. $\frac{R150}{75 \text{ kilogram}} =$ ____

b. $\frac{80 \text{ metre}}{8 \text{ seconds}} =$ ____

c. $\frac{R200}{8 \text{ litres}} =$ ____

d. $\frac{10 \text{ kilometre}}{20 \text{ minutes}} =$ ____

3. Solve the following. Show all calculations.

a. Autumn started and over a period of 4 hours, 120 leaves fell from a tree. At this rate, how many leaves fell in one hour?	b. Peter drove a total of 1 000 km and used 100 litres of petrol. What is this rate in kilometres per litre?
c. Zaheeda scored 9 goals in 5 netball matches. At this rate, about how many goals did she score in each game?	d. Climbing up a mountain, Richard ascended 120 metres every hour. At this rate, how many metres will he ascend in 4 hours?

4. We use rate on a daily basis. Give five examples and then write each one as a unit rate.

Rate daily example	Unit rate
a. We travelled 5 km to school, and it took us 10 minutes.	
b.	
c.	
d.	
e.	

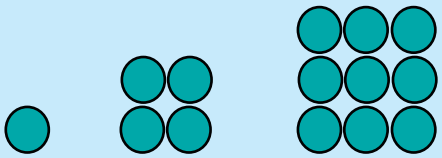
Problem solving

A water tank that holds 100 litres is leaking at a rate of 2 litre/min. How long will it take to waste 24 litres at this rate?

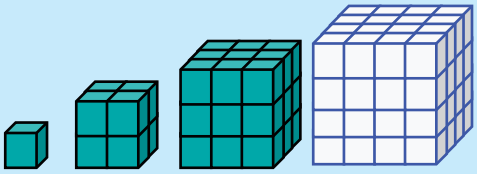
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

25 Square and cube numbers

Look at the following pattern:



If we have one circle in the first pattern, four circles in the second pattern and nine circles in the third pattern, how many circles will we have in the tenth pattern? How did you work out your answer?



If we have one circle in the first pattern, four circles in the second pattern and nine circles in the third pattern, how many circles will we have in the tenth pattern? How did you work out your answer?

1. The numbers above are called _____ **and** _____ **numbers.**

2. Write the following as square numbers:

Example: $13 \times 13 = 13^2$

This 2 is the **exponent**. We say 13 squared or 13 to the power of 2.

a. $2 \times 2 =$

b. $7 \times 7 =$

c. $5 \times 5 =$

d. $10 \times 10 =$

e. $3 \times 3 =$

f. $11 \times 11 =$

3. Write the following as multiplication sentences:

Example: $15^2 = 15 \times 15$

a. $5^2 =$

b. $9^2 =$

c. $4^2 =$

d. $2^2 =$

e. $7^2 =$

f. $12^2 =$

4. For 3^2, identify: a. the base number. b. the exponent.

5. Colour all the square numbers on the multiplication board. What pattern do you see?

x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

6. Arrange these numbers in ascending order:

$2, 9^2, 5^2, 5, 6^2, 2^2, 8^2, 7^2, 12^2, 1^2, 3^2, 10, 11^2, 4^2, 10^2$

7. Arrange the above numbers in descending order:

8. Fill in <, > or =

a. 2^2 ____ 2×2

b. 5^2 ____ 5×2

c. 9^2 ____ 9×9

d. 8^2 ____ 2×8

e. 11^2 ____ 10×11

f. 3×3 ____ 3^2

9. Some of the numbers in question 8 are called ____ numbers.

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Square and cube numbers continued

10. Write the following as cube numbers:

Example: $6 \times 6 \times 6 = 6^3$

a. $3 \times 3 \times 3 =$ _____ b. $2 \times 2 \times 2 =$ _____ c. $5 \times 5 \times 5 =$ _____

11. Write the following as multiplication sums:

Example: $6^3 = 6 \times 6 \times 6$

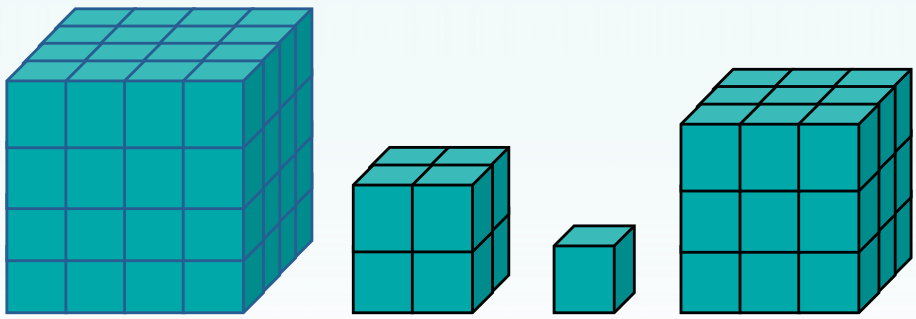
a. 2^3 _____ b. 4^3 _____ c. 1^3 _____

12. Explain in your own words what a cube number is.

13. Identify: a. the base number
b. the exponent

4^3

14. Name the drawings and place them in order from the smallest to the largest. Give a reason for your answer, using cube numbers.



15. Arrange these numbers in ascending order:

3^3, 4^3, 2^3, 5^3, 1^3

16. Fill in <, > or = :

a. 2^3 ☐ 2 x 2

b. 125 ☐ 5^3

c. 1 x 1 ☐ 1^3

d. 27 ☐ 3^3

e. 6 ☐ 3^3

f. 5^3 ☐ 8

17. First estimate and then calculate the answers.

Example: $5^2 + 3^2 = 25 + 9 = 34$

a. $2^2 + 102 =$

b. $62 - 32 =$

c. $82 + 102 =$

18. First estimate and then calculate the answers.

Example: $5^2 + 3^2 = 125 + 27 = 152$

a. $6^3 - 5^2 =$

b. $2^2 + 3^3 =$

c. $9^3 - 4^2 =$

19. First estimate and then calculate the answers.

a. $2^2 + 3^3 - 1^3 =$

b. $5^3 - 4^3 + 3^3 =$

c. $4^2 + 4^3 + 2^2 =$

Problem solving

Add the smallest square number and the largest square number that is smaller than 100. Do the same with cube numbers.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

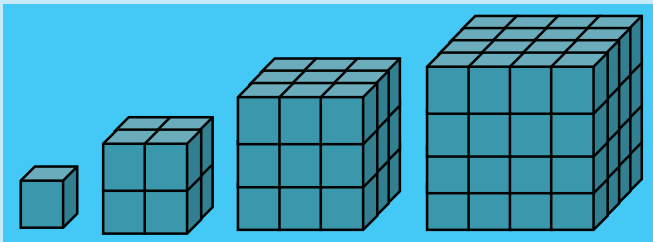
26 Square and cube roots

What do you think these diagrams represent?

1	2	3
4	5	6
7	8	9

$\sqrt{9}$

3 x 3 = 9,
so the square root of 9 is 3.



$\sqrt[3]{27}$

3 x 3 x 3 = 27,
so the cube root of 27 is 3.

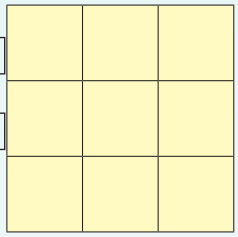
1. What square number and root do the diagrams below represent?

Example: a. 3 x 3 = 9, so the square number is 9 and the square root ($\sqrt{\ }$)of 9 is 3

a.

( )^2 9

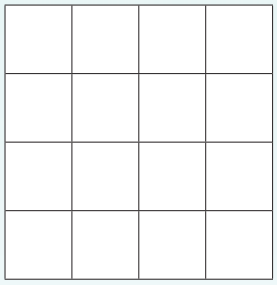
$\sqrt{\ }$ 3



b.

( )^2 ____

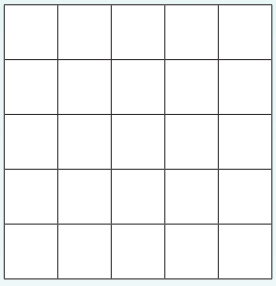
$\sqrt{\ }$ ____



c.

( )^2 ____

$\sqrt{\ }$ ____



2. Write the following in symbols:

a. The square root of 9

b. The square root of 25

3. Calculate the square root:

Example: $\sqrt{9} = \sqrt{3 \times 3} = 3$

a. $\sqrt{81}$ = ____

b. $\sqrt{1}$ = ____

c. $\sqrt{121}$ = ____

d. $\sqrt{64}$ = ____

e. $\sqrt{36}$ = ____

f. $\sqrt{169}$ = ____

4. Write the following in ascending order.

$\sqrt{16}$, $\sqrt{4}$, $\sqrt{25}$, $\sqrt{9}$, $\sqrt{36}$, ____

5. Write the following in ascending order.

$\sqrt{4.4}$, $\sqrt{3.3}$, $\sqrt{2.2}$, ____

6. Write the following in descending order.

$\sqrt{25}$; 2^2; $\sqrt{16}$; $\sqrt{100}$; 9^2 ☐

7. Fill in <, > or =

a. $\sqrt{36}$ ☐ $\sqrt{25}$

b. $\sqrt{81}$ ☐ $\sqrt[3]{27}$

c. $\sqrt{9}$ ☐ $\sqrt{16}$

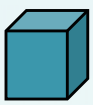
d. $\sqrt{81}$ ☐ 3^2

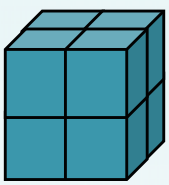
e. 3^2 ☐ $\sqrt{36}$

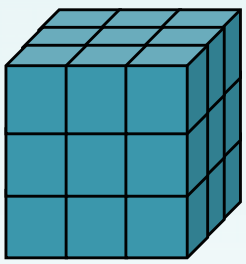
f. 4^2 ☐ $\sqrt{25}$

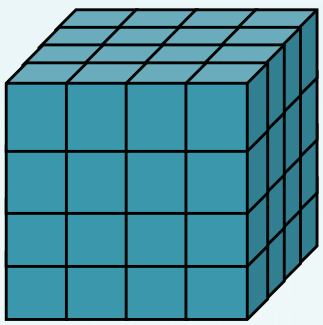
8. What is the cube root of these?

Example: 3 x 3 x 3 = 27, so the cube root of 27 is 3

a. 

b. 

c. 

d. 

a. so the cube root of _____ is _____

b. _____

c. _____

d. _____

9. Write the following in symbols:

a. The cube root of 27 ☐

b. The cube root of 8 ☐

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

26b Square and cube roots continued

10. Calculate the cube root.

Example: $\sqrt[3]{27}$ Since 27 = 3 x 3 x 3
$= \sqrt[3]{3 \times 3 \times 3}$
$= 3$

a. $\sqrt[3]{8}$ ☐ b. $\sqrt[3]{64}$ ☐ c. $\sqrt[3]{1}$ ☐

11. Write the following in ascending order:

$\sqrt[3]{27}$; $\sqrt[3]{8}$; $\sqrt[3]{125}$; $\sqrt[3]{1}$ ☐

12. Write the following in descending order:

$\sqrt[3]{3 \cdot 3 \cdot 3}$; $\sqrt[3]{2 \cdot 2 \cdot 2}$; $\sqrt[3]{4 \cdot 4 \cdot 4}$; ☐

13. Write the following in ascending order:

2^3; 1^3; $\sqrt[3]{27}$; 4^3 ☐

14. Fill in <, > or =

a. $\sqrt[3]{8}$ ☐ $\sqrt[3]{1}$ b. 3^2 ☐ $\sqrt{36}$ c. 4^2 ☐ $\sqrt{25}$

d. $\sqrt[3]{125}$ ☐ 53 e. $\sqrt[3]{8}$ ☐ 8 f. $\sqrt[3]{125}$ ☐ 2

15. Write the following in ascending order:

$\sqrt[3]{27}$; $\sqrt[3]{8}$; $\sqrt[3]{125}$; $\sqrt[3]{1}$ ☐

16. Calculate

Example: $\sqrt{16} + \sqrt{25}$
$= 4 + 5$
$= 9$

a. $\sqrt{9} + \sqrt{16} =$ ☐ b. $\sqrt{25} - \sqrt{16} =$ ☐

c. $\sqrt{100} + \sqrt{81} =$ ☐ d. $\sqrt{25} + \sqrt{64} =$ ☐



17. Calculate.

Example: $\sqrt[3]{64} - \sqrt[3]{27}$
$= 4 - 3$
$= 1$

a. $\sqrt[3]{216} + \sqrt[3]{27} =$ ☐

b. $\sqrt[3]{27} - \sqrt[3]{8} =$ ☐

c. $\sqrt[3]{64} + \sqrt[3]{216} =$ ☐

d. $\sqrt[3]{27} + \sqrt[3]{64} =$ ☐

18. Calculate.

Example: $\sqrt[3]{125} - \sqrt{16}$
$= 5 + 4$
$= 9$

a. $\sqrt{216} - \sqrt{25} =$ ☐

b. $\sqrt{16} + \sqrt[3]{8} =$ ☐

c. $\sqrt{25} + \sqrt[3]{8} =$ ☐

d. $\sqrt{25} - \sqrt[3]{27} =$ ☐

19. Calculate.

Example: $\sqrt[3]{27} + 3^2 - \sqrt{25}$
$= 3 + 9 - 5$
$= 7$

a. $\sqrt[3]{216} + 4^2 - \sqrt{16} =$ ☐

b. $9^2 - \sqrt[3]{27} + \sqrt{4} =$ ☐

c. $3^3 + 4^3 + \sqrt{25} =$ ☐

d. $\sqrt{144} - 2^2 + \sqrt[3]{8} =$ ☐

Problem solving

Square and cube fun

- Write down all the two–digit square numbers.
- Write down all the three–digit cube numbers.
- Write down the square roots of all the two–digit square numbers.
- Write down the cube roots of all the two–digit and three–digit cube numbers.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

27 Exponential notation

In science, we deal with numbers that are sometimes extremely large or extremely small.



There are 602 000 000 000 000 000 000 000 water molecules in 18 grams of water. A shorter way of writing the same number is exponential notation to show all those zeros as a number to the power of ten:

$6{,}02 \times 10^{23}$ is the shorter way of representing the number of all those molecules. Such a number can be read "Six point zero two times ten to the twenty-third."

How do you think do we write 1023 as a number?



1. How fast can you calculate the following?

Example: 10 x 10 x 10 x 10 = 10 000

a. 10 x 10 = _____

b. 10 x 10 x 10 x 10 x 10 = _____

c. 10 x 10 x 10 x 10 = _____

d. 10 x 10 x 10 = _____

e. 10 x 10 x 10 x 10 x 10 x 10 x 10 = _____

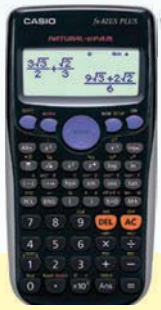
f. 10 x 10 x 10 x 10 x 10 x 10 = _____

2. Complete the table.

Sum	Exponential format	Answer
a. 10 x 10	10^2	100
b. 10 x 10 x 10		
c. 10 x 10 x 10 x 10		
d. 10 x 10 x 10 x 10 x 10		
e. 10 x 10 x 10 x 10 x 10 x 10		

Check your answers using a scientific calculator.



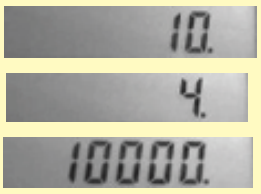


To type 10^4, you can type ten:

Then use the xy button and type 4:

The result should be ten thousand:





3. Identify the base number and the exponent: 10^8. _____

4. Match column B with column A:

A	B
10^7	a. ten to the power of nine
10^5	b. ten to the power of seven
10^8	c. ten to the power of five
10^3	d. ten to the power of eight
10^9	e. ten to the power of three

5. Write the following in exponential form.

Example: $10 \times 10 \times 10 \times 10 = 10^4$

a. $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 =$ _____

b. . $10 \times 10 \times 10 \times 10 \times 10 =$ _____

c. $10 \times 10 \times 10 \times 10 \times 10 \times 10 =$ _____



6. Simplify the following or expand:

Example: $10^3 = 10 \times 10 \times 10$

a. 10^2 _____ b. 10^4 _____ c. 10^5 _____

d. 10^6 _____ e. 10^7 _____ f. 10^8 _____

7. Your cousin wrote this in her maths book: 10^5. What does this mean?

8. Give some practical examples of where exponential notation (also called scientific notation) is used.

Problem solving

Write one billion in exponential notation.

28 Estimate and calculate exponents

Which numbers will give you an answer of 10^4?

10 x 1 000	1 x 10 x 1 000	10 x 100	10 x 100 x 10	100 x 1 000
1 x 1 000	100 x 10 x 1	10 x 10 x 10 x 10	1 x 1 x 1 x 1	1 000 x 10
1 x 1 000 x 10	10 x 10 x 100	100 x 10 x 1 x 1	1 x 10 000	100 x 10 + 10
10 000 x 1	100 x 10 x 10 x 1	1 000 x 1 000	100 x 10	10 + 10 + 10 + 10
100 x 10 x 10	10 x 10	10 x 1 x 1 000	10 x 10 x 10	100 x 100

1. Write in exponential form.

Example: $10 \times 10 \times 10 \times 10 = 10^4$

a. $10 \times 10 \times 10 \times 10 \times 10 =$ _____

b. $10 \times 10 \times 10 =$ _____

c. $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 =$ _____

d. $10 \times 10 \times 10 \times 10 =$ _____

e. $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 =$ _____

2. Write in multiplication form.

Example: $10^4 = 10 \times 10 \times 10 \times 10$

a. 10^3 _____ b. 10^{10} _____ c. 10^7 _____

d. 10^5 _____ e. 10^4 _____ f. 10^6 _____

3. Calculate.

Example: $10^4 + 10^3$
$= 10\,000 + 1\,000$
$= 11\,000$

a. $10^3 + 10^2 =$ b. $10^4 + 10^6 =$ c. $10^5 + 10^3 =$

4. Calculate.

Example: $4 + 10^3$
$= 4 + 1\,000$
$= 1\,004$

a. $5 + 10^4 =$

b. $10^5 \times 9 =$

c. $10^5 \times 7 =$

5. Calculate.

Example: $2 \times 10^4 + 3 \times 10^5$
$= 2 \times 10\,000 + 3 \times 100\,000$
$= (2 \times 10\,000) + (3 \times 100\,000)$
$= 20\,000 + 300\,000$
$= 320\,000$

a. $3 \times 10^3 + 4 \times 10^4 =$

b. $8 \times 10^4 + 3 \times 10^2 =$

c. $5 \times 10^2 + 8 \times 10^6 =$

6. Calculate.

Example: $2 \times 10^4 + 3 \times 10^3 + 4 \times 10^5$
$= 2 \times 10\,000 + 3 \times 1\,000 + 4 \times 100\,000$
$= (2 \times 10\,000) + (3 \times 1\,000) + (4 \times 100\,000)$
$= 20\,000 + 3\,000 + 400\,000$
$= 423\,000$

a. $1 \times 10^2 + 8 \times 10^5 + 3 \times 10^6$

b. $3 \times 10^3 + 8 \times 10^3 + 7 \times 10^7 =$

c. $5 \times 10^3 + 6 \times 10^2 + 2 \times 10^4 =$

d. Make your own number sentence and calculate it.

Problem solving

Calculate ten to the power of three plus ten to the power of two plus three times ten to the power of zero.

continued

29 Estimate and calculate more exponents

Match the word with the picture and explain your answer to a friend.

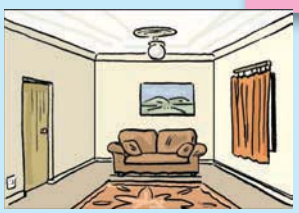
Square numbers

Cube numbers

Power of ten









A number to the power of 0. What does this mean?

1. Estimate then calculate.

Example: $2^2 + 2^3 = 4 + 8 = 12$

a. $2^2 + 12^2 =$ _____

b. $4^2 + 10^2 =$ _____

c. $2^3 + 11^2 =$ _____

d. $6^3 + 1^3 =$ _____

e. $3^2 + 2^3 =$ _____

f. $5^2 + 2^3 =$ _____

2. Estimate then calculate.

Example: $2^2 + 3^3 + 4^2 = 4 + 27 + 16 = 47$

a. $2^2 + 4^3 + 3^2 =$ _____

b. $5^3 + 6^2 + 9^2 =$ _____

c. $7^2 + 2^3 + 8^0 =$ _____

d. $5^2 + 10^2 + 12^2 =$ _____

e. $11^2 + 4^2 + 3^3 =$ _____

f. $5^3 + 9^0 - 6^2 =$ _____

3. How fast can you calculate the following?

a. $3^2 =$ _____

b. $3^3 =$ _____

c. $5^2 =$ _____

d. $11^2 =$ _____

e. $2^0 =$ _____

f. $2^2 =$ _____

g. $5^3 =$ _____

h. $4^2 =$ _____

i. $6^2 =$ _____

4. Calculate.

Example: $(12 - 9)^3$
$= (3)^3$
$= 27$

a. $(8 - 4)^3 =$ _____

b. $(7 + 1)^2 =$ _____

c. $(9 + 2)^2 =$ _____

d. $(18 - 9)^2 =$ _____

e. $(11 - 6)^3 =$ _____

f. $(16 - 11)^3 =$ _____

5. Create your own number sentence and calculate the answers:

a. Add three cube numbers.	b. Add three square numbers.	c. Add two cube numbers and one square number.
d. Subtract a square number from a cube number.	e. The sum of two cube and two square numbers.	f. The sum of three to the power of zero and three cube numbers.
g. Use multi operations on three cube numbers.	h. Use multi operations on three square numbers.	i. Add a 3–digit cube number to a 2–digit square number.

Problem solving

What is four to the power of three minus one to the power of one plus one hundred to the power of zero. Check your answer using a calculator.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

30 Numbers in exponential form

If:

- square numbers are 1, 4, 9,16, 25, …
- Cube numbers are 1, 8, 27, 64, 81, …

What will:

- Pentagonal numbers and
- Hexagonal numbers be?



1. Complete the pattern. Use your calculator, where necessary, to calculate the answers.

a. $20 = 20^1$
$20 \times 20 = 20^2$

b. $10 = 10^1$
$10 \times 10 = 10^2$

c. $17 = 17^1$
$17 \times 17 = 17^2$

d. $38 = 38^1$
$38 \times 38 = 38^2$

e. $59 = 59^1$
$159 \times 59 = 59^2$

f. $15 = 5^1$
$15 \times 15 = 15^2$

2. Write a sum for and use your calculator to calculate the answer.



Example: 18^4
$= 18 \times 18 \times 18 \times 18$
$= 104\,976$

a. 22^3

b. 81^2

c. 74^4

d. 39^1

e. 97^7

f. 32^8

3. What is the next number in the pattern?

a. $a = a^1$
$a \times a = a^2$

b. $b = b^1$
$b \times b = b^2$

c. $m = m^1$
$m \times m = m^2$

d. $r = r^1$
$r \times r = r^2$

e. $k = k^1$
$k \times k = k^2$

f. $n = n^1$
$n \times n = n^2$

4. Write a sum for.

Example: m^4
$= m \times m \times m \times m$

a. a^3

b. b^2

c. r^4

d. m^1

e. p^7

f. p^8

Calculate the answers for questions 3 and 4, if:

$a = 10$ $b = 3$ $m = 100$ $r = 5$ $k = 1$ $n = 20$ $p = 2$

You will need additional paper to do these calculations.

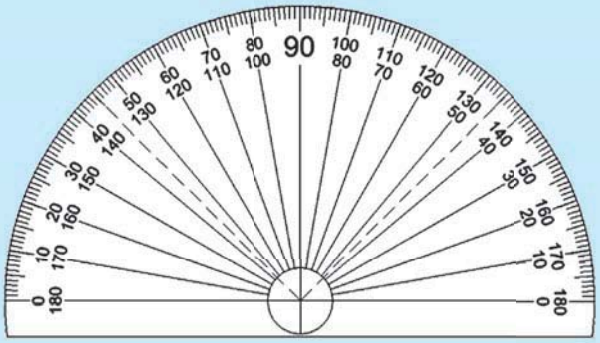
Problem solving

I have fifty-four to the power of one, and seventy-nine to the power of one. What will the total be if I add these two numbers?

31 Constructing geometric objects

What do we use a protractor for?

- A protractor is used for measuring an angle.
- An angle is measured in degrees.
- A circle has 360°.

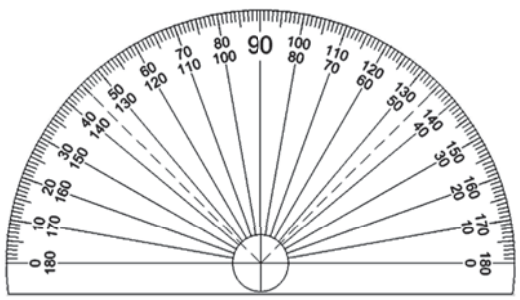




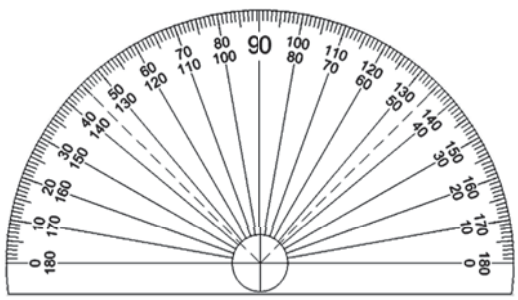
1. How do you measure angles using a protractor?

Fill in the missing words. These words can help you (you can use a word more than once): angle, sides, curved, centre, zero

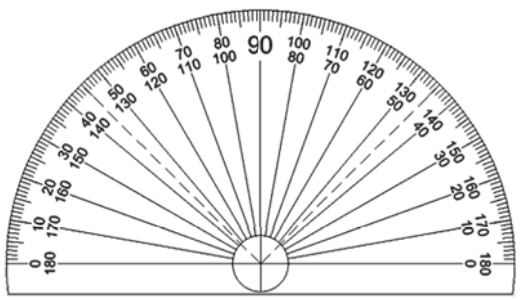
a. Find the _____hole above the straight edge of the protractor.



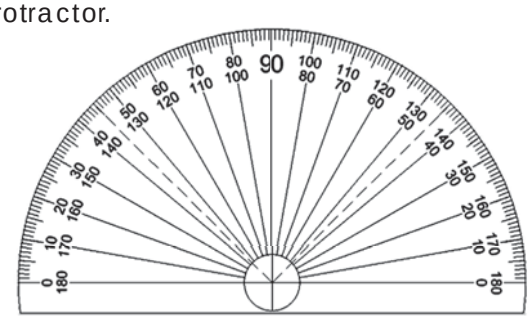
b. Place the hole over the vertex of the _____ you wish to measure.



c. Line up the _____ on the straight edge of the protractor with one of the _____of the angle.



d. Find the point where the second _____ of the angle intersects the _____ edge of the protractor.



2. Name four professions where people use protractors.

a. _____

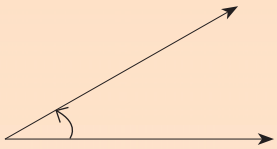
b. _____

c. _____

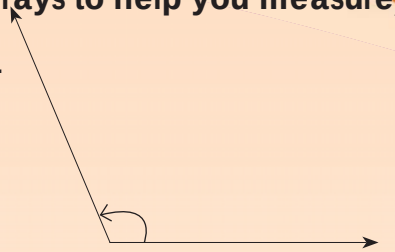
d. _____

3. Measure each angle (you can extend the rays to help you measure).

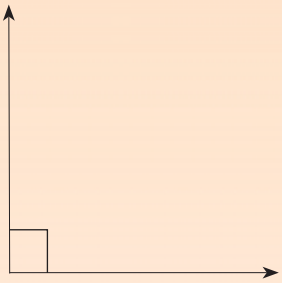
a.



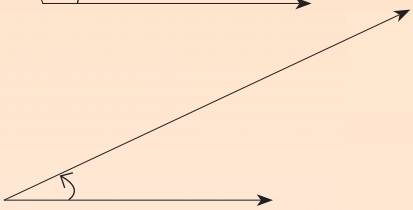
b.



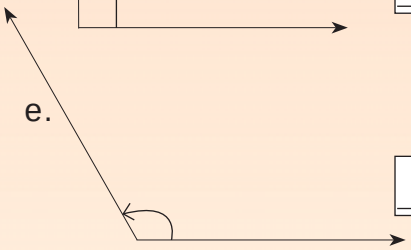
c.



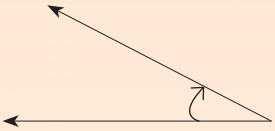
d.



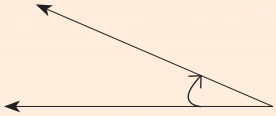
e.



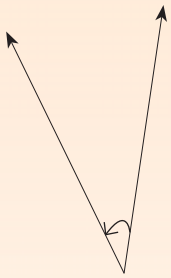
f.



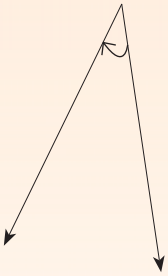
g.



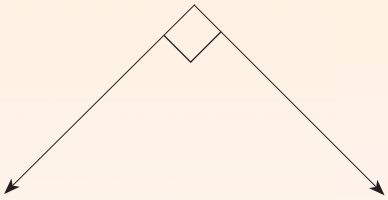
h.



i.



j.



4. Estimate and draw an angle.

a. Smaller than 90 degrees. Measure it.

b. Bigger than 90 degrees. Measure it.

Problem solving

If you measure an angle that is between 0° and 45°, how big could the angle be? Where in nature do we find an angle of that size?

32 Angles and sides

Identify all the 90° angles, the angles smaller than 90° and the angles bigger than 90°.



1. What is an angle?

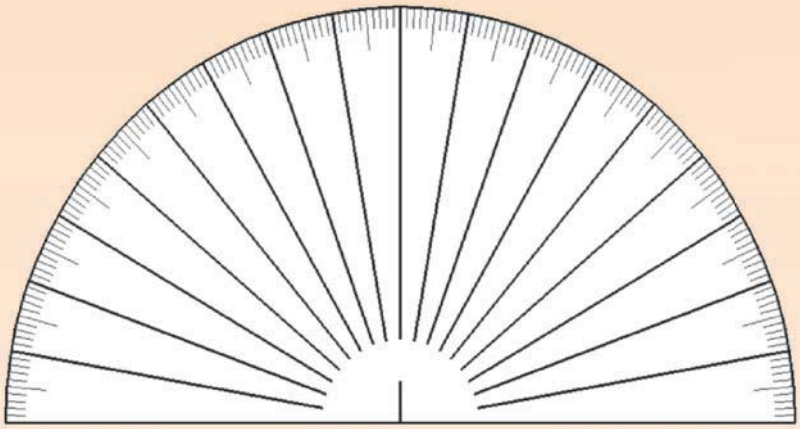
2. Match column A with column B:

A: Name of angle	B: Degrees
Acute angle	90°
Right angle	360°
Obtuse angle	Less than 90°
Straight angle	Between 180° and 360°
Reflex angle	Between 90° and 180°
Revolution	180°

3. What is a protractor?

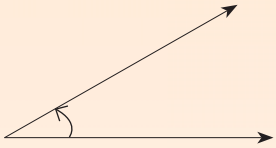


4. Label this protractor.



5. Measure and name each angle.

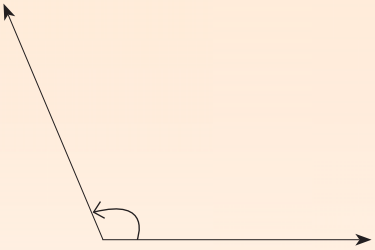
a.



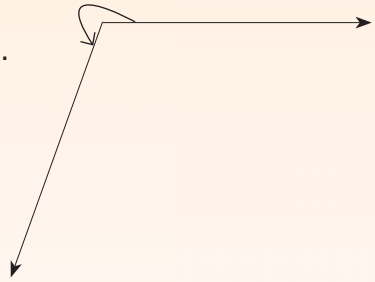
30°

Acute angle

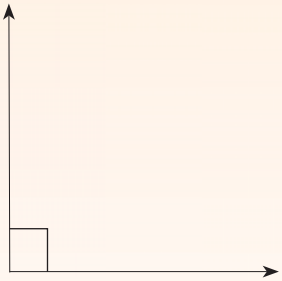
b.



c.



d.



e.



continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

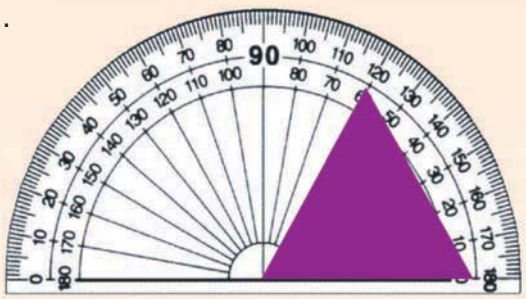
Angles and sides continued

6. What is a side?

7. Look at the pictures of the protractors.

Write down the size of the interior angle being measured each time and also measure the length of the sides of each shape.

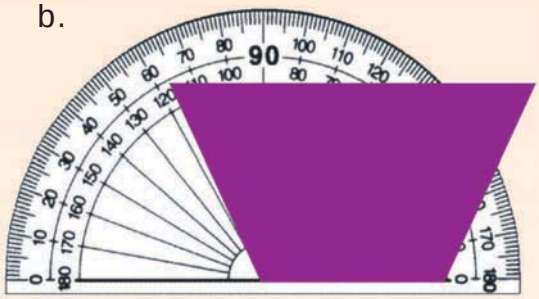
a.



Angle: 60°

Length of sides: 28 mm x 3

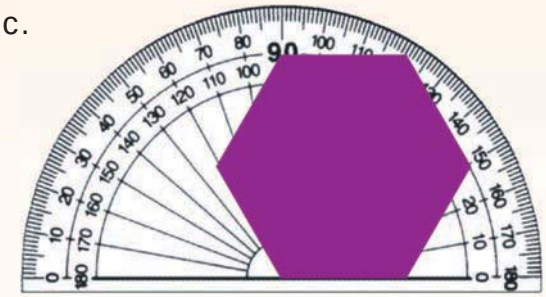
b.



Angle: _____

Length of sides: _____

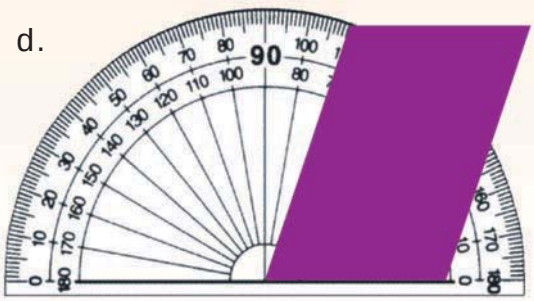
c.



Angle: _____

Length of sides: _____

d.



Angle: _____

Length of sides: _____

8. Name the angles.

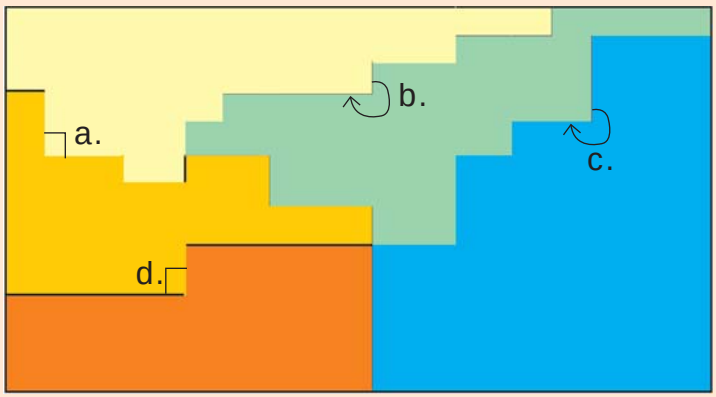
Angle size	Name of angle
40°	
96°	
180°	
172°	
200°	
145°	
60°	
2°	
359°	
240°	

9. How many angles can you see in this picture? What kind are they?



Problem solving

a. Add the angles that are shown on the diagram.



b. If I have an angle that is not an acute angle and is smaller than 180°, what type of angle is it?

33 Size of angles

What is an angle? Make three drawings of angles that you can see in your home.

1. Find angles in these pictures and measure them using degrees.



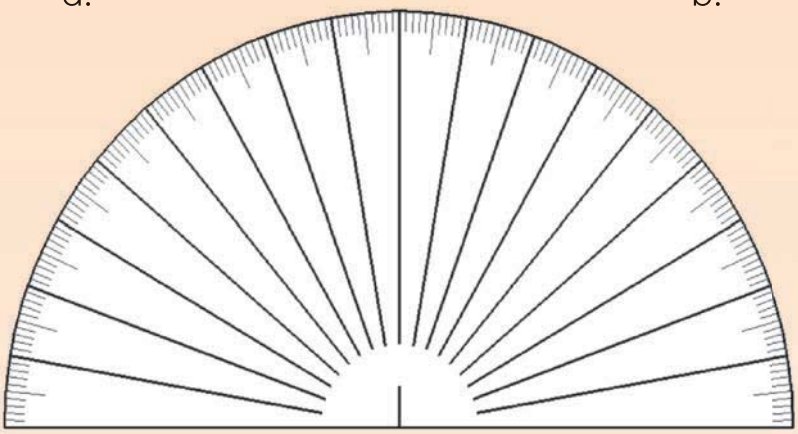




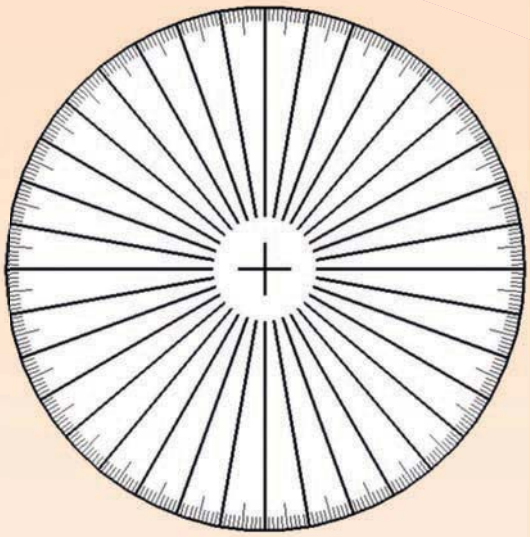


2. Fill in the degrees on the protractors.

a.

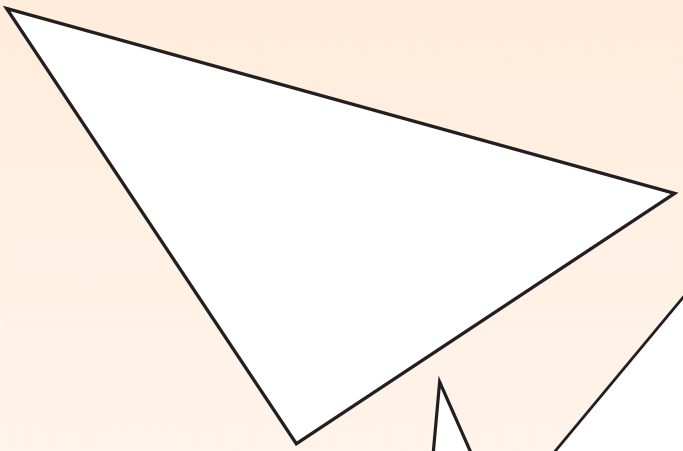


b.

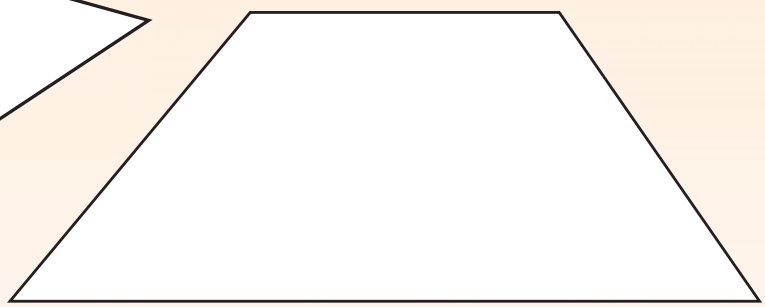


3. Measure the angle sizes and fill them in on the shapes?

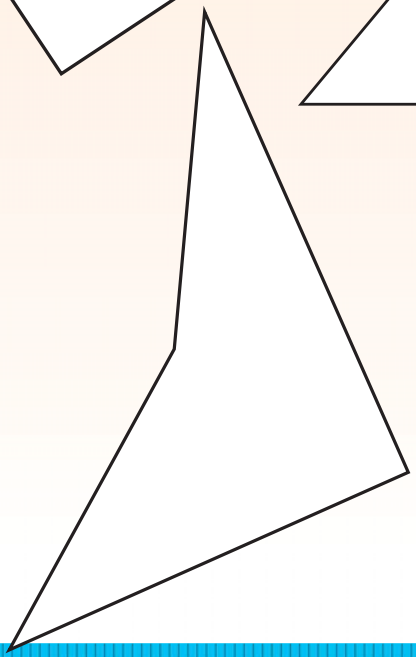
a.



b.



c.

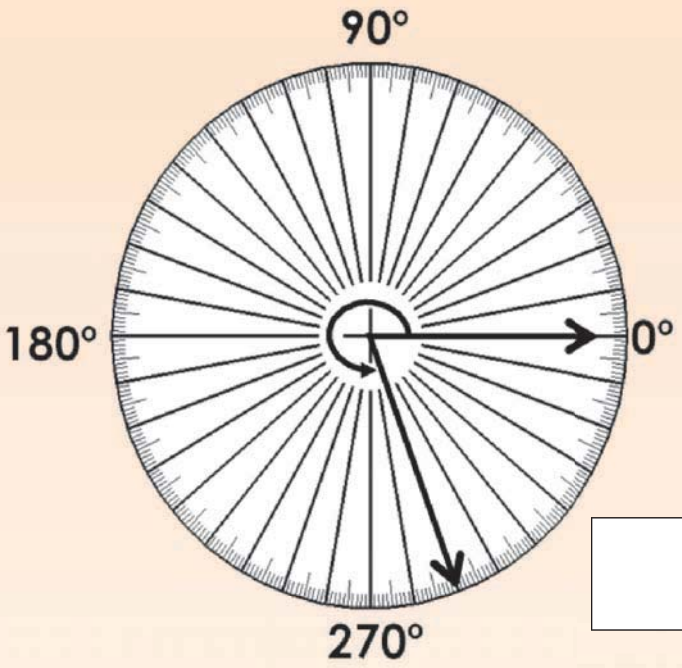


continued ☛

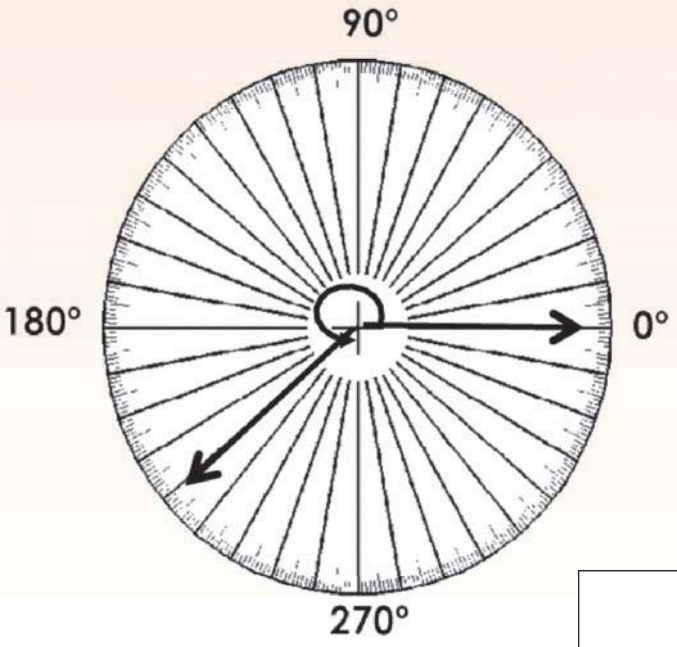
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

33b Size of angles continued

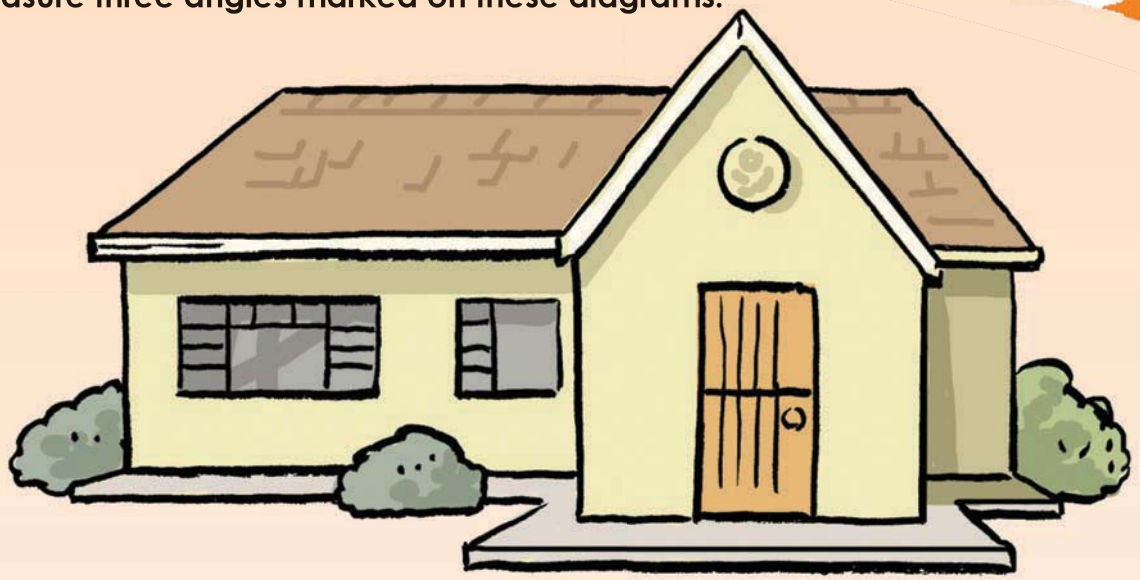
4a. The angle measured below is 290º. Is it possible to get a polygon with an angle of 290º? Explain your answer.

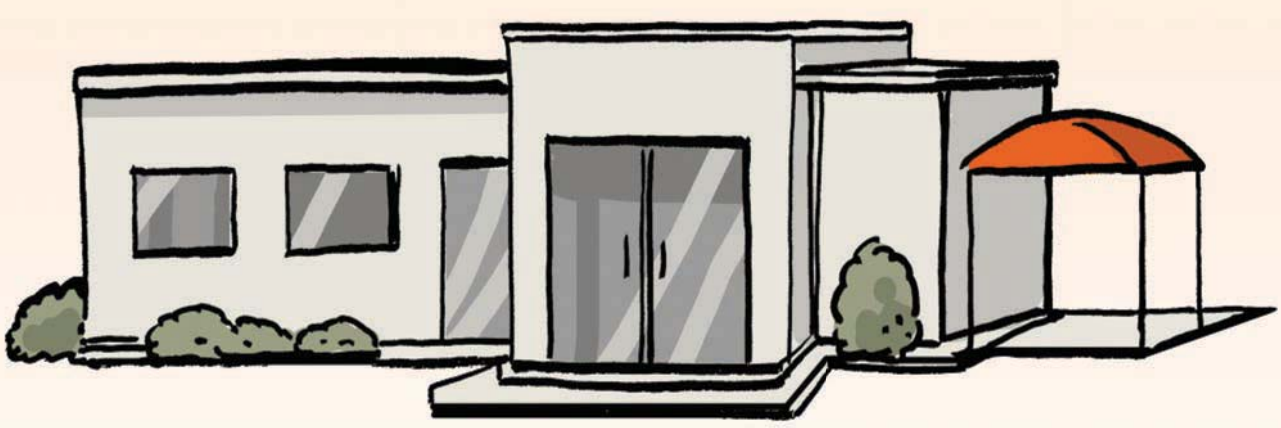


b. What is the size of the angle? Draw a polygon that has the same angle.



5. Measure three angles marked on these diagrams.



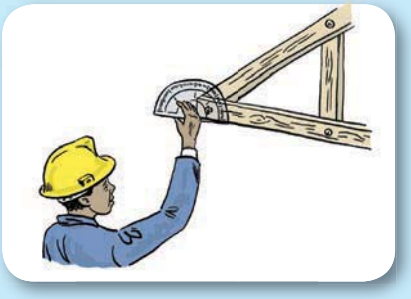


Problem solving

What are the most common angles you will find in your home?
What angles are the most common in motor vehicles?

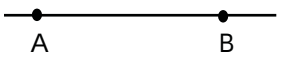
34 Using a protractor

Look at the pictures. What are these people using their protractors for?

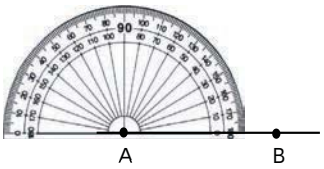




Use a protractor to draw some angles. Do this by following the step–by–step instruction on the left.

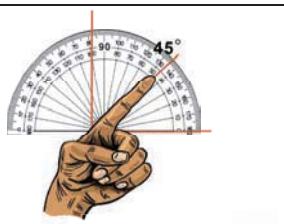
Step 1: Draw a line segment. Label it AB.



Step 2: Place the protractor so that the origin (small hole) is over the point A. Rotate the protractor so that the base line is exactly along the line AB.



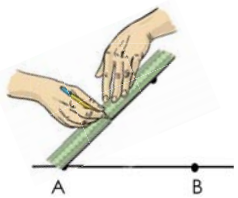
Step 3: Using (in this case) the inner scale, find the angle desired – In 1. it is 45°.



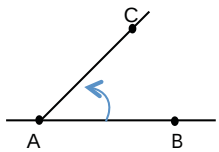
Step 4: Make a mark at this angle, and remove the protractor.



Step 5: With the protractor or a ruler draw a straight line from A to the mark you just made. Label this point C.



Step 6: The line drawn makes an angle BAC with a measure of 45°.



1. Draw a 45° angle ABC.

2. Draw a 100° angle CDE.

3. Draw a 175° angle JKL.



2. Use a ruler and a protractor to draw and label geometric figures. Write down the steps you go through to construct each one.

a. A 60° angle ABC.

b. A triangle with angles including a 45° angle and a 65° angle.

c. A quadrilateral with angles including a 70° angle and a 100° angle. A quadrilateral has four sides.

Problem solving

Draw a polygon with six sides where one angle is 30°.

35 Parallel and perpendicular lines

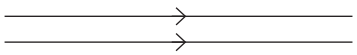
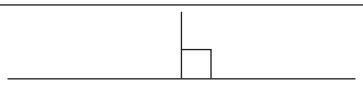
Look at the structures. Identify the parallel, perpendicular and line segments.





1. What mathematical instrument is a compass? Draw a picture of a compass.

2. Match column A with column B.

Column A	Column
Line segment	
Parallel lines	
Perpendicular lines	

3. Draw the following line segments with a ruler.

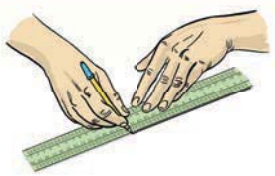
a. 5 cm

b. 7,5 cm

c. 65 mm

d. 23 mm

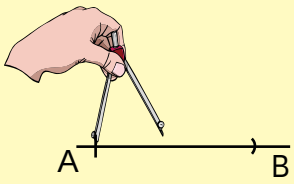
e. 8,9 cm



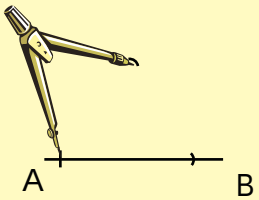


4. Construct lines perpendicular to both sides of a line using a compass. Use the guidelines to help you. Join C and D with a straight line

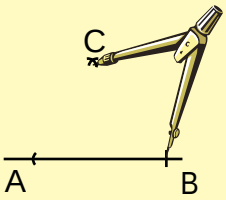
Step 1
Draw a line, mark a points (A and B) on it. Put the compass point on A and open it so that the pencil touches B. (So you have "measured" the length of AB with the pair of compasses.)



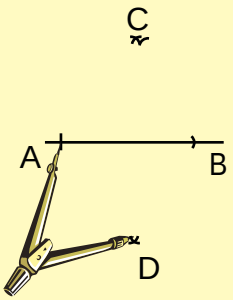
Step 2
Leaving the compass point on A, draw an arc with the compass roughly where you want the perpendicular line to be.



Step 3
Now move the compass point to point B and draw another arc which crosses the first. Label it C.



Step 4
Follow the same steps to get get D. Label it D. Join points C and D. Name the point C. It intersects iwth AB and E.



Measure angle AEC and BED to check how accurate you construction is.

5. What symbols do we use to show:

- Lines that are perpendicular?
- Sides that are equal?
- Sides that are parallel?

Problem solving

Are these lines and pillars parallel or not? Say why or why not.





15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

36 Construct angles and a triangle

Identify the triangles and estimate the size of the angles.

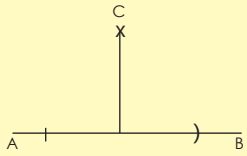




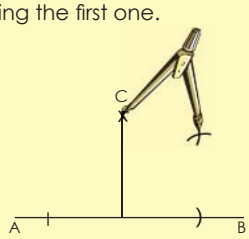


1. Construct a 45º angle. Use the guidelines to help you.

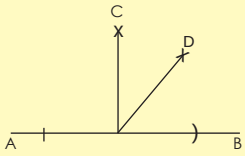
Step 1
Follow the steps to draw a perpendicular line on page 95.



Step 2
Leaving the compass point on C, draw an arc with the compass roughly half way between C and B. Then place the compass point on B and draw an arc crossing the first one.



Step 3
Mark it as D and draw the line which creates two 45° angles.



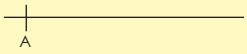
To construct a 45° angle you bisect a 90° angle.

2. Give five everyday examples of where we will find 45º angles.

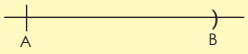


3. Construct an equilateral triangle. Follow the steps and construct your triangle on the right.

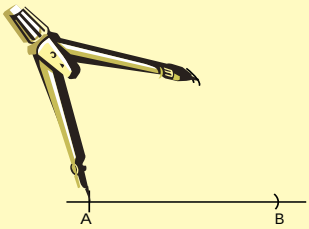
Step 1
Draw a line. Make a marking on it (A).



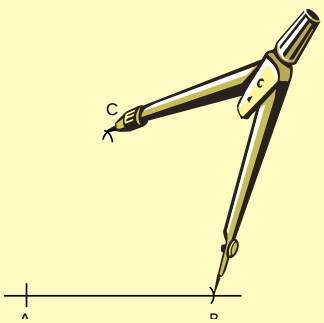
Step 2
Put the compass point on A and open it so that the pencil touches B. (So you have "measured" the length of AB with the pair of compasses.)



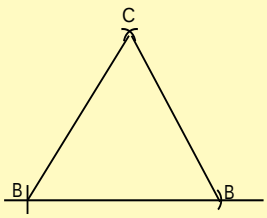
Step 3
Leaving the compass point on A, draw an arc with the compass roughly where you think the other vertex (corner) of the triangle is going to be. (The distance from A to this point is going to be the same as the length of AB.)



Step 4
Do not adjust the compass. Now move the compass point to B and draw another arc which crosses the first. Label it C.



Step 5
Since the lengths of AC and BC are both equal to the length of AB, we have three points all the same distance from each other. If we join them up, we therefore have an equilateral triangle, with each angle equal to 60°.



Measure the angles to determine how accurate your construction is.

continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Construct angles and a triangle

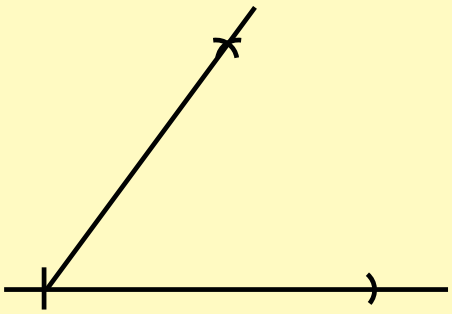
continued

4. Construct a triangle of your own choice that is different from the previous one.

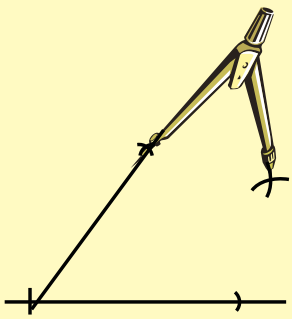
5. Construct a 30° angle. Use the guidelines below.

Follow the steps to construct a 60° angle (as in Question on page 97) and then follow steps 1 to 3 below.

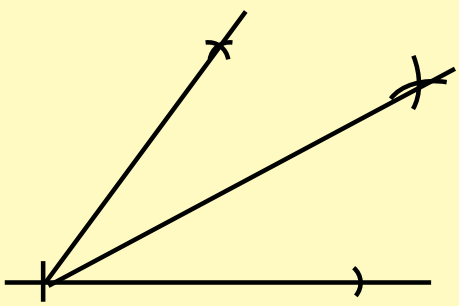
Step 1



Step 2



Step 3



To construct a 30° angle you bisect a 60° angle.

Problem solving

Construct any figure with at least one 30° and one 45° angle.

37 Circles

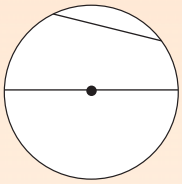
What do all these pictures have in common?

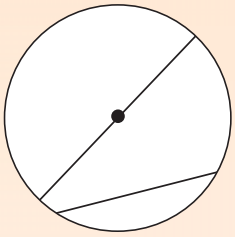


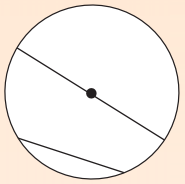


1. Label the circle.

Use the following words: chord, diameter, radius and centre.

a.


b.


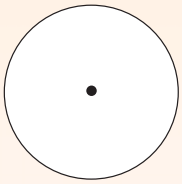
c.


2. What is a circle?

3. Measure the diameter of each circle. What is the radius of each circle?

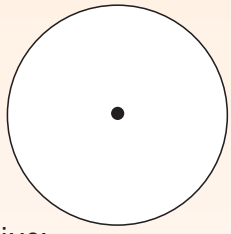
a. Underneath each circle write its radius.

b. Draw any chord on each circle and measure it.

(i).


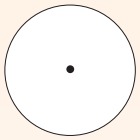
Radius: _____

Chord: _____

(ii).


Radius: _____

Chord: _____

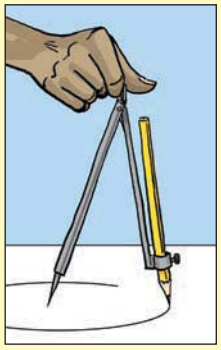
(iii).


Radius: _____

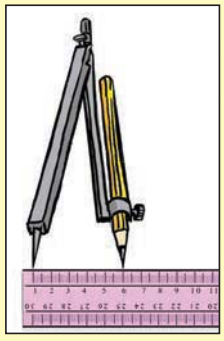
Chord: _____

How to draw a circle

To draw a circle accurately, use a pair of compasses.

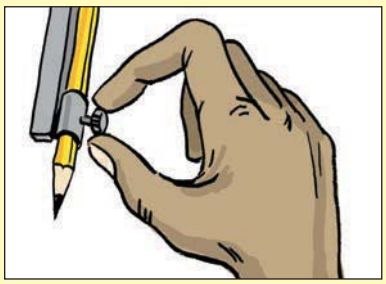


Align the pencil lead with the compass point.

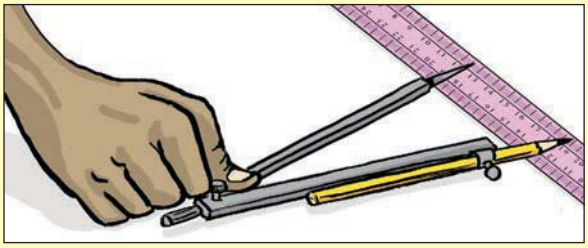




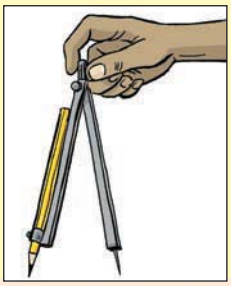
Tighten the hold for the pencil so it also does not slip.



Set the compass to the radius of the circle. (The radius is the distance between the centre and the circumference; it is half the diameter.)



Make sure that the hinge at the top of the compass is tightened so that it does not slip.



Press down the compass point and turn the knob at the top of the compass to draw a circle.



4. Draw these circles.

a. A circle with a diameter of 4 cm.

b. A circle with a diameter of 35 mm.

c. A circle with a diameter of 2,6 cm.

d. A circle with a diameter of 30 mm.

Problem solving

Draw a circle with a radius of 25 mm. Continue drawing circles with 25 cm radii to fill a separate sheet of paper with circle patterns.

continued

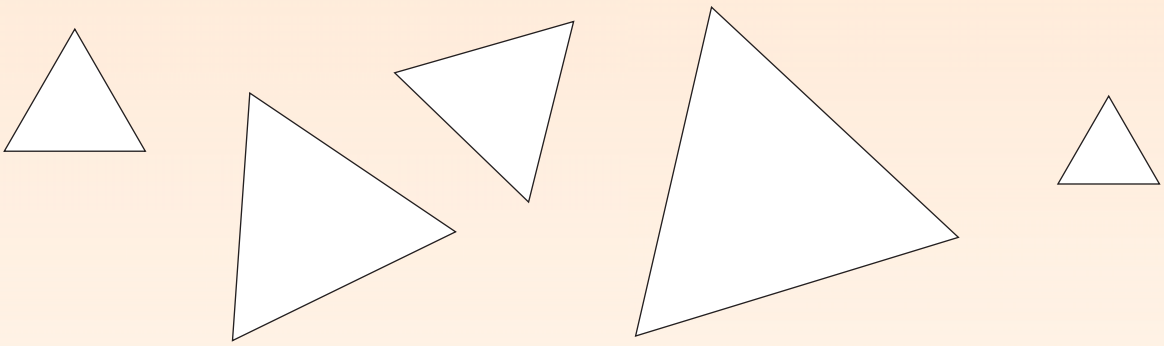
38 Triangles

What do these triangular road signs mean? Draw another two.



1. Measure each of these triangles:

a. Measure the sides.
b. What do you notice?
c. Measure the angles of the triangles.
d. Label each triangle.

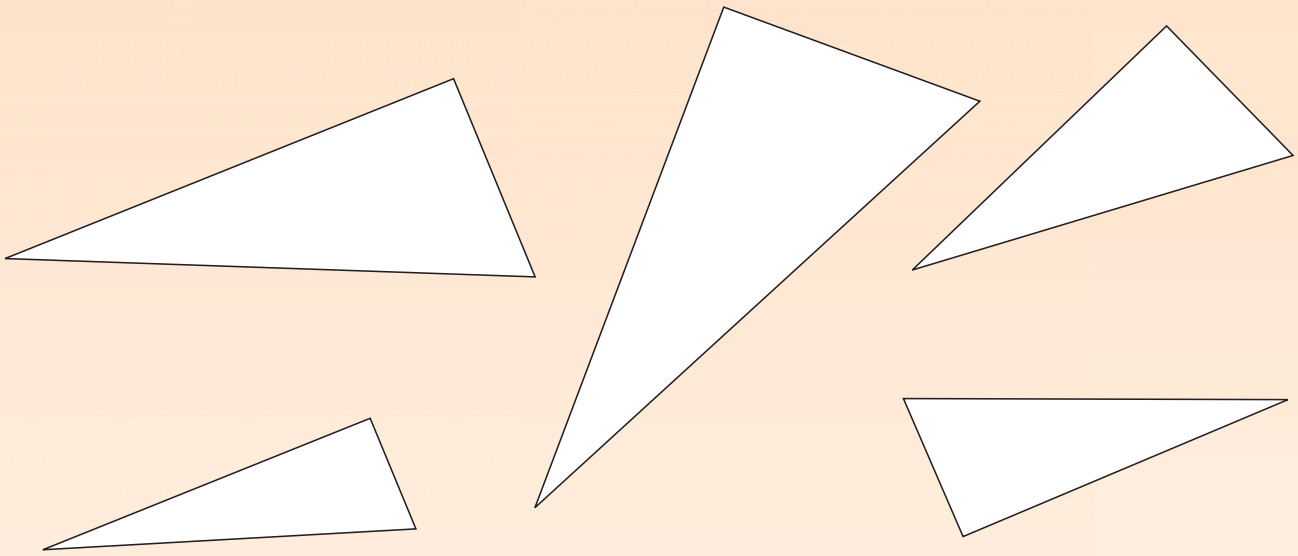


2. A triangle called an equilateral triangle has three equal sides and three equal angles. Draw three different equilateral triangles. Label each.



3. Measure each of these triangles:

a. Measure the sides.
b. What do you notice?
c. Measure the angles of the triangles.
d. Label each triangle.



4. A triangle called an isosceles triangle has two sides of equal length. Draw three different isosceles triangles.

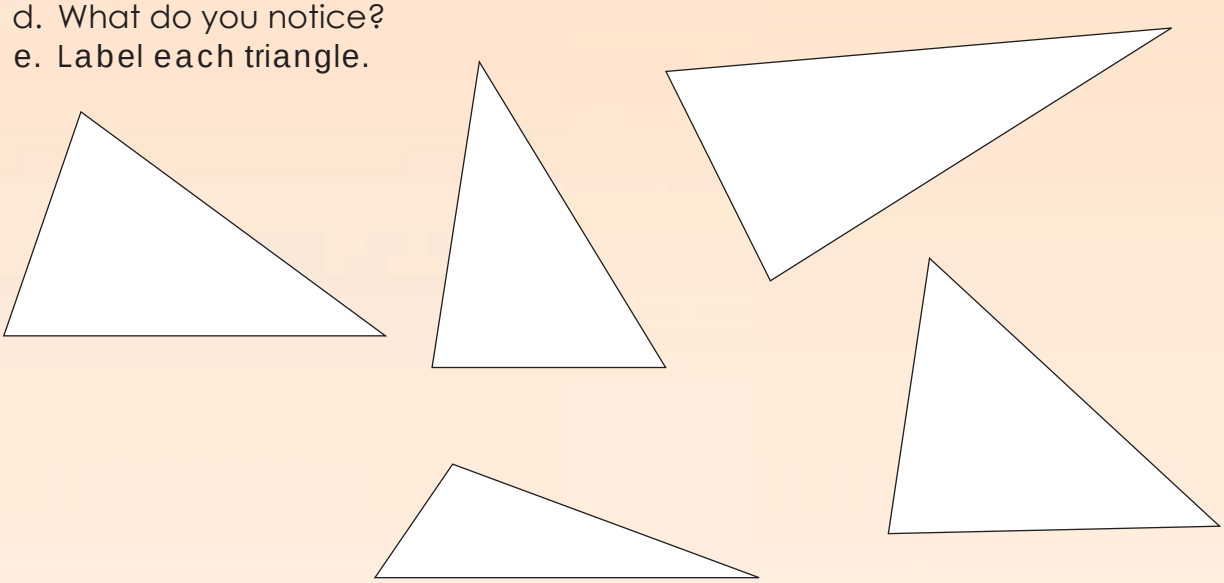
continued ☛

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Triangles continued

5. Measure each of these triangles:

a. Measure the sides.
b. What do you notice?
c. Measure the angles of the triangles.
d. What do you notice?
e. Label each triangle.

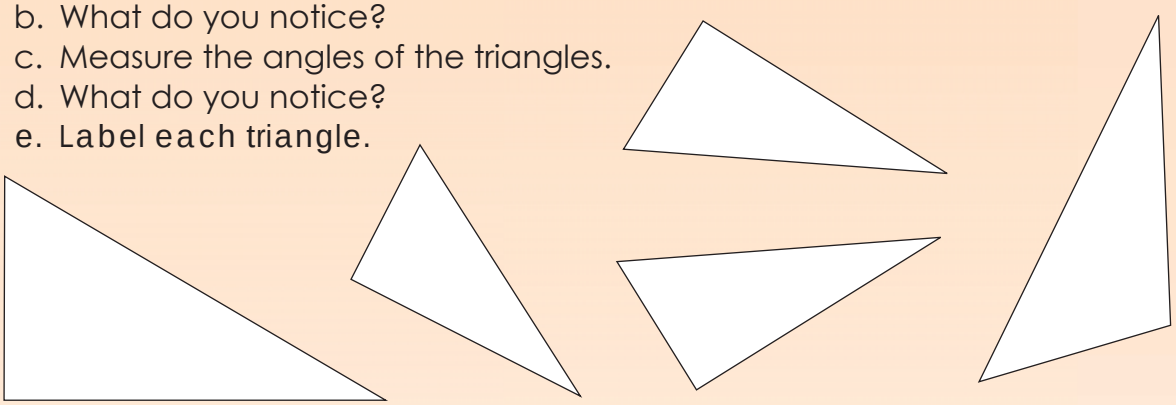


6. A scalene triangle has three sides of different lengths. Draw three different scalene triangles.



7. Measure each of these triangles:

a. Measure the sides.
b. What do you notice?
c. Measure the angles of the triangles.
d. What do you notice?
e. Label each triangle.



8. Draw three triangles of different size each with a right angle (90°).

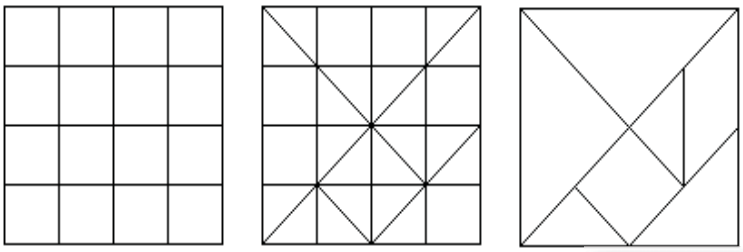
Problem solving

Create your own gift wrapping by drawing triangles on a sheet of paper. You should use all the types of triangles you have learned about.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

39 Polygons

Use the diagrams below to make your own Chinese puzzle, the tangram.





Why do you think we call a tangram a dissectional puzzle?

Draw each polygon on the left. Remember to make all sides equal, then measure one angle.

Measure all the other angles. What do you notice?

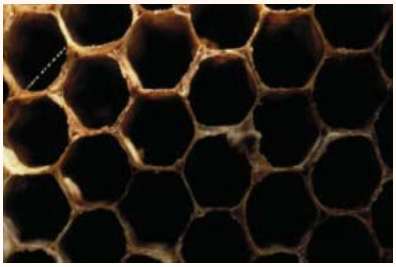
1. Complete this table.

Polygon	Number of sides	Angle size	Total sum of angles
			
			
			
			
			
			

2. What is this? Where would you find it? What polygon(s) can you identify?

Test your answers using the formula for calculating the angles of a polygon (number of sides – 2) x 180°

a.



b.



3. What geometric figures do you see?

a.



b.



4. Identify, name and describe the polygons in these pictures.

a.



b.



continued ☛

5. The tangram in Cut–out 1 is a dissection puzzle. It consists of seven pieces, called tans, which fit together to form a shape of some sort. The objective is to form a specific shape with seven pieces. The shape has to contain all the pieces, which may not overlap.

a. One of the shapes is a square. Build a large square with all the tangram pieces and then make a drawing of it.

b. Make a rectangle with all the pieces. Make a drawing of it.

c. Make a parallelogram with all the pieces. Make a drawing of it.

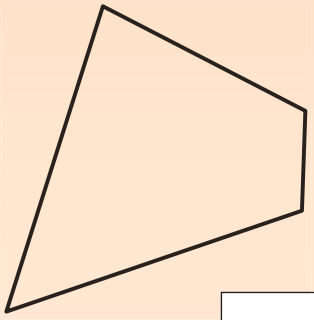
d. Make a trapezium with all the pieces. Make a drawing of it.

e. Make a triangle with all the pieces. Make a drawing.

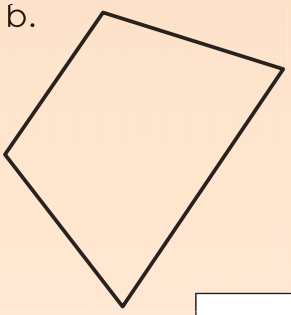
f. Make any other quadrilateral with the tangram pieces. Make a drawing.

6. Say whether each of the following is a quadrilateral or not. Give reasons for your answers.

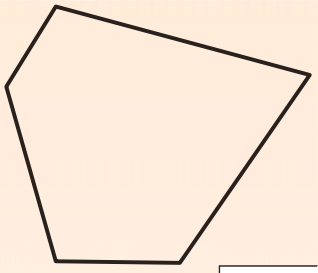
a.



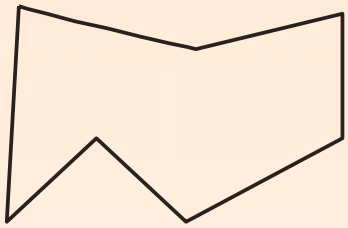
b.



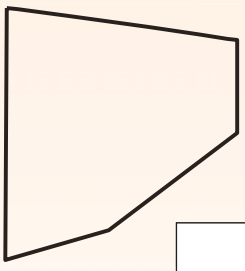
c.



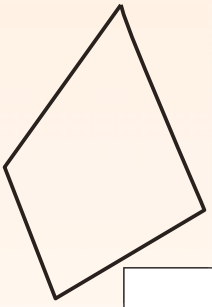
d.



e.

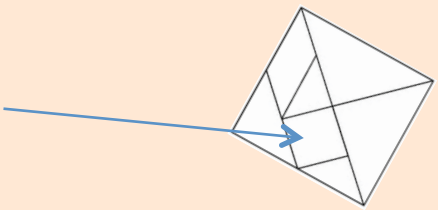


f.



Problem solving

What fraction of the tangram is this square?

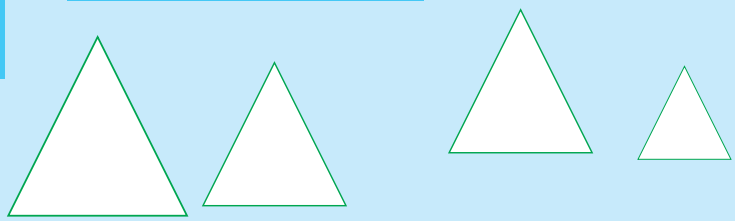


40 Congruent and similar shapes



Congruent means two shapes have the same shape and size even if you flip, turn or slide them.

Similar means two shapes differ only in size.



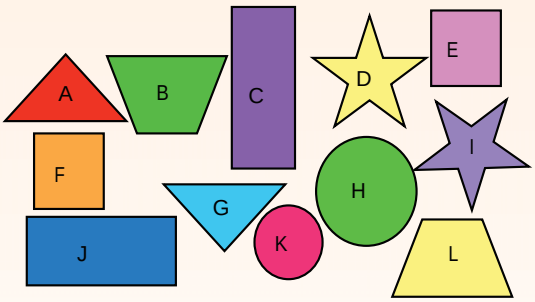
1. What do you notice about these pictures?



2. What do you notice about these pictures?



3. Which of the following shapes are congruent?



4. Draw a set of four similar shapes.

a.

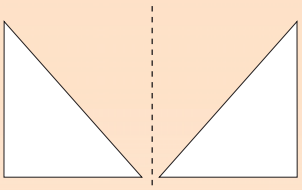
b.

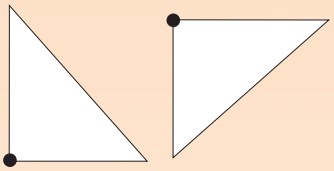
c.

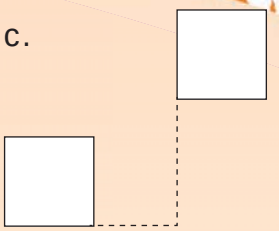
d.



5. Are these shapes congruent? Give reasons for your answer.

a. 

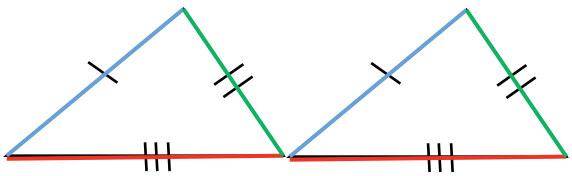
b. 

c. 

6. All these triangles are congruent. State your answer. We have done the first one for you.

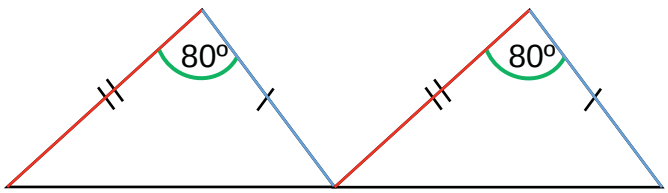
Use the colours to help you. Also use S = side and A = angle .

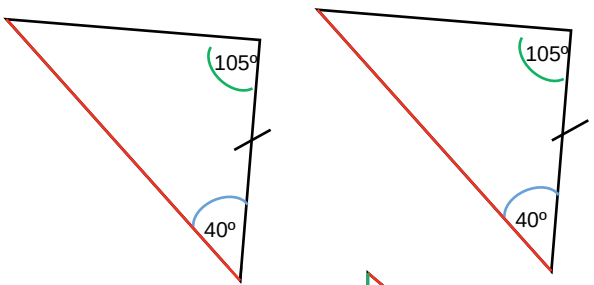
Make a drawing **similar** to one triangle.

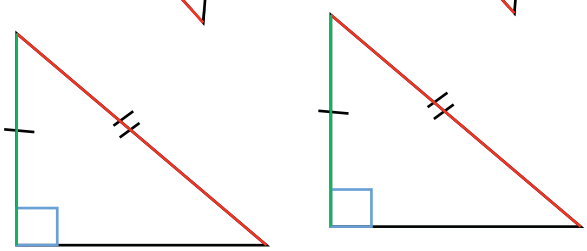
a. 

SSS
side
side
side

All three corresponding sides are equal.

b. 

c. 

d. 

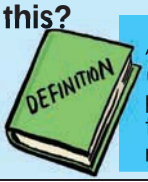
Problem solving

Where in nature will we see similarity and congruency? Draw a picture to illustrate your answer.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

41 Fractions

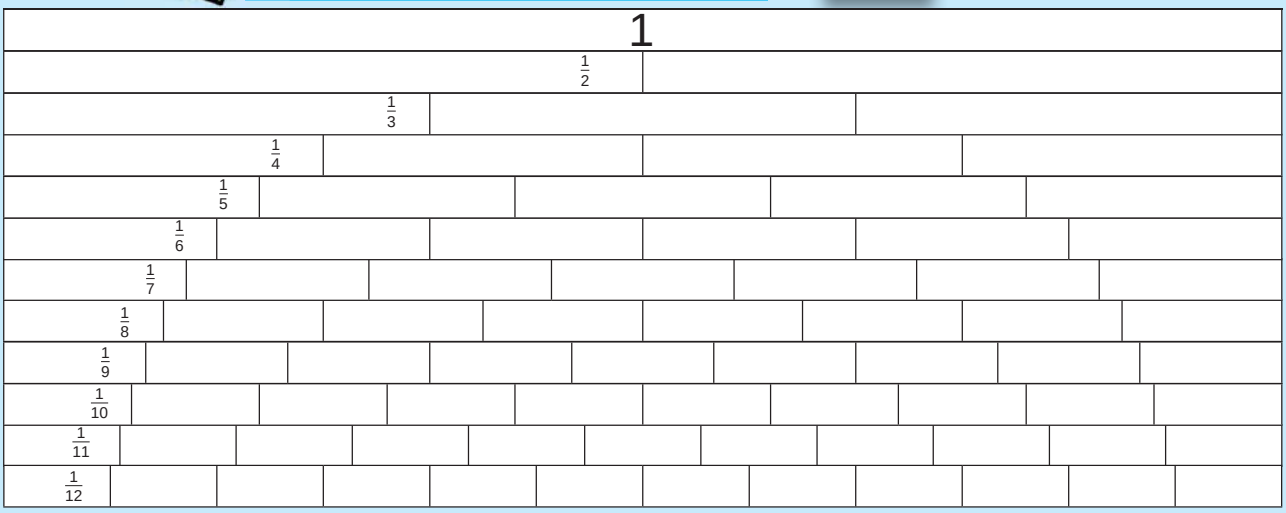
What is this?



A **fraction** is written with the bottom part (the **denominator**) telling you how many parts the whole is divided into, and the top part (the **numerator**) telling how many of those parts you have.

$\frac{3}{4}$ numerator

denominator



1. Complete the following:

a. $\frac{1}{4}$; $\frac{2}{4}$; ...1

b. $\frac{1}{9}$; $\frac{2}{9}$; $\frac{3}{9}$; ...1

c. $\frac{1}{11}$; $\frac{2}{11}$; $\frac{3}{11}$; ... 1

Where in daily life do we need to know about fractions and number lines?

d. $\frac{1}{5}$; $\frac{2}{5}$; $\frac{3}{5}$; ... 1

e. $\frac{1}{6}$; $\frac{2}{6}$; $\frac{3}{6}$; ...1

f. $\frac{1}{8}$; $\frac{2}{8}$; $\frac{3}{8}$; ... 1

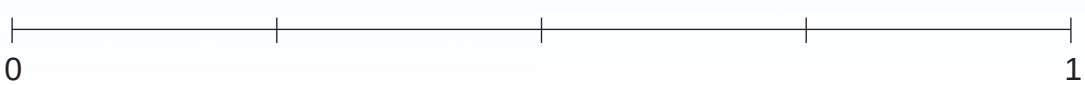


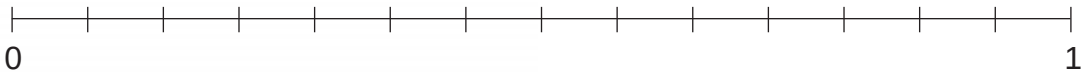
2. Complete the number lines.

a.


b.


c.


d.


e.


3. Count from:

a. two tenths to four tenths. _____

b. one twentieth to nine twentieths. _____

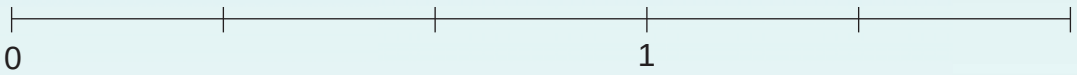
c. four fifteenths to ten fifteenths. _____

d. one hundredth to eight hundredths. _____

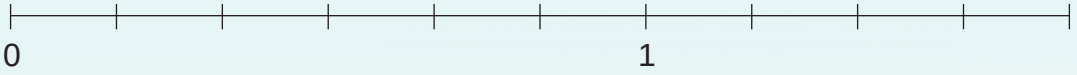
e. ten fiftieths to twelve fiftieths. _____

4. Complete the number lines:

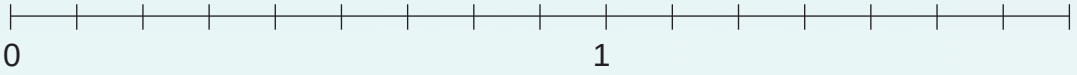
a.



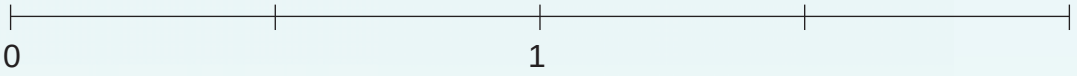
b.



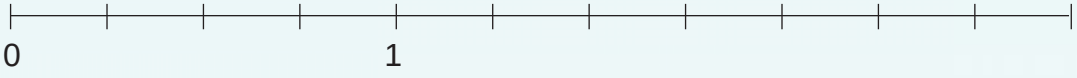
c.



d.



e.



f. How do these number lines differ from the ones in question 2?

5. Say whether it is a proper or improper fraction, or a mixed number:

a. $\frac{2}{4}$ _____ b. $\frac{6}{2}$ _____ c. $1\frac{1}{2}$ _____

d. $\frac{8}{5}$ _____ e. $\frac{1}{5}$ _____ f. $\frac{7}{4}$ _____

6. Write down:

a. Five proper fractions.

b. Five improper fractions.

c. Five mixed numbers.

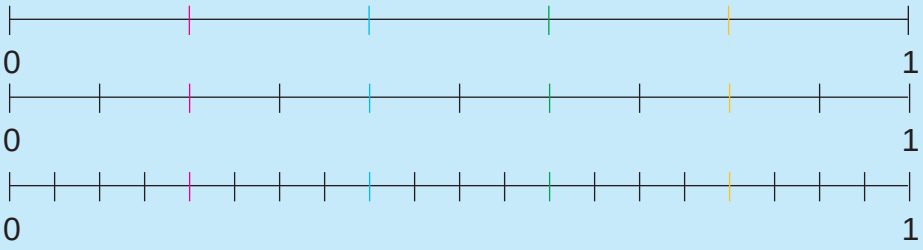
Problem solving

Name five fractions that are between one quarter and two quarters.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

42 Equivalent fractions

What do the same colour intervals have in common?



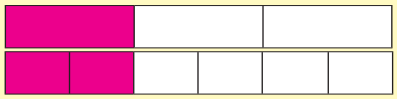
DEFINITION

Equivalent fractions have the same value, even though they look different.

Example: $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent, because they are both 'half'.

1. What fraction equals ___? Draw a diagram to show it.

Example: $\frac{1}{4} = \frac{2}{6}$



a. $\frac{1}{2}$ b. $\frac{1}{7}$ c. $\frac{1}{6}$

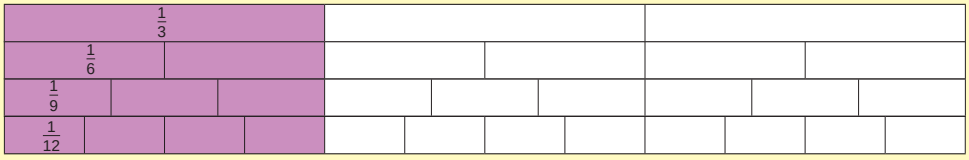
d. $\frac{1}{10}$ e. $\frac{1}{12}$ f. $\frac{1}{3}$

How can you use these measuring spoons to explain equivalent fractions to a friend?



2. Write the next or previous equivalent fraction for:

Example: $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$



One third is equivalent to two sixths, this again is equivalent to three ninths, and this again to four twelfths.

a. $\frac{2}{4} =$ ☐ b. $\frac{3}{4} =$ ☐ c. ☐ $= \frac{4}{14}$

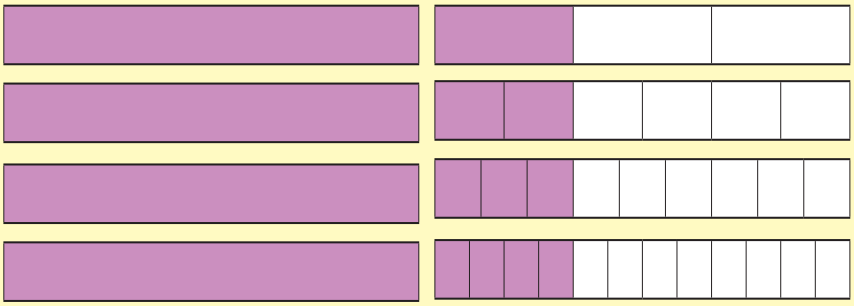
d. $\frac{8}{10} =$ ☐ e. ☐ $= \frac{4}{10}$ f. $\frac{4}{5} =$ ☐

3. What happened to the numerator and denominator in question 2?

a. ☐ b. ☐ c. ☐ d. ☐ e. ☐ f. ☐

4. Write down three equivalent fractions for each mixed number and make a drawing.

Example: $1\frac{1}{3} = 1\frac{2}{6} = 1\frac{3}{9} = 1\frac{4}{12}$



What happened to the denominators and numerators? Always start with the given number.

$1\frac{1}{3} \overset{\times 2}{\underset{\times 2}{}} = 1\frac{2}{6}$

$1\frac{1}{3} \overset{\times 3}{\underset{\times 3}{}} = 1\frac{3}{9}$

$1\frac{1}{3} \overset{\times 4}{\underset{\times 4}{}} = 1\frac{4}{12}$

a. $1\frac{1}{2}$

b. $3\frac{2}{3}$

c. $4\frac{4}{2}$

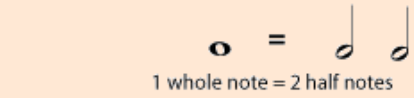
d. $6\frac{1}{3}$

e. $2\frac{3}{4}$

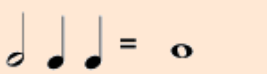
f. $2\frac{4}{5}$

Problem solving

What have music notes and equivalent fractions in common? Fill in the answers.



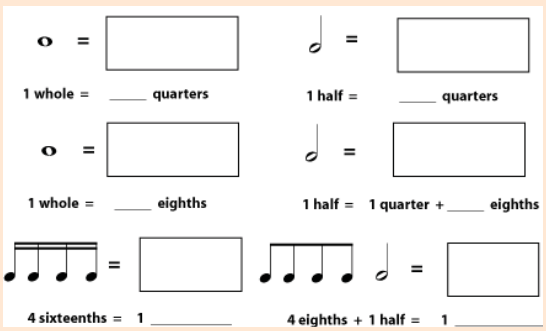
1 whole note = 2 half notes



1 half note + 2 quarter notes = 1 whole note



4 eighth notes = 1 half note



15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

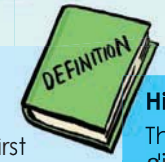
43 Simplest form

Are $\frac{8}{16}$ and $\frac{1}{2}$ the same?

What happened to the numerator from the first to the second fractions?

What happened to the denominator?

Why do you think we need to know how to use the HCF?



Highest common factor (HCF)
The highest number that divides exactly into two or more numbers.
If you find all the factors of two or more numbers, and you find some factors are the same ("common"), then the largest of those common factors is the Highest Common Factor.

The HCF is sometimes **also called the Greatest Common Factor (GCF)** or the **Greatest Common Divisor (GCD)**.



1. What is the highest common factor?

Example:
Highest common factor (HCF)
Factors of 4 = {1, 2, 4}
Factors of 6 = {1, 2, 3, 6}
HCF = 2
So 2 is the biggest number that can divide into 4 and 6.

a. Factors of 3 and of 4

b. Factors of 5 and of 6

c. Factors of 6 and of 12

d. Factors of 3 and of 9

e. Factors of 7 and of 8

f. Factors of 11 and of 10

2. Write in the simplest form.

Example: $\frac{12}{16}$

$= \frac{12}{16} \div \frac{4}{4}$

$= \frac{3}{4}$

HCF:
Factors of 12: = {1, 2, 3, (4), 5, 6, 12}
Factors of 16 : = {1, 2, (4), 8, 12}

a. $\frac{6}{18}$

b. $\frac{15}{25}$

c. $\frac{3}{9}$

d. $\frac{7}{21}$

e. $\frac{4}{36}$

f. $\frac{18}{36}$

3. Fill in the missing words.
(common factor, numerator, denominator)

a. Fractions can be simplified when the _____ and _____ have a _____ in them.

b. Give five examples of fractions that can be simplified.

Problem solving

What is $\frac{324}{414}$ in its simplest form?

44 Add common fractions with the same and different denominators

Give five fractions where the denominators are the same.
Give five fractions where the denominators are different.



Proper fraction	Improper fraction	Mixed number
$\frac{3}{4}$	$\frac{5}{4}$	$3\frac{1}{2}$

Sometimes we need to change proper fractions to improper fractions or vice versa.

Mixed number		Improper fraction
$1\frac{1}{4}$	⟺	$\frac{5}{4}$

Mixed number to an improper fraction: 1 (whole number) x 4 (denominator) + 1 (numerator) = 5.

Improper fraction to a mixed number: 5 (numerator) ÷ 4 (denominator) = 1 remainder 1

1. Add the following, write it as a mixed number, and simplify if necessary.

Example:

$$\frac{1}{3} + \frac{4}{3}$$
$$= \frac{5}{3}$$
$$= 1\frac{2}{3}$$



When we add fractions the denominators should be the same.

a. $\frac{2}{5} + \frac{4}{5} =$

b. $\frac{5}{9} + \frac{6}{9} =$

c. $\frac{3}{4} - \frac{2}{4} =$

d. $\frac{7}{10} + \frac{5}{10} =$

e. $\frac{5}{6} + \frac{3}{6} =$

f. $\frac{5}{7} + \frac{6}{7} =$

2. Calculate and simplify if necessary.

Example: $\frac{1}{2} \overset{\times 2}{\underset{\times 2}{}} + \frac{1}{4}$

$= \frac{2}{4} + \frac{1}{4}$

$= \frac{3}{4}$

Remember when we add fractions the denominators should be the same.

To do that we can find the Lowest Common Multiple (LCM).

Multiples of: = {2, (4), 6, 8, ...}

Factors of: = {(4), 8, 12, 16, ...}

Note that in this case the denominators are multiples of each other (2 is a multiple of 4.

a. $\frac{1}{4} + \frac{1}{2} =$

b. $\frac{1}{5} + \frac{1}{10} =$

c. $\frac{1}{3} + \frac{1}{6} =$

d. $\frac{1}{8} + \frac{1}{4} =$

e. $\frac{1}{5} + \frac{1}{4} =$

f. $\frac{1}{2} + \frac{1}{3} =$

3. In your own words write down how you would add:

Fractions with the same denominators.	Fractions with denominators that are multiples of each other.

Problem solving

What is $\frac{5}{10} + \frac{3}{10}$ in its simplest form?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

45 Multiply unit fractions by unit fractions

Compare the two calculations on the right. What do you notice?



A unit (or unitary) fraction is a fraction with a numerator of 1.

E.g.. $\frac{1}{4}$

$\frac{1}{2} + \frac{1}{4}$

LCM = 4

$\frac{2}{4} + \frac{1}{4}$

$= \frac{3}{4}$

$\frac{1}{2} \times \frac{1}{4}$

$= \frac{1}{8}$

When you multiplying fractions you simply multiply the numerators with each other, and the denominators with each other. In this example the sum means $\frac{1}{2}$ OF $\frac{1}{4}$ which is $\frac{1}{8}$.

1. First add and then multiply the two fractions.

Example: $\frac{1}{2}, \frac{1}{3}$

Addition

$\frac{1}{2} + \frac{1}{3}$

LCM = 6

$\frac{3}{6} + \frac{2}{6}$

$= \frac{5}{6}$

Multiplication

$\frac{1}{2} \times \frac{1}{3}$

$= \frac{1}{6}$

I see that when multiplying fractions the answer gets smaller. The denominator of the answerg gets bigger. So $\frac{1}{6}$ is less than $\frac{1}{2}$ and less than $\frac{1}{3}$.

That is true. Think about it. If I multiply a six pack of juice by 2 then I get twelve juices. But if I take half ($\frac{1}{2}$) of a six pack of juice I get three.

a. $\frac{1}{2}; \frac{1}{12}$

b. $\frac{1}{2}; \frac{1}{11}$

c. $\frac{1}{3}; \frac{1}{3}$

d. $\frac{1}{4}; \frac{1}{5}$

e. $\frac{1}{4}; \frac{1}{10}$

f. $\frac{1}{5}; \frac{1}{6}$

2. Calculate.

Example: $\frac{1}{2} \times \frac{1}{3} \times \frac{1}{4}$

$= \frac{1}{24}$



Why do you think it is so important to know your times tables?

a. $\frac{1}{2} \times \frac{1}{3} \times \frac{1}{2} =$

b. $\frac{1}{4} \times \frac{1}{5} \times \frac{1}{2} =$

c. $\frac{1}{3} \times \frac{1}{2} \times \frac{1}{4} =$

d. $\frac{1}{3} \times \frac{1}{6} \times \frac{1}{2} =$

e. $\frac{1}{3} \times \frac{1}{5} \times \frac{1}{2} =$

f. $\frac{1}{2} \times \frac{1}{5} \times \frac{1}{9} =$

3. What two fractions, when multiplied together, will give you the answer of $\frac{1}{32}$? What three fractions, when multiplied together, will give you the same answer?

4. What do you notice when you extend this unitary fraction pattern?

$\frac{1}{2} \times \frac{1}{2}, \frac{1}{3} \times \frac{1}{3}, \frac{1}{4} \times \frac{1}{4}, \frac{1}{5} \times \frac{1}{5} \ldots$

Problem solving

Can two unit (or unitary) fractions give you a single unit fraction if you:

- add them together?
- multiply them?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

46 Multiply common fractions by common fractions with the same and different denominators

Look at the fractions and compare the two blocks. Use the colours to guide you.

$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{4}$
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{6}$

$\frac{2}{4}$	$\frac{5}{6}$	$\frac{3}{8}$	$\frac{5}{7}$
$\frac{2}{8}$	$\frac{2}{7}$	$\frac{1}{4}$	$\frac{3}{6}$

Think of unit fractions and non–unit fractions.

Multiply the numbers with the same colour. Compare the two sets of calculations.

☐	X	☐	= ☐	☐	X	☐	= ☐
☐	X	☐	= ☐	☐	X	☐	= ☐
☐	X	☐	= ☐	☐	X	☐	= ☐
☐	X	☐	= ☐	☐	X	☐	= ☐

What happens with the denominators if you multiply them? Remember:
- If you multiply unit fractions, the product is a unit fraction.
- If you multiply non–unit fractions and non–unit fractions with a unit fraction, the product is a non–unit fraction.

1. Calculate:

Example 1: $\frac{6}{7} \times \frac{5}{7} = \frac{30}{49}$

Example 2: $\frac{6}{7} \times \frac{5}{6} = \frac{30}{42}$

a. $\frac{1}{3} \times \frac{2}{3} =$

b. $\frac{2}{4} \times \frac{1}{4} =$

c. $\frac{1}{6} \times \frac{3}{7} =$

d. $\frac{1}{2} \times \frac{4}{6} =$

e. $\frac{7}{8} \times \frac{2}{4} =$

f. $\frac{8}{5} \times \frac{4}{5} =$

2. How many different answers can you get? Give them all. State what fractions you are multiplying by.

Example: ___ x ___ = $\frac{12}{18}$

$\frac{3}{3} = 1$

$\frac{3}{3} \times \frac{4}{6} = \frac{12}{18}$ — A whole number x a proper fraction.

$\frac{3}{3} \times \frac{4}{6} = \frac{12}{18}$ — A proper fraction x an improper fraction.

a. ___ x ___ = $\frac{4}{9}$

b. ___ x ___ = $\frac{8}{4}$

c. ___ x ___ = $\frac{6}{8}$

d. ___ x ___ = $\frac{12}{16}$

e. ___ x ___ = $\frac{10}{64}$

f. ___ x ___ = $\frac{9}{12}$

3. What is one quarter of a half? Use diagrams to show your calculation.

Problem solving

What two fractions can you multiply to get the answer 42/99?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

47 Multiply whole numbers by common fractions

Look at the following and discuss it with a friend.

$8 \div 1 = 8$

$\frac{8}{1} = 8$

So we can write 8 as $\frac{8}{1}$

How would I write the following whole numbers as a fraction?

2	78	356	1 245	23 432	978 323

1. Calculate the following.

Example:

$8 \times \frac{1}{4}$

$= \frac{8}{1} \times \frac{1}{4}$

$= \frac{8}{4}$

$= 2$

$\frac{8}{4}$
$= 8 \div 4$
$= 2$

a. $2 \times \frac{3}{5} =$

b. $4 \times \frac{5}{6} =$

c. $11 \times \frac{3}{10} =$

d. $9 \times \frac{1}{2} =$

e. $\frac{2}{3} \times 2 =$

f. $8 \times \frac{6}{7} =$

2. What whole number and fraction will give you the following answer?

Example: $__ \times __ = \frac{2}{3}$

$= \frac{2}{1} \times \frac{1}{3}$

$= 2 \times \frac{1}{3}$

a. $__ \times __ = \frac{4}{6}$

b. $__ \times __ = \frac{9}{10}$

c. $__ \times __ = \frac{3}{8}$

d. $__ \times __ = \frac{15}{50}$

e. $__ \times __ = \frac{7}{21}$

f. $__ \times __ = \frac{6}{24}$

3. One fifth of 15 cell phones were sole on a special. What fraction were not sold?

Problem solving

If ___ (whole number) x __ fraction = $\frac{8}{12}$, how many possible solutions are there for this multiplication sum?

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

48 Multiply common fractions and simplify

Simplifying fractions means to make the fraction as simple as possible. Why say four eighths ($\frac{4}{8}$) when you really mean half ($\frac{1}{2}$) ?

Show a friend or family member how this fraction was simplified.

Explain this:

$$\frac{24}{108} \overset{\div 2}{=} \frac{12}{54} \overset{\div 2}{=} \frac{6}{27} \overset{\div 3}{=} \frac{2}{9}$$

1. Simplify the following:

Example:

$$\frac{15}{20} = \frac{15}{20} \div \frac{5}{5} = \frac{3}{4}$$

a. $\frac{4}{12}$ ☐

b. $\frac{8}{16}$ ☐

c. $\frac{5}{10}$ ☐

d. $\frac{16}{24}$

e. $\frac{7}{21}$ ☐

f. $\frac{24}{64}$ ☐

2. Multiply and simplify if possible.

Example:

$$\frac{1}{3} \times \frac{4}{8} = \frac{4}{24} = \frac{4}{24} \div \frac{4}{4} = \frac{1}{6}$$

a. $\frac{1}{2} \times \frac{4}{8} =$ ☐

b. $\frac{7}{7} \times \frac{3}{6} =$ ☐

c. $\frac{8}{10} \times \frac{10}{12} =$ ☐

d. $\frac{1}{3} \times \frac{5}{5} =$ ☐

e. $\frac{1}{2} \times \frac{3}{4} =$ ☐

f. $\frac{1}{2} \times \frac{2}{7} =$ ☐



3. Revision: write the improper fractions as mixed numbers and simplify if necessary.

Example: $\frac{14}{4} = \frac{7}{2} = 3\frac{1}{2}$

a. $\frac{19}{3}$ ☐

b. $\frac{21}{5}$ ☐

c. $\frac{20}{6}$ ☐

d. $\frac{22}{7}$ ☐

e. $\frac{10}{8}$ ☐

f. $\frac{21}{9}$ ☐

4. Multiply and simplify.

Example: $\frac{6}{4} \times \frac{5}{2}$

$= \frac{30}{8}$

$= 3\frac{6}{8}$

$= 3\frac{3}{4}$

HCF is 2

a. $\frac{3}{2} \times \frac{7}{6} =$ ☐

b. $\frac{6}{3} \times \frac{6}{5} =$ ☐

c. $\frac{8}{7} \times \frac{6}{4} =$ ☐

d. $\frac{5}{4} \times \frac{9}{8} =$ ☐

e. $\frac{6}{5} \times \frac{9}{8} =$ ☐

f. $\frac{9}{7} \times \frac{6}{3} =$ ☐

Problem solving

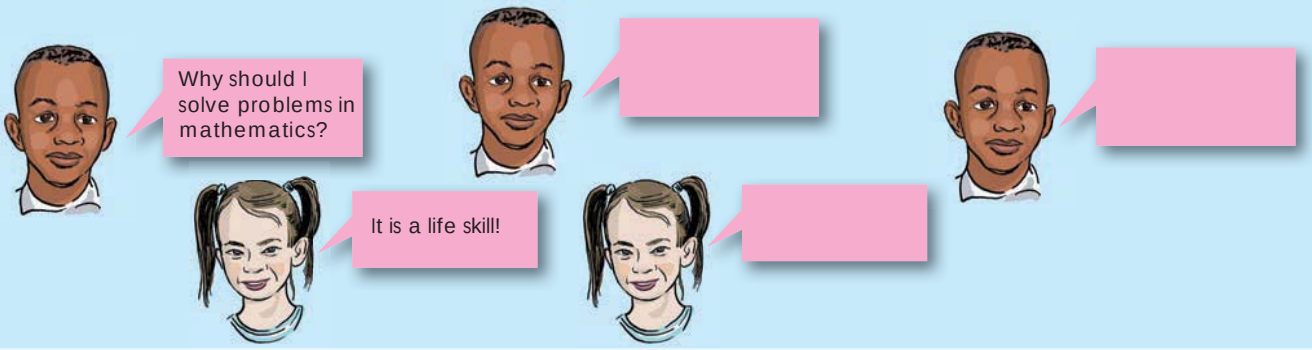
a. What is $\frac{16}{20} \times \frac{2}{4}$ in its simplest form?

b. Multiply any two improper fractions and simplify your answer if necessary.

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

49 Solve fraction problems

Complete this conversation about why we should solve problems in mathematics.



1. Calculate the following. You may need extra paper to do your calculations.

Example 1: One half of an hour

$= \frac{1}{2}$ of 60 minutes

$= \frac{1}{2} \times 60$

$= \frac{1}{2} \times \frac{60}{1}$

$= \frac{60}{2}$

= 30 minutes

Which word tells you it is a multiplication sum?

Example 2: What fraction is six hours of one day?

$\frac{6}{24}$

Factors of 6 = {1, 2, 3, 6}

Factors of 24 = {1, 2, 3, 4, 6, 8, 12, 24}

$= \frac{6}{24} \div \frac{6}{6}$

$= \frac{1}{4}$

a. One half of a week.

b. One quarter of a day.

c. One fifth of a decade.

d. One third of an hour.

e. One half of a century.

f. One half of a millennium.

g. What fraction is 2 days of 9 weeks?

h. What fraction is 3 months of 9 years?

i. What fraction is 15 minutes of an hour?





2. How much of their R150 did they have left?

Example: You have R150.
If you spent $\frac{1}{5}$ of it, how much money would you have left?

$\frac{1}{5}$ of R150

Which word tells you it is a multiplication sum? (of)

$= \frac{1}{2} \times \frac{R150}{1}$

$= \frac{R150}{5}$ (R150 ÷ 5)

= R30

= R150 – R30

You have R120 left.

a. John spent $\frac{1}{2}$

b. Veronica spent $\frac{1}{6}$

c. Mary spent $\frac{1}{10}$

d. Mandla spent $\frac{1}{8}$

e. Susan spent $\frac{1}{4}$

f. Gugu spent $\frac{1}{3}$



3. You have R120 to spend on clothing. You can get discounts at different stores. Work out how much discount you can get at each.

Example: You bought clothing to the value of R120. You got $\frac{1}{3}$ discount. How much discount did you get?

$\frac{1}{3} \times$ R120

$= \frac{1}{3} \times \frac{R120}{1}$

$= \frac{R120}{3}$ (R120 ÷ 3)

= R40

You got R40 discount.

a. $\frac{1}{2}$

b. $\frac{1}{8}$

c. $\frac{1}{12}$

d. $\frac{1}{4}$

e. $\frac{1}{6}$

f. $\frac{1}{3}$

continued

15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

49b Solve time fraction problems continued

4. Solve these:

Example: What is one half of a metre?

$\frac{1}{2}$ of a metre

$= \frac{1}{2}$ of a 1 000 mm

$= \frac{1}{2} \times \frac{1\,000}{1}$ mm

$= \frac{1\,000}{2}$ mm (1 000 ÷ 2)

= 500 mm

a. $\frac{1}{2}$ of a kilometre

b. $\frac{1}{4}$ of a kilometre

c. $\frac{1}{4}$ of a centimetre

d. $\frac{1}{5}$ of a kilometre

e. $\frac{1}{4}$ of a metre

f. $\frac{1}{2}$ of a kilometre

5. Solve these completion of travel distance problems. If I completed ___ of the distance, how far do I still have to travel?

Example: I completed one fifth of my 200 km journey. How far do I still need to travel?

$= \frac{1}{5} \times 200$ km

$= \frac{1}{5} \times \frac{200}{1}$ km

$= \frac{200}{5}$ km (200 ÷ 5)

= 40 km

I still need to travel 160 km (200 km – 40 km)

a. $\frac{1}{10}$

b. $\frac{1}{12}$

c. $\frac{1}{2}$

d. $\frac{1}{3}$

e. $\frac{1}{4}$

f. $\frac{1}{6}$

6. My r friends and I competed in a cycling race of 120 km. We had to finish the race in eight hours. After six hours, ten of us still needed to travel the remaining quarter of the distance. How far did we still need to go to the finishing line? Did we finish the race in time?

7. Solve: What is?

Example: What is a quarter of a kilogram?

$\frac{1}{4}$ of a kilogram

$= \frac{1}{4}$ of 1 000 g

$= \frac{1}{4} \times \frac{1\,000}{1}$ g

$= \frac{1\,000}{4}$ g (1 000 ÷ 4)

= 250 g

a. $\frac{1}{2}$ of a kg

b. $\frac{1}{4}$ of a kg

c. $\frac{1}{5}$ of a kg

d. $\frac{1}{10}$ of a kg

e. $\frac{1}{8}$ of a kg

f. $\frac{1}{100}$ of a kg

8. Solve: How many grams did I eat?

Example: I ate $\frac{1}{5}$ of my 150 grams of food. How many grams did I eat?

$= \frac{1}{5}$ of 150 grams

$= \frac{1}{5} \times 150$ grams

$= \frac{1}{5} \times \frac{150}{1}$ grams

$= \frac{150}{5}$ grams

= 30 grams

= I ate 30 grams

a. $\frac{1}{8}$

b. $\frac{1}{2}$

c. $\frac{1}{4}$

d. $\frac{1}{5}$

e. $\frac{1}{10}$

f. $\frac{1}{20}$

9. Solve: How many mililitres did I drink?

Example: What is two fifths of a litre?

$\frac{2}{5}$ of a litre

$= \frac{2}{5} \times \frac{1\,000}{1}$ ml

$= \frac{2\,000}{5}$ ml (2 000 ÷ 5)

= 400 ml

a. $\frac{1}{2}$ of a litre

b. $\frac{1}{4}$ of a litre

c. $\frac{2}{4}$ of a litre

d. $\frac{4}{5}$ of a litre

e. $\frac{3}{8}$ of a litre

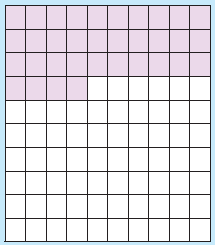
f. $\frac{3}{10}$ of a litre

Problem solving

Write your own word problem on a separate piece of paper, using capacity and fractions. Use the previous questions to guide you.

50 Fractions, decimals and percentages

Explain the following:



$\frac{34}{100}$ = 0,34 = 34%

Quick quiz: What does the following mean:

- **Cent**?
- **Cent**ury?
- **Cent**ipede?
- Per**cent**age?

100

1. Write the following as a fraction and a decimal fraction:

Example: 18% or $\frac{18}{100}$ or 0,18

= $\frac{9}{50}$

If possible write the fraction in the simplest form.

$\frac{18}{100}$ Simplified is $\frac{9}{50}$

a. 37%

b. 25%

c. 83%

d. 90%

e. 55%

f. 3%

2. Write the following as a fraction in its simplest form.

Percentage	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Fraction										
Simplest form										

Describe the pattern.

3. Calculate.

Example: 18% of R20

= $\frac{18}{100} \times \frac{R20}{1}$

= $\frac{R360}{100}$

= R3,60

a. 20% of R24

b. 70% of R15

c. 60% of R95

d. 80% of R74

e. 30% of R90

f. 50% of R65

4. Calculate.

Example: 60% of R150

$\frac{60}{100} \times \frac{R150}{1}$

= $\frac{3}{5} \times \frac{R150}{1}$

= $\frac{R450}{5}$

= R90

I can write 60% as $\frac{60}{100}$

$\frac{60}{100}$ simplified is $\frac{6}{10} = \frac{3}{5}$

or

= $\frac{9\,000}{100}$

= R90

a. 30% of R1,80

b. 80% of R1,60

c. 90% of R8,10

d. 20% of R4,60

e. 60% of R5,40

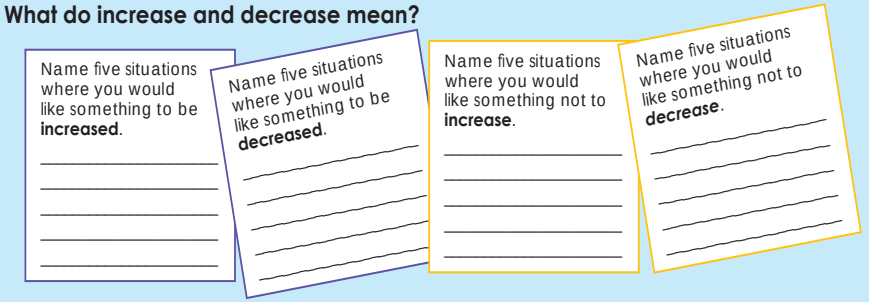
f. 20% of R6,40

Problem solving

I bought a pair of shoes for R150. I got 25% discount. How much did I pay for it?

51 Increase and decrease percentages

What do increase and decrease mean?



1. Calculate the percentage increase.

Example: Calculate the **percentage** increase if the price of a bus ticket of R60 is **increased** to R84.

$$\frac{24}{60} \times \frac{100}{1} = \frac{240}{60} = 40\%$$

We first need to ask by how much the bus ticket price was increased.

It was increased by R24 because R84 minus R60 is R24.

24/60 is the price increase.

To work out the percentage increase we multiply by 100.

a. R50 to R70

Price increase: _____

b. R80 to R120

Price increase: _____

c. R15 to R18

Price increase: _____

d. R25 to R30

Price increase: _____

e. R100 to R120

Price increase: _____

f. R36 to R54

Price increase: _____

2. Name an item which you really like, the price of which was increased recently. What was the percentage increase?

3. Calculate the percentage decrease.

Example: Calcualte the percentage decrease if the price of petrol goes down from 20 cents a litre to 18 cents.

$$\frac{2}{20} \times \frac{100}{1} = \frac{200}{20} = 10\%$$

We first need to say by how much the petrol price was decreased.

It was decreased by 2c because 18c + 2c gives you 20c.

2/20 is the decrease in price.

Then, to work out the percentage decrease, we multiply $\frac{2}{20}$ by 100.

a. R20 of R15

Price decrease: _____

b. R50 of R45

Price decrease: _____

c. R18 of R15

Price decrease: _____

d. R24 of R18

Price decrease: _____

e. R90 of R80

Price decrease: _____

f. R28 of R21

Price decrease: _____

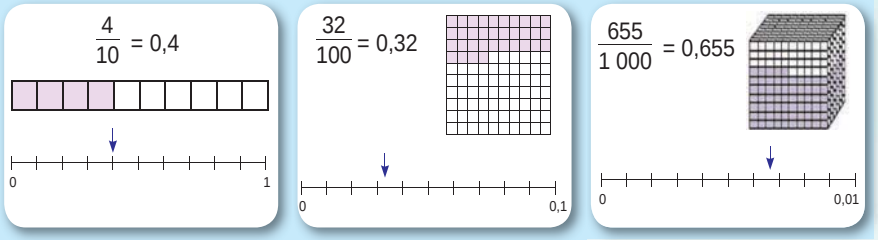
4. What item do you want to be decreased in price? What does it cost? If the price is decreased by 20% what will the new price be?

Problem solving

Calculate the percentage decrease if the price of petrol goes down from 960 cents to 840 cents per litre.

52 Place value, and ordering and comparing decimals

Look at the following and explain it.



1. Write the following in expanded notation:

Example: 3,785
= 3 + 0,7 + 0,08 + 0,005

a. 4,378 b. 5,213 c. 14,678

d. 5,036 e. 8,305 f. 9,006

2. Write the following in words:

Example: 4,326
= 4 units + 3 tenths + 2 hundredths + 6 thousandths

a. 5,376

b. 8,291

c. 3,589

d. 7,036

e. 8,005

3. Write the following in the correct column:

		thousands	hundreds	tens	units		tenths	hundredths	thousandths
a.	4,765				4	,	7	6	5
b.	18,346					,			
c.	19,005					,			
d.	231, 04					,			
e.	7685,2					,			

4. Write down the value of the underlined digit:

Example: 3,7<u>8</u>4
= 0,08 or 8 hundredths

a. 6,3<u>5</u>7 b. 4,3<u>2</u> c. <u>5</u>,809

d. 8,9<u>9</u>9 e. 8<u>8</u>,080 f. 34,00<u>2</u>

5. Write the following in ascending order:

a. 0,04; 0,4; 0,004

b. 0,1; 0,11; 0,011

c. 0,99; 0,9; 0,999

d. 0,753; 0,8; 0,82

e. 0,67; 0,007; 0,06

6. Fill in <, >, =

a. 0,4 ☐ 0,04 b. 0,05 ☐ 0,005 c. 0,1 ☐ 0,10

d. 0,62 ☐ 0,26 e. 0,58 ☐ 0,85 f. 0,37 ☐ 0,73

g. 0,123 ☐ 0,321 h. 0,2 ☐ 0,20 i. 0,4 ☐ 0,40

j. 0,05 ☐ 0,050

continued ☛

Place value, and ordering and comparing decimals continued

7. Write as a decimal fraction:

Example: $\frac{5}{100}$

= 0,05

a. $\frac{6}{10}$ b. $\frac{7}{10}$ c. $\frac{8}{1\,000}$

d. $\frac{4}{10}$ e. $\frac{5}{1\,000}$ f. $\frac{3}{1\,000}$

8. Write as a decimal fraction:

Example: $\frac{23}{100}$

= 0,23

a. $\frac{45}{100}$ b. $\frac{76}{100}$ c. $\frac{98}{100}$

d. $\frac{36}{100}$ e. $\frac{476}{100}$ f. $\frac{75}{1\,000}$

9. Write as a decimal fraction.

Example: $\frac{45}{10}$

= 4,5

a. $\frac{36}{10}$ b. $\frac{6\,705}{100}$ c. $\frac{88}{10}$

d. $\frac{3\,200}{100}$ e. $\frac{765}{10}$ f. $\frac{9\,347}{100}$

10. Write as a common fraction.

Example: 5,7

$= \frac{57}{10}$

a. 9,5 b. 15,15 c. 8,934

d. 3,76 e. 32,004 f. 7,6

11. Write the following as a decimal fraction.

Example: $\frac{2}{5} = \frac{4}{10} = 0{,}4$

$\frac{1}{25} = \frac{4}{100} = 0{,}04$

a. $\frac{1}{5}$ b. $\frac{1}{4}$ c. $\frac{1}{2}$

d. $\frac{3}{5}$ e. $\frac{2}{4}$ f. $\frac{1}{25}$

Problem solving

[You can use a calculator if you want to.]
What would you do to change the decimal fraction 7,345 to 7,305?
Then to change it to 7,005 and then to 7?
If the tenths digit is nine and the units digit is five, what should I do to get an answer of 5,932?

53 Decimal fractions

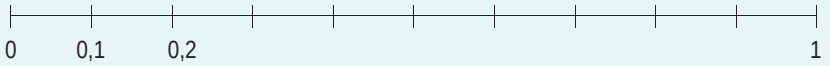
How fast can you count from:

0,2 to 1,3	0,2; 0,3; 0,4; _____
1,12 to 1,2 (1,2 is the same as 1,20.)	1,12; 1,13; 1,14; _____
1,251 to 1,26 (1,26 is the same as 1,260.)	1,251; 1,252; 1,253; _____

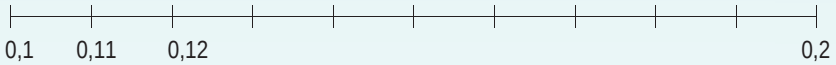
How does this link to decimal fractions: kg, m, ml, cm, etc.?

1. Complete the number lines.

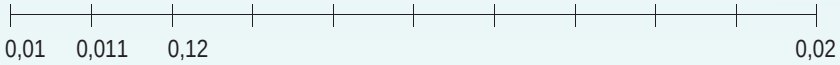
a.



b.



c.



d. What do you notice? _____

2. Complete the following:

Example: 0,34; 0,35; 0,36; …; 0,39
= 0,34; 0,35; 0,36; **0,37**; **0,38**; 0,39

a. 0,1; 0,2; 0,3; …; 0,5; 0,6; 0,7; 0,8; 0,9
_____

b. 0,21; 0,22; 0,23; …; 0,25; 0,26; 0,27; 0,28; 0,29
_____

c. 0,31; 0,32; 0,33; …; 0,35; 0,36; 0,37; 0,38; 0,39
_____

3. Extend the pattern by five decimal fractions:

Example: 5,36; 5,37; 5,38; …
= 5,36; 5,37; 5,38; **5,39; 5,4; 5,41; 5,42; 5,43**

a. 7,7; 7,8; 7,9; _____

b. 3,64; 3,65; 3,66; _____

c. 2,173; 2,174; 2,175; _____

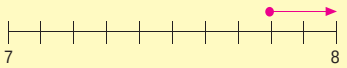
d. 5,4; 5,5; 5,6; _____

e. 9,6; 9,5; 9,4; _____

f. 3,874; 3,873; 3,872; _____

4. Round off to the nearest unit.

Example: 7,8
Rounded off to 8

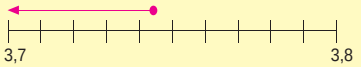


a. 3,1 _____ b. 2,8 _____ c. 5,27 _____

d. 5,3 _____ e. 3,9 _____ f. 6,89 _____

5. Round off to the nearest tenth.

Example: 3,745
Rounded off to 3,7



a. 6,14 _____ b. 3,578 _____ c. 5,63 _____

d. 68,467 _____ e. 7,223 _____ f. 4,32 _____

6. Round off to the nearest 10, 100 and 1 000.

		Unit	Tenth
a.	3,84		
b.	3,89		
c.	14,27		
d.	999,31		
e.	4,09		
f.	51,781		

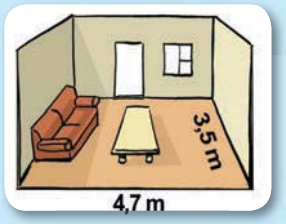
Problem solving

1. Give five examples of decimal fractions that will be between 0,08 and 0,09.
2. Give five examples of numbers you could have rounded off to 5.

54 Addition and subtraction with decimal fractions

Look at the following pictures. Make up your own addition and/or subtraction sums.







1. Calculate using both methods. Check your answer.

Example 1: 2,37 + 4,53
= (2 + 4) + (0,3 + 0,5) + (0,07 + 0,03)
= 6 + 0,8 + 0,1
= 6,9

Example 2:
2,37
+ 4,53
6,90

Make sure the commas are under each other.

Note that 6,9 and 6,90 are the same.

a. 3,12 + 4, 57 =

b. 5,34 + 2,26 =

You can check your answer using the inverse operation of addition, that is subtraction.

c. 1,46 + 2,28 =

d. 3,45 + 4,67 =

e. 6,58 + 5,78 =

f. 9,99 + 9,97 =

2. Calculate using both methods.

Example 1: 2,37 + 4,53 – 3,88
= (2 + 4 – 3) + (0,3 + 0,5 – 0,8) + (0,07 + 0,03 – 0,08)
= 3 + 0 + 0,02
= 3,02

Example 2:
2,37
+4,53
6,90
– 3,88
3,02

Make sure the commas are under each other.

a. 1,15 + 2,21 – 1,21 =

b. 2,34 + 3,42 – 2,34 =

c. 3,24 + 3,35 – 5,36 =

d. 4,76 + 6,11 – 3,52 =

e. 2,36 + 5,42 – 3,47 =

f. 6,89 + 9,10 – 5,19 =

3. Make five different number sentences using the following decimals. Solve them. 2,56; 1,99 and 3,47. Calculate the answers.

Problem solving

My friend went on a diet and lost 2,5 kg the first week, and 1,25kg the second week. He gained 0,75kg the third week and lost 0,5 kg the fourth week. How much did he lose in the four weeks? (Remember it is not healthy to lose too much weight in a short period of time.)

55 Multiplication of decimal fractions

Look at the following pictures. Make up your own addition, subtraction and multiplication sum for each.





1. Calculate. (Check your answers using a calculator.)

Example:

- 0,2 x 0,3 = 0,06
- 0,02 x 0,3 = 0,006
- 0,02 x 0,03 = 0,0006

Do you notice the pattern? Describe it.

a. 0,4 x 0,2 = ____ b. 0,3 x 0,1 = ____ c. 0,4 x 0,5 = ____

d. 0,6 x 0,7 = ____ e. 0,04 x 0,02 = ____ f. 0,05 x 0,1 = ____

2. Calculate. (Check your answers using a calculator.)

Example 1: 0,2 x 4 = 0,8

Example 2: 0,02 x 4 = 0,08

Example 3: 0,4 x 3 = 1,2

a. 0,5 x 3 = ____ b. 0,8 x 3 = ____ c. 0,6 x 4 = ____

d. 0,02 x 9 = ____ e. 0,07 x 6 = ____ f. 0,003 x 8 = ____

3. Calculate. (Check your answers using a calculator.)

Example 1: 0,3 x 0,2 x 100
= 0,06 x 100
= 6

Example 2: 0,3 x 0,2 x 10
= 0,06 x 10
= 0,6

a. 0,4 x 0,2 x 10 =

b. 0,5 x 0,02 x 10 =

c. 0,3 x 0,3 x 100 =

d. 0,6 x 0,03 x 100 =

e. 0,5 x 0,2 x 100 =

f. 0,7 x 0,01 x 100 =

4. Calculate. (Check your answers using a calculator.)

Example: 5,276 x 30
= (5 x 30) + (0,2 x 30) + (0,07 x 30) + (0,006 x 30)
= 150 + 6 + 2,1 + 0,18
= 150 + 6 + 2 + 0,1 + 0,1 + 0,08
= 158 + 0,2 + 0,08
= 158,28

a. 1,123 x 10 =

b. 4,886 x 30 =

c. 2,932 x 40 =

d. 7,457 x 60 =

e. 8,234 x 20 =

f. 6,568 x 80 =

g. Take your answers from a to f and write them down in ascending order.

5. Now take question and use the column method to do all the multiplications. Use a separate sheet of paper.

Problem solving

Multiply the number that is exactly between 1,15 and 1,16 by the number that is equal to ten times three.

56 Division, rounding off and flow diagrams

Look at the following two patterns and describe them.

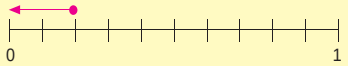
800 ÷ 4 = 200	80 ÷ 4 = 20	8 ÷ 4 = 2	0,8 ÷ 4 = 0,2	0,08 ÷ 4 = 0,02
150 ÷ 3 = 50	15 ÷ 3= 5	1,5 ÷ 3 = 0,5	0,15 ÷ 3 = 0,05	0,015 ÷ 3 = 0,005

Explain to a friend what rounding off to the nearest whole number or to a tenth means if you work with decimals.

1. Calculate the following:

Example: 0,4 ÷ 2 = 0,2

0,2 rounded off to the nearest whole number is 0.



a. 0,8 ÷ 4 = ____ b. 0,6 ÷ 3 = ____ c. 0,6 ÷ 2 = ____

d. 0,8 ÷ 2 = ____ e. 1,8 ÷ 3 = ____ f. 2,4 ÷ 8 = ____

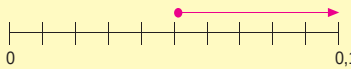
2. Now round off your answers to question 1 to the nearest whole number.

a. ____ b. ____ c. ____ d. ____ e. ____ f. ____

3. Calculate the following:

Example: 0,25 ÷ 5 = 0,05

0,05 rounded off to the nearest tenth is 0,1.



a. . 0,81 ÷ 9 = ____ b. 0,35 ÷ 7 = ____ c. 0,63 ÷ 7 = ____

d. 0,54 ÷ 6 = ____ e. 0,12 ÷ 4 = ____ f. 0,85 ÷ 5 = ____

4. Now round off your answers to question 3 to the nearest tenth.

a. ____ b. ____ c. ____ d. ____ e. ____ f. ____

5. Complete these flow diagrams. Round off to the nearest whole number.

a.
- R0,50
- Divide by 2
- Round off to the nearest rand
- ____

b.
- Divide by 2m
- Divide by 8
- Round off to the nearest metre
- ____

c.
- 5,4 kg
- Divide by 9
- Round off to the nearest kilogram
- ____

d.
- R3,75
- Divide by 25
- Round off to the nearest rand
- ____

e.
- 2,5 *l*
- Divide by 5
- Round off to the nearest litre
- ____

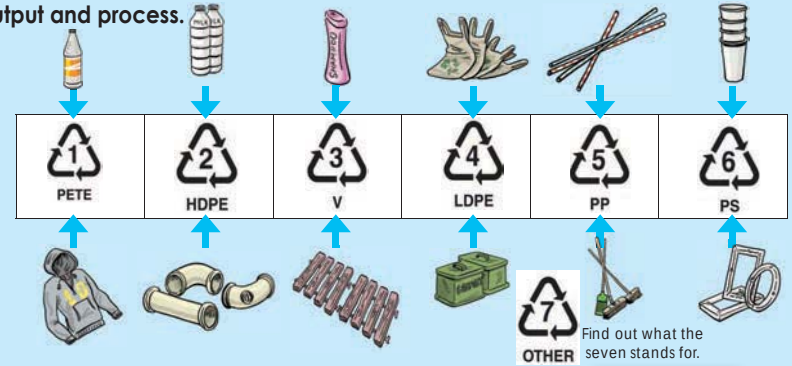
f.
- 1,44 kg
- Divide by 12
- Round off to the nearest kilogram
- ____

Problem solving

- You need seven equal pieces from 28,7 m of rope. How long will each piece be?
- I have R45,75. I have to divide it by five. What will my answer be?
- My mother bought 12,8 m of string. She has to divide it into four pieces. How long will each piece be?

57 Flow and spider diagrams

Look at the pictures. Describe them using words such as recycling, plastic, input, output and process.



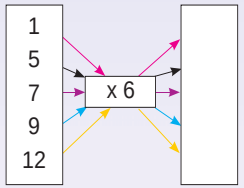
Find out what the seven stands for.

1. How fast can you complete the diagrams?

This is why it is important to know your times tables.

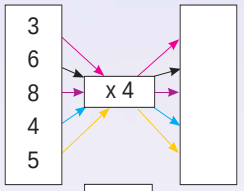


a. Input output



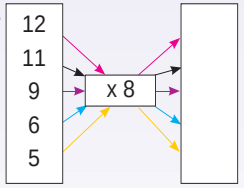
The rule is x6.

b. Input output



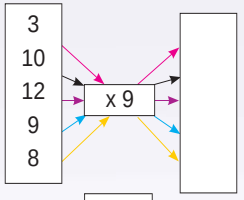
The rule is _____.

c.



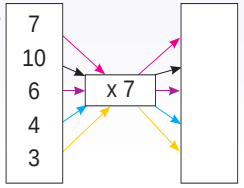
The rule is _____.

d.



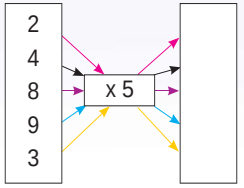
The rule is _____.

e.



The rule is _____.

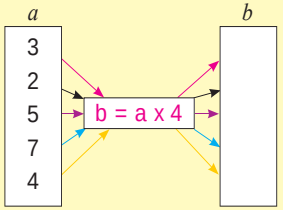
f.



The rule is _____.

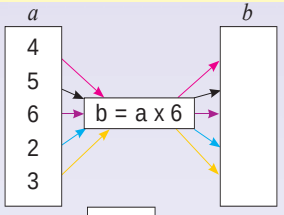
2. Use the given rule to calculate the value of *b*.

Example:



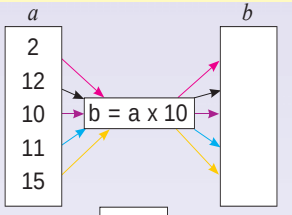
b = a x 4
- **3 x 4 = 12**
- **2 x 4 = 8**
- **5 x 4 = 20**
- **7 x 4 = 28**
- **4 x 4 = 16**

a.



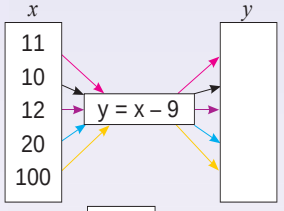
The rule is _____.

b.



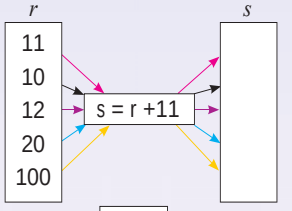
The rule is _____.

c.



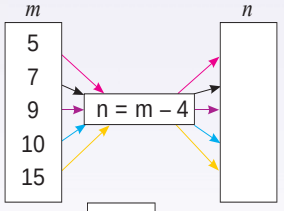
The rule is _____.

d.



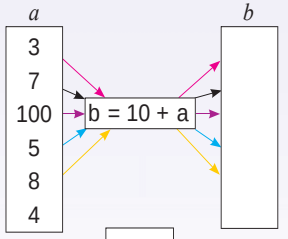
The rule is _____.

e.



The rule is _____.

f.



The rule is _____.

3. Prepare to present any flow diagram done in this lesson in a future lesson period.

Problem solving

Draw a spider diagram where a = b + 7.

58 More spider diagrams

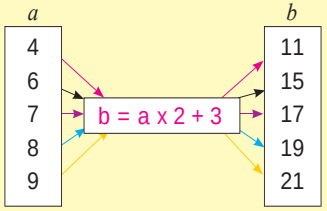
Let us look at Input and Output again. What do you think this is?





1. Complete the spider diagrams. Show all your calculations.

Example:



a is the **input**
b is the **output**
b = a x 2 + 3 is the **rule**

b = 4 x 2 + 3 = 1

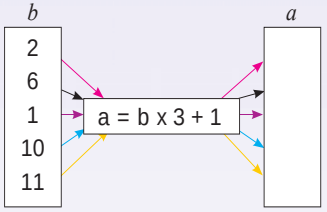
b = 6 x 2 + 3 = 15

b = 7 x 2 + 3 = 17

b = 8 x 2 + 3 = 19

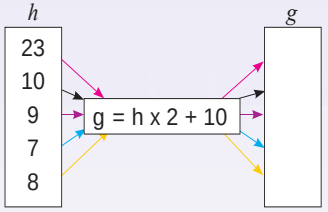
b = 9 x 2 + 3 = 21

a.



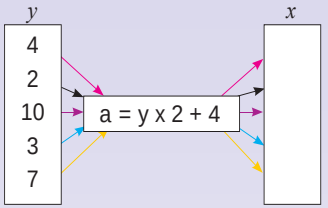
The rule is _____.

b.



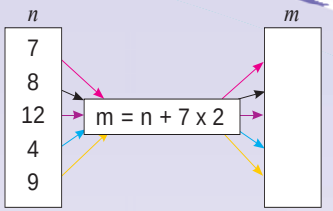
The rule is _____.

c.



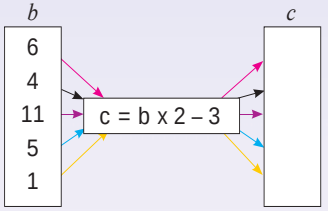
The rule is _____.

d.



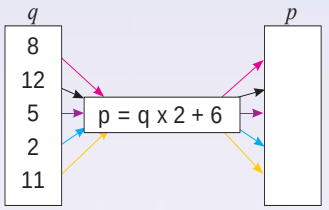
The rule is _____.

e.



The rule is _____.

f.



The rule is _____.

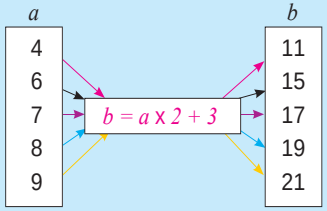
2. Prepare a flow diagram to present to the class. Change the spider diagram to an "input" and "output" device.

Problem solving

Draw your own spider diagram where a = b x 2 + 11.

59 Tables

Complete the following:



The rule: $b = a \times 2 + 3$

4 x 2 + 3 = 11
6 x 2 + 3 = 15
7 x 2 + 3 = 17
8 x 2 + 3 = 19
9 x 2 + 3 = 21

a	4	6	7	8	9
b	11	15	17	19	21

1. Complete the tables and show your calculations.

a. $y = x + 2$

x	2	4	6	8	10	20
y	4					

4 = 2 + 2

b. $b = a + 7$

a	1	2	3	4	5	10
b						

c. $n = m + 4$

m	4	5	6	7	10	100
n						

d. $z = x \times 2$

x	2	3	4	5	6	7
z						

e. $y = 2x - 1$

x	1	2	3	4	5	6
y						

f. $n = 3m + 2$

m	1	5	10	20	25	100
n						

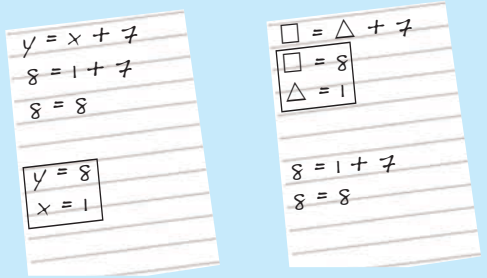
2. Prepare any table to present to the class.

Problem solving

If x = 2y + 4 and y = 2, 3, 4, 5, 6, draw a table to show it.

60 Input and output values

I got these notes from two of my friends. Compare them.



1. Determine the rule and solve *m* and *n*.

Example:

x	1	2	3	4		18	*m*	51
y	8	9	10	11		25	39	*n*

Determine the rule:
$y = x + 7$

m?
x = m and y = 39
y = x + 7
39 = m + 7
39 – 7 = m + 7 – 7
32 = m
m = 32

n?
y = x + 7
y = 51 + 7
y = 58
n is 58

a.

x	1	2	3	4		25	*m*	51
y	10	11	12	13		*n*	39	60

m? ***n?*** Rule:

b.

x	1	2	3	4		*m*	30	60
y	2	4	6	8		22	*n*	120

m? ***n?*** Rule:

c.

x	1	2	3	4		10	15	*m*
y	5	10	15	20		50	*n*	90

m? ***n?*** Rule:

d.

x	1	2	3	4		7	*m*	46
y	13	14	15	16		19	24	*n*

m? ***n?*** Rule:

e.

x	1	2	3	4		6	10	*m*
y	3	6	9	12		18	*n*	60

m? ***n?*** Rule:

f.

x	1	2	3	4		*m*	41	70
y	11	12	13	14		28	*n*	80

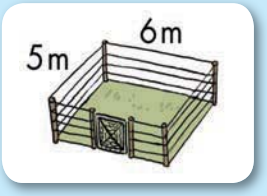
m? ***n?*** Rule:

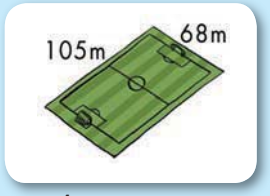
Problem solving

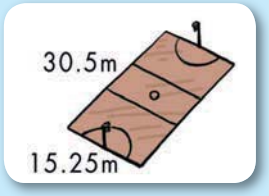
What is the10th pattern for 3 x 4: 4 x 4: 5 x 4: . . .

61 Perimeter and area

Look at the pictures and say what the perimeters are. What will the area of each shape be? You can use a calculator.







Draw these on grid paper where: 1 m = 1 cm represents 1 m

1. Calculate the perimeter and the area of the following polygons:

Example: Perimeter

Perimeter of a rectangle: 2 x *length* + 2 x *breadth*
Area of a rectangle: *length* x *breadth*

Double 4,5 cm + double 2,2 cm *or*
(2 x 4,5 cm) + (2 x 2,2 cm)
= 9 cm + 4,4 cm
= 13,4 cm

Example: Area

Perimeter of a square: *4 length*
Area of a square: *length* x *length*

4,5 cm x 2,2 cm
= 9,9 cm²

a. 4,5 cm — A — 2,2 cm

b. 2,9 cm — B — 1,4 cm

c. 1,5 cm — C

2. Draw and place polygons A, B, C together to result in:

- the shortest possible perimeter
- the largest possible perimeter

a.

Do your drawings like this:

a. Polygons A and B
b. Polygons A and C
c. Polygons B and C
d. Polygons A, B and C

b.

c.

d.

3. If the area is _____, what could the perimeter be?

a. 36 cm²
b. 12 cm²
c. 100 cm²
d. 125 cm²
e. 30 cm²
f. 18 cm²

4. Work out the perimeter and area of each shape. Give your answer in mm and cm.

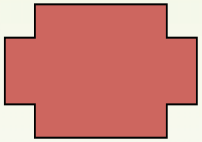
a.



Perimeter:

Area:

b.



Perimeter:

Area:

c.



Perimeter:

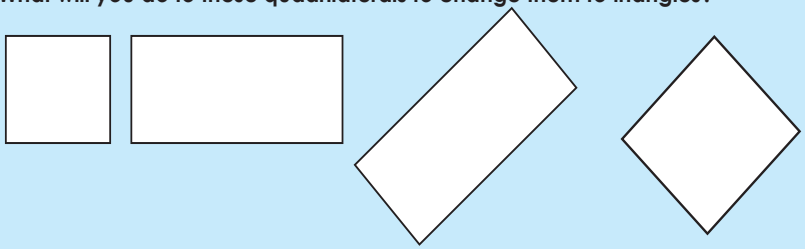
Area:

Problem solving

- Draw a square and a rectangle each of which has a perimeter of 9 cm.
- If the perimeter of a square is 22 cm, what is the length of each side?
- What is the perimeter of a regular octagon if the length of each side is 17 cm?
- What is the perimeter of a square if its area is 225 cm?

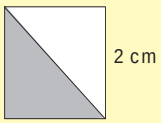
62 Area of triangles

What will you do to these quadrilaterals to change them to triangles?



1. What is the area of these triangles? Use both methods to solve this.

Example:



length^2
= (2 cm)^2
= 2 cm x 2 cm
= 4 cm^2

The triangle is half of the square.

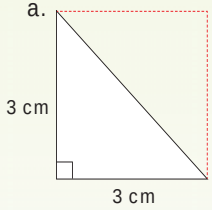
Method 1

$\frac{1}{2}$ of 4 cm^2
= $\frac{1}{2}$ x 4 cm^2
= $\frac{1}{2}$ x $\frac{4}{1}$ cm^2
= $\frac{4}{2}$ cm^2
= 2 cm^2

Method 2

4 cm^2 ÷ 2
= 2 cm^2

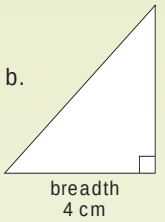
a.



Area:



b.



Area:

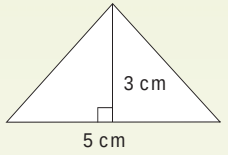
2. What is the area of the triangles?

The area of a triangle is: $\frac{1}{2}$ breadth x height



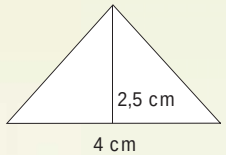
Before calculating the area of the triangles, explain to a friend what the half in the formula means.

a.



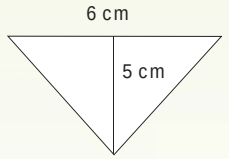
Area:

b.



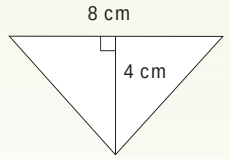
Area:

c.



Area:

d.



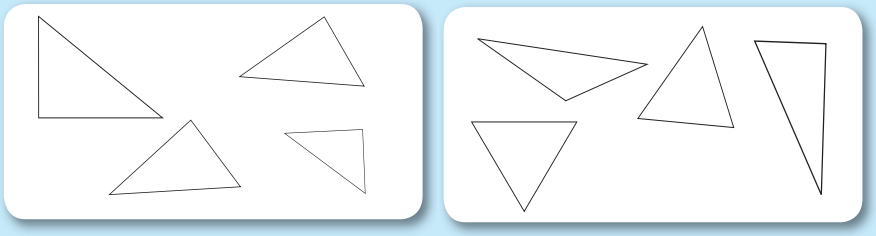
Area:

Problem solving

What is the area of a triangle if the base is 8 cm and the height is 3 cm?

63 More area of triangles

Look at these triangles. Compare them.



1. Draw a perpendicular line showing the height of the triangle.

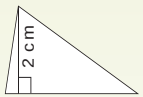
a. 

b. 

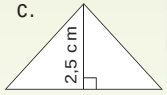
c. 

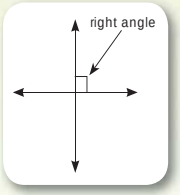
Perpendicular lines are lines that are at right angles (90°) to each other.

2. Calculate the area of the triangles.

a. 

b. 

c. 



3. Draw the triangle and then calculate the area.

a. Height 4 cm
Base 8 cm

Drawing Area

b. Height 3,5 cm
Base 10 cm

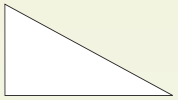
Drawing Area

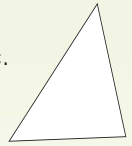
c. Height 2,5 cm
Base 8 cm

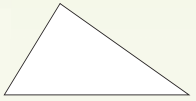
Drawing Area

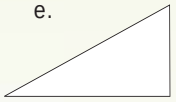
4. Measure and calculate the area. Give your answer in cm² and mm².

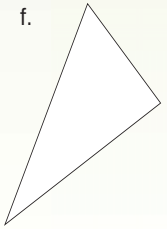
a. 

b. 

c. 

d. 

e. 

f. 

Problem solving

What is the area of a triangle if the base equals 3,5 cm and the height equals 1,5cm?

64 Area conversion

Convert the following:

Revision

1 000 mm = ___m
___cm = 1 m
___m = 1 km

How did we get these answers?

$cm^2 = 100\ 000\ mm^2$

1 cm = 100 mm
1 cm^2 (1 cm x 1 cm)
= 100 000 mm^2 (100 mm x 100 mm)

$m^2 = 1\ 000\ 000\ mm^2$

1 m = 1 000 mm
1 m^2 (1 m x 1 m)
= 1 000 000 mm^2 (1 000 mm x 1 000 mm)

$km^2 = 1\ 000\ 000\ m^2$

1 km = 1 000 m
1 km^2 (1 km x 1 km) 0
= 1000 000 m^2 (1 000 m x 1 000 m

1. Work out the area and give your answer in m^2, cm^2 and mm^2.

Example: Length = 2 m, breadth = 1m

l x b	l x b	l x b
= 2 m x 1 m	= 200 cm x 100 cm	= 2 000 mm x 1 000 mm
=2 m^2	=20 000 cm^2	=2 000 000 mm^2



a. Length = 5 m, breadth = 3 m

m^2	cm^2	mm^2	Possible drawing
			5 m, 3 m

b. Length = 3 m, breadth = 1,5 m

c. Length = 6 m, breadth = 3,2 m

d. Length = 4,5 m, breadth = 2,1 m

e. Length = 7,2 m, breadth = 5 m

2. Given the area, find a possible length and breadth in cm and m.

Example: If the area is 9 000 000 mm^2, what is the length and breadth in cm and m?
6 000 mm x 1 500 mm
= 600 cm x 150 cm
= 6 m x 1.5 m

length = 600 cm = 6 cm
breadth = 150 cm = 1.5 m

a. 15 000 000 mm^2

Calculation:

Possible drawing:

b. 63 000 000 mm^2

Calculation:

Possible drawing:

c. 27 000 000 mm^2

Calculation:

Possible drawing:

d. 28 000 000 mm^2

Calculation:

Possible drawing:

e. 36 000 000 mm^2

Calculation:

Possible drawing:

f. 16 000 000 mm^2

Calculation:

Possible drawing:

Problem solving

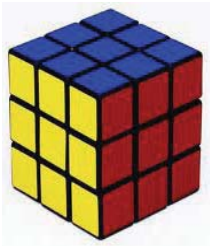
If the base of a triangle is 4 m and the height 3 m, calculate the area and give your answer in m^2, cm^2 and mm^2.

65 Understanding the volume of cubes

How many containers are on the truck?

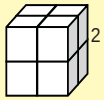


How many cubes do you count in this block?



1. Label the diagram. Count the cubes and write it in exponential form.

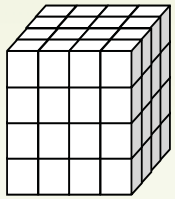
Example

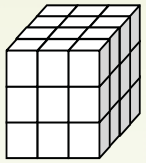


$2 \times 2 \times 2 = 2^3$

$= 2 \text{ m} \times 2 \text{ m} \times 2 \text{ m}$

$= 2 \text{ m}^3$





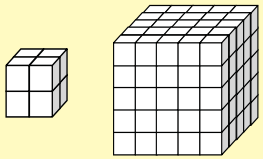
2. Write down a sum in exponential form for each.

Example:

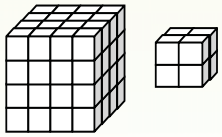
$2 \text{ blocks}^3 + 5 \text{ blocks}^3$

$= 8 \text{ blocks} + 125 \text{ blocks}$

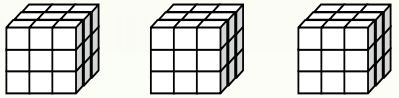
$= 133 \text{ blocks}$



a.

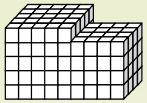


b.

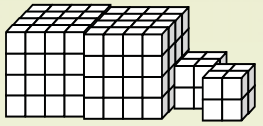


3. Calculate the volume of the buildings. Show your calculations.

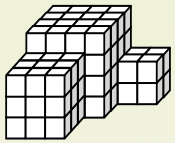
a.



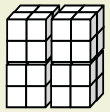
b.



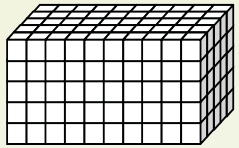
c.



d.



e.



4. Make a drawing and calculate the following:

a. 2 cm x 2 cm x 2 cm

b. 4 cm x 4 cm x 4 cm

c. 5 cm x 5 cm x 5 cm

d. 3 cm x 3 cm x 3 cm

e. 1 cm x 1 cm x 1 cm

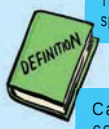
f. 7 cm x 7 cm x 7 cm

Problem solving

If a block has 1 728 cubic units, what will its dimensions be?

Volume of cubes

What is the difference between volume and capacity?



The **volume** of a solid is the amount of space it occupies.

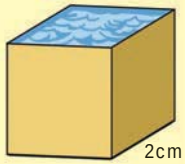
Capacity is the amount of liquid a container can hold.



10 cm x 10 cm x 10 cm
= 1 000 cm^3
= 1000 ml
= 1 *l*

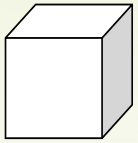
1. Use a formula to calculate the volume of water that will fill each cube.

Example:
The formula for the volume of a cube is l^3

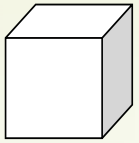


2 cm x 2 cm x 2 cm
= 8 cm^3
= 8 ml
= 0,008 *l*

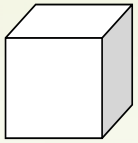
a.



b.



c.



2. What will the dimensions of a cube be if its volume is ___?

Example:
8 cm^3 = 2 cm x 2 cm x 2 cm

a. 27 cm^3

b. 64 cm^3

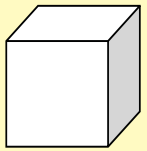
c. 125 cm^3

d. 1 cm^3

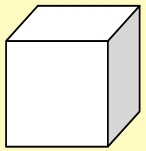
e. 216 cm^3

3. Use the example to guide you in completing these volume calculations for these cubes:

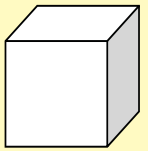
Example:



2 m x 2 m x 2 m
= 8 m^3

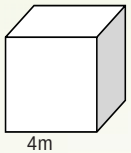


200 cm x 200 cm x 200 cm
= 8 000 000 cm^3

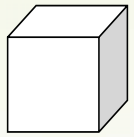


2 000 mm x 2 000 mm x 2 000 mm
= 8 000 000 000 mm^3

a.

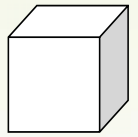


m³



cm

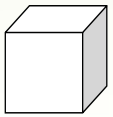
cm³



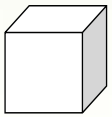
mm

mm³

b.

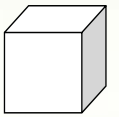


m³



cm

cm³



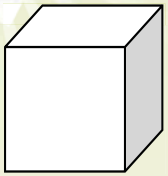
mm

mm³

continued ☛

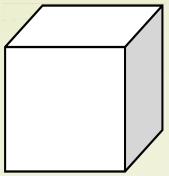
Volume of cubes continued

c.



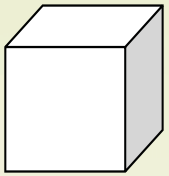
_____ m

_____ m^3



_____ cm

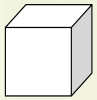
_____ cm^3



5 000 mm

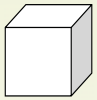
_____ mm^3

d.



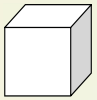
_____ m

_____ m^3



100 cm

_____ cm^3



_____ mm

_____ mm^3

4. Look at the example of calculating the dimensions of a volume. Do the same with all the volumes in Question 3.

Example:

8 000 000 000 mm^3

= 2 000 mm x 2 000 mm x 2 000 mm

8 000 000 cm^3

= 200 cm x 200 cm x 200 cm

8 m^3

= 2 m x 2 m x 2 m

a.

b.

c.

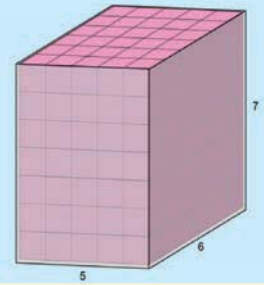
d.

Problem solving

- If the volume of a cube is 125 cm^3, what are its dimensions in mm and m?
- With a family member think of five everyday objects that are cubes.

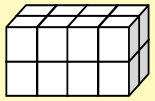
67 Volume of rectangular prisms

How many small containers are in the large container?



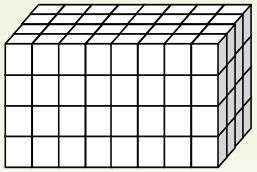
1. Count the cubes and write it in exponential form.

Example:

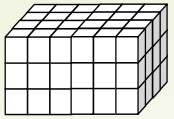


4 x 2 x 2 = 16

a.



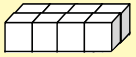
b.

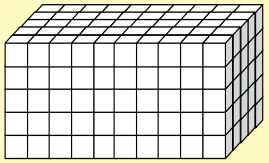


2. Write down a sum in exponential form for each.

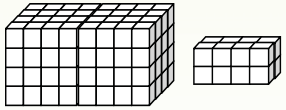
Example:

8 blocks^3 + 250 blocks^3
= 8 blocks + 250 blocks
= 258 blocks

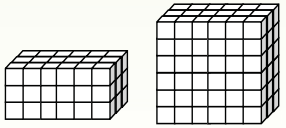




a.

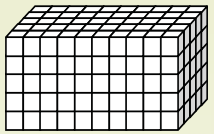


b.

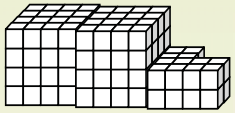


3. Calculate the volume of each of these buildings. Show your calculations.

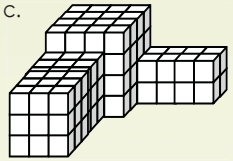
a.



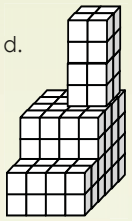
b.



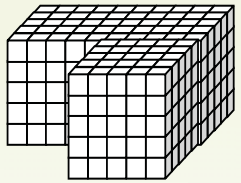
c.



d.



e.



4. Calculate the following and make a drawing of each volume :

a. 2 cm x 3 cm x 1 cm

b. 4 cm x 2 cm x 2 cm

c. 5 cm x 3 cm x 4 cm

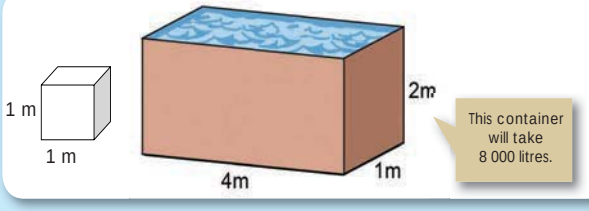
d. 4 cm x 2 cm x 2 cm

Problem solving

If a rectangular prism has 384 cubic units, what will its dimensions be?

68 Volume of rectangular prisms

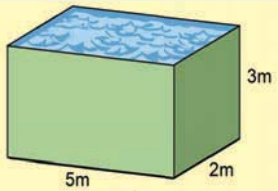
How many small containers will fit in the large container? How did you work it out? Why do we know the large container can hold 8 000 litres?



We know that
10 cm x 10 cm x 10 cm
= 1000 cm^3
= 1000 ml
= 1 *l*

1. Calculate the volume of the following and give your answer in m^3, cm^3 and mm^3. Also say what the capacity of each container is when filled with water.

Example:



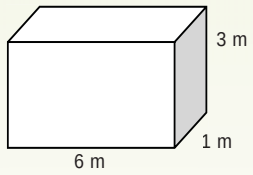
This containmer will hold 30 000 000 ml or 30 000 *l* of water.

$\frac{m^3}{l \times b \times h}$
= 5 m x 2 m x 3 m
= 30 m^3

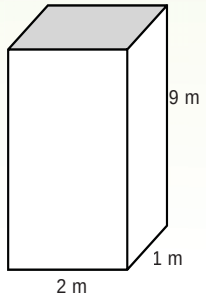
$\frac{cm^3}{l \times b \times h}$
= 500 cm x 200 cm x 300 cm
= 30 000 000 cm^3

$\frac{mm^3}{l \times b \times h}$
= 5 000 mm x 2 000 mm x 3 000 mm
= 30 000 000 000 mm^3

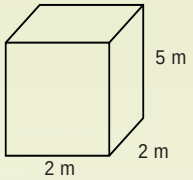
a.



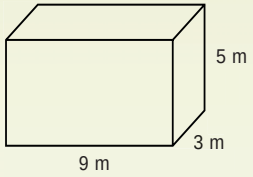
b.



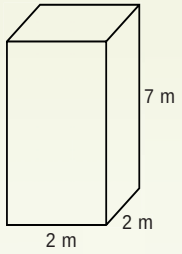
c.



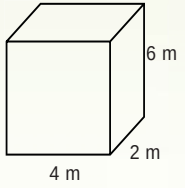
d



e.



f.



Problem solving

- What is the volume if the dimensions are the following: length = 2,4 cm, breadth = 3 m and height = 10cm? What type of geometric object is it?
- With a family member think of five everyday objects that are rectangular prisms.

69 Volume of triangular prisms



Highlight the top floor of the building.

What geometric object is the top floor?

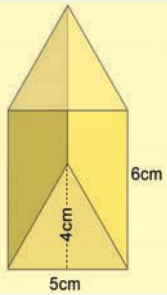
What will this objects base be? (Note that the base is the base of the object, not the base of the building or the ground the building is standing on)

Visualising the top floor, what do you think its dimensions will be (area of the base and the height)?

Volume of a triangular prism:
The area of the triangle x length
The area of a triangle is $\frac{1}{2}$ the triangle base breadth x the triangle height.

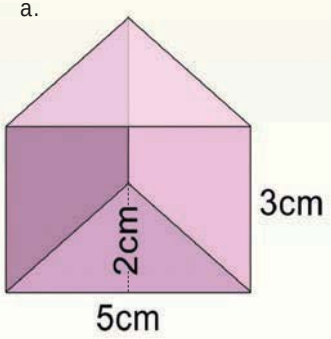
1. Calculate the volume:

Example:

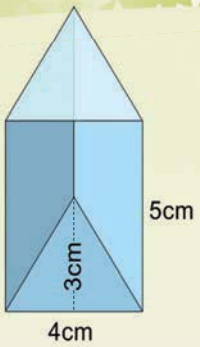


$= (\frac{1}{2} \text{ b x h}) \text{ x l}$
$= (\frac{1}{2} \text{ x 5 cm x 4 cm}) \text{ x 6 cm}$
$= (\frac{5}{2} \text{ cm x } \frac{4}{1} \text{ cm}) \text{ x 6 cm}$
$= \frac{20}{2} \text{ cm}^2 \text{ x 6 cm}$
$= 10 \text{ cm}^2 \text{ x 6 cm}$
$= 60 \text{ cm}^3$

a.



b.



2. What could the possible dimensions be if the volume of a triangular prism is ___? Show all your calculations.

a. 60 m^3

b. 63 cm^3

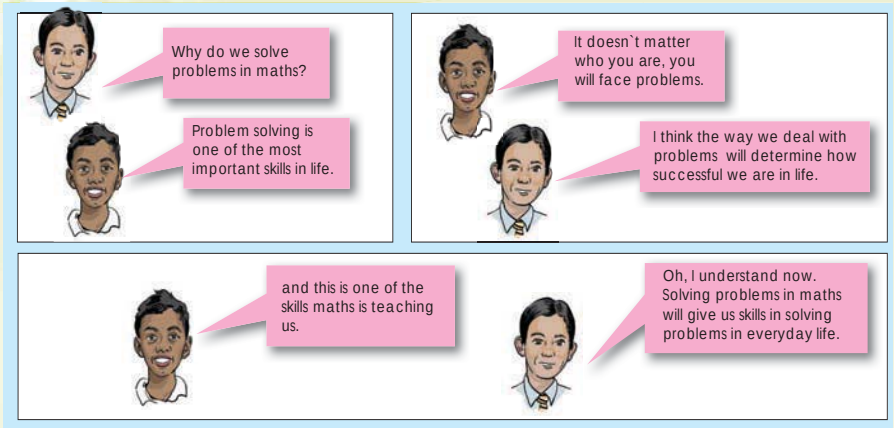
c. 42 m^3

d. 30 cm^3

Problem solving

What is a quick way to divide a regular polygon into triangles? Use a heptagon to illustrate this.

70 Volume problems



1. **Calculate the volume (in cubic centimetres) of a prism that is 5 m long, 40 cm wide and 2 500 mm high. Make a drawing.**

2. **A swimming pool is 8 m long, 6 m wide and 1,5 m deep. The water resistant paint needed for the pool costs R50 per square metre.**

   a. How much will it cost to paint the interior surfaces of the pool?

   b. How many litres of water will be needed to fill the pool?

3. **At a factory they are trying to store boxes in a storage room with a length of 5 m, width of 3 m and height of 2 m. How many boxes can fit in this space if each box is 10 cm long, 6 cm wide and 4 cm high?**

Problem solving

Solve this with a family member or members.

- Assume we each create a cube of 30 cm x 30 cm x 30 cm of waste per day.
- We have a classroom with dimensions of 5,1m x 4,5m. x 3 m.
- We are 30 children in the class.

How long will we take to fill the class with waste?

Imagine our waste didn't go to the landfills but to school classrooms.

Do you know that we will then fill all 28 000 school classrooms in South Africa about 6 times a year with waste.

Volume and capacity

This person needs to collect information. What do you notice?



1. Show that the following statements are true:

1 cm^3 = 1 millilitre
1 000 cm^3 = 1 litre
1 m^3 = 1 000 litre

A possible way to look for the solution to this problem.

Start — What is the actual problem?

Ask yourself the following questions:

What do I know?

- What are millilitres and litres?
- What is cm3?
- What is m3?
- What examples do I know?

What do I need to prove?

- cm3 = 1 millilitre
- 1 000 cm3 = 1 litre
- 1 m3 = 1 000 litre

What do I need to know?

Possibly:

- What is volume?
- What is capacity?

Note that sometimes we think of something later on; we don't always think of everything at the beginning. Add anything else.

2. Attack the problem.

Write down everything you know to prove that the statements are true Show patterns and relationships. Make a sensible guess or conjecture and then see if you can prove it.

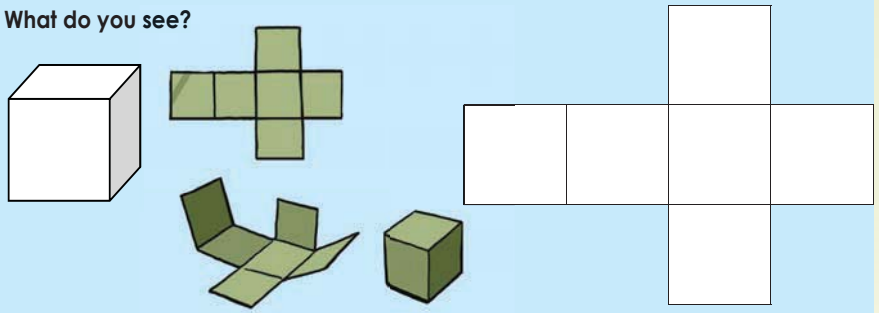
3. Come to a conclusion that is convincing.

Problem solving

Share this process step by step with a friend or a family member.

72 Surface area of a cube

What do you see?

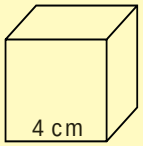


1. Revision: Calculate the volume of these cubes.

	cm	cm^3	mm^3	Make a drawing of the net. Describe in words the geometric figures (2–d shapes) in the net.
a.	4 cm x 4 cm x 4 cm			
b.	4 cm x 4 cm x 4 cm			

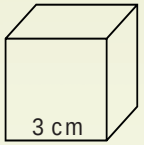
2. Calculate the surface area of the following cubes.

Example: The surface area of a cube is length x length x total number of faces.

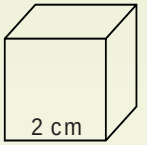


= l^2 x total faces
= $(4cm)^2$ x total faces
= 16 cm^2 x 6
= 96 cm^2

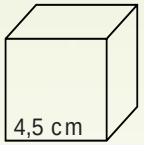
a.



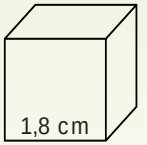
b.



c.



d.



3. You want to make a cube gift box for a friend. The gift is 15 cm high and 9 wide. How much card board do you need to make a cube gift box.

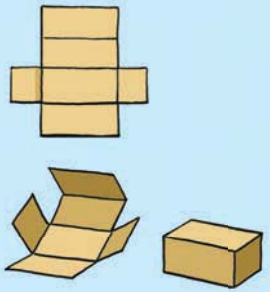
Problem solving

If a cube's surface area is 150 cm^2, what will the dimensions of the cube be?

73 Surface area of rectangular prisms

What do you see? What will the net look like?

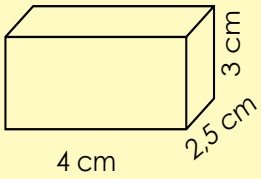




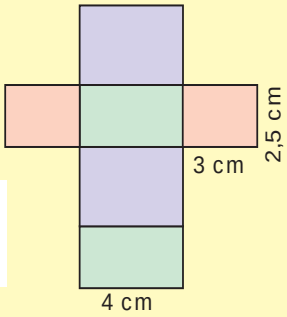
1. Revision: Calculate the volume of these rectangular prisms.

	cm	cm^3	mm^3	Make a drawing of the net. Describe in words the geometric figures (2–d shapes) in the net.
a.	3 cm x 2 cm x 1 cm			
b.	3 cm x 2,5 cm x 1,5 cm			

2. Calculate the surface area of the following rectangular prisms:



Surface area of a rectangular prism = (2 x Length x Width) + (2 x Length x Height) + 2 x Width x Height)



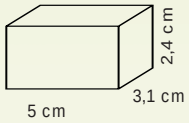
Area of a rectangle:
4 cm x 2,5 cm =10 cm^2
2 x 10 cm^2 = 20 cm^2

Area of a rectangle:
4 cm x 3 cm = 12 cm^2
2 x 12 cm^2 = 24 cm^2

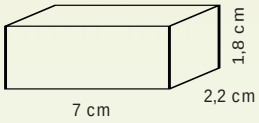
Area of a rectangle:
2,5 cm x 3 cm = 7,5 cm^2
2 x 7.5 cm^2 = 15 cm^2

20 cm^2 + 24 cm^2 + 15 cm^2 = 59 cm^2

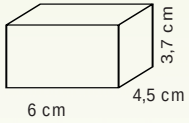
a.



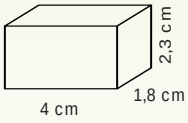
b.



c.



d.

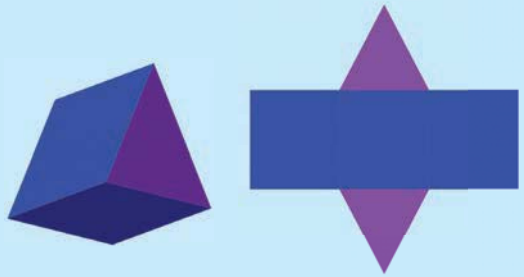


Problem solving

If the surface area of a rectangular prism is 52 cm, what are its dimensions?

74 Volume of triangular prisms

What do you see?



1. Revision: Calculate the volume of these triangular prisms.

	cm	cm^3	mm^3	Make a drawing of the net. Describe in words the geometric figures (2–d shapes) in the net.
a.	2 cm x 1 cm x 4 cm			
b.	1,5 cm x 2,2 cm x 1,6 cm			

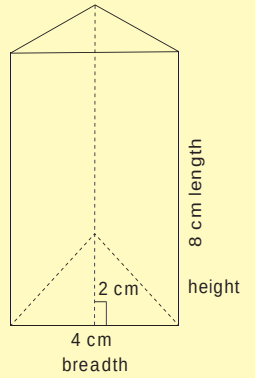
2. Calculate the volume of the triangular prisms below.

Example:

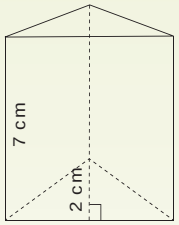
Volume = area of base x length

Area of base = $\frac{1}{2}$ breadth x height
$\frac{1}{2}$(4 cm x 2 cm)
= 4 cm^2

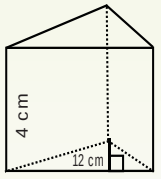
Volume = 4 cm^2 x length
= 4 cm^2 x 8 cm
= 32 cm^3



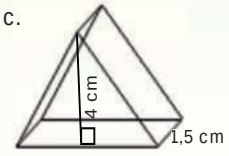
a.



b.



c.



Problem solving

If the surface area of a rectangular prism is 52 cm^2, what are its dimensions?

75 Surface area problem solving

Before solving the problems, make notes on how you will solve a problem.

Revise the formulas for surface area.
Write them down.

Cube:

Rectangular prism:

Triangular prism:

1. How many square tiles (20 cm x 20 cm) are needed to cover the sides and base of a pool that is 10 m long, 6 m wide and 3 m deep?

What is this problem all about?

What do I know?

What do I need to know more about?

Tackle the problem:

2. Four cubes of ice with sides lengths of 4 cm each are left to melt in a cylindrical glass with a radius of 6 cm. How high will the water rise when all of them have melted?

What is this problem all about?

What do I know?

What do I need to know more about?

To calculate the area, I need to know:
Area = πr^2

To calculate the volume, I need to know:
Area of the circle: $\pi \times r^2$
Height: h
Volume = Area × Height = $\pi \times r^2 \times h$

Tackle the problem:

Problem solving

You are a great problem solver. Share with a family member why you are a great problem solver. Why is maths helping you to become such problem solver?

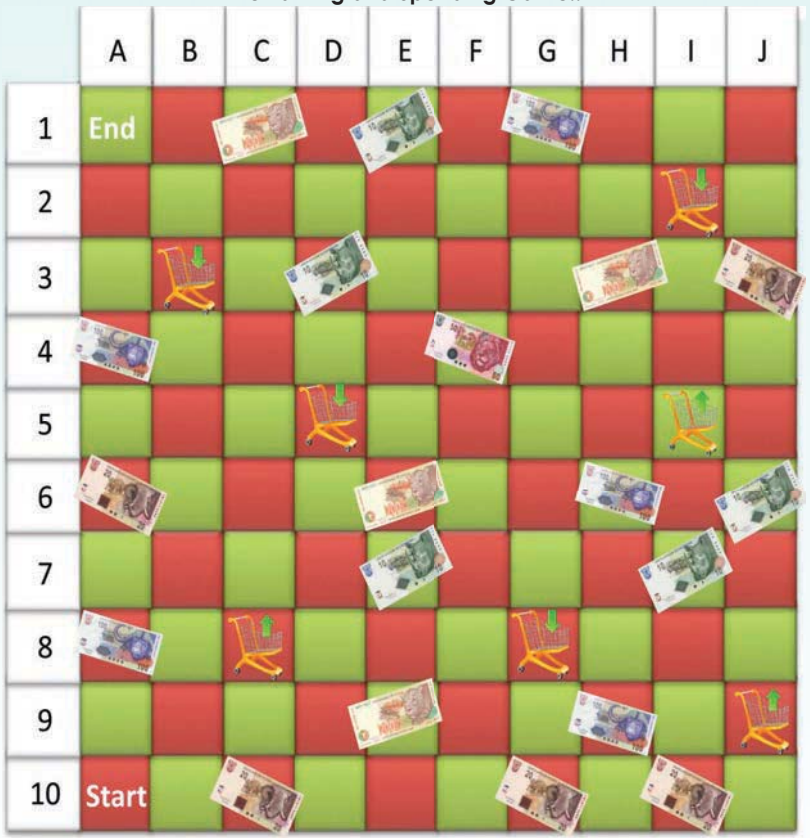
Money in South Africa.

The **rand**, sign: **R**; code: **ZAR**, is the currency of South Africa. It takes its name from the Witwatersrand the ridge upon which Johannesburg is built and where most of South Africa's gold deposits were found. The rand has the symbol "R" and is equal to100 cents, symbol "c".

Find out what was the currency before Rand and cents.



The Earning and Spending Game!!





You sell some goods. Move one row up and earn R100.



You buy some goods. Move one row down and pay R100.

Direction of play:
Start on A10 and play in the direction of J10.
Move then one row up.
Move in the direction of A9.
Move one row up.
Move in the direction of J8. Continue this pattern.

1. If these were the results of the numbers your die landed on, how much money do you have at the end of the game. After each result use a number sentence or word sum to describe what happened.

Number on dice	Number sentence or word sum.
6	Earns R20
6	R20 + R100 = R120
3	R120 +
6	
1	
3	
6	
3	
2	
5	
5	
6	
2	
4	
2	
5	

Problem solving

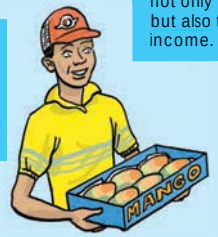
Make your own dice and use two stones as tokens. Play this game with a family member.

77 Finances – Profit, loss and discount

Do you know the meaning of profit, lossand discount?



Profit is the surplus remaining after total costs are deducted from total revenue.
Loss is the excess of expenditure over income.
Discount is the amount deducted from the asking price before payment.



Remember profit and loss do not only apply to businesses, but also to your personal income.

1. Are you making a profit or a loss in these examples? How much profit or loss?
(Circle the correct answer and calculate the amount.)

a. You are buying sweets for 45c each and selling them for 65c each. I made a profit / loss of _____ (amount) per sweet.



b. You are buying pencils for R2,00 each and selling them for R2,40 each to your friends. You manage to sell 40 pencils. I made a profit / loss of _____ (amount).



c. On Saturdays you hire a stall at the local flea–market for R50. You are buying juice for R1,50 each and selling them for R2,50 each. Last Saturday it was cold and you only managed to sell 40..I made a profit / loss of _____ (amount).



d. You are buying sweets in large packets of 100 for R10,45 per packet. You are selling to your friends for 30c per sweet. During the first break you manage to sell 75 sweets.I made a profit / loss of _____ (amount).



e. You are buying fruit directly from the market and selling it to your neighbours, friends and family. Last weekend you bought 3 boxes of bananas. Each box contained 12 bunches of 12 bananas each. Each box cost you R75. You managed to sell 80 % of the bananas at 65c each before the rest were too ripe to sell and you had to throw them away.I made a profit / loss of _____ (amount).



Profit can be calculated in different methods. Normally when we talk about 10 % profit we calculate it on the cost price. We sometimes also refer to a 10 % mark–up. Example: If my football cost me R200 and I want to sell it and make a 10 % profit, I need to sell it for R220.
R200 + (R200x 10 %) = R220

2. How much must I sell it for?

a. You are buying sweets for 45c each and you want to make a 25 % profit. How much must you sell them for?_____ (amount).

b. You are buying pens for R1,27 each and you want to make a 17 % profit. How much must you sell them for?_____ (amount).



c. On Saturdays you hire a stall at the local flea–market for R50. You buy juice for R1,50 per box and you normally sell 200 units per Saturday. If you want to make a 35 % profit after paying for the stall, how much must you ask per fruit juice?_____ (amount).

3. Will I still make a profit if I sell it with discount?
(Circle the correct answer and calculate the amount)

a. You are buying sweets in large packets of 100 for R12,45 per packet. You are selling to your friends for 20c per sweet. If they buy 10 sweets or more at a time you give them a 25 % discount. During the first break you sold 35 loose sweets and 25 sweets at discounted price. What will your profit be?_____ (amount).

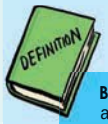
b. You are buying fruit directly from the market and sell it to your neighbours, friends and family. Last weekend you bought 3 boxes of bananas. Each box contained 12 bunches of 12 bananas each. Each box cost you R75. You managed to sell 80 % of the bananas at 65c each The rest of the bananas got too ripe and you sold them at a discount of 80 %. I made a profit / loss of _____ (amount).

Problem solving

If you bought your bicycle for R1 300 and you are selling it for R1 500, what percentage discount, on selling price, can you give your friend who wants to buy your bicycle and still make R50 profit?

Finances – Budget

Do you know what a budget is?
Can I have my own budget or is it only for adults?



Budget is the estimate of cost and revenues over a specified period.



Budget is like a scale where you try to balance your income and your expenses.

Important: Your income should always outweigh your expenses.



Creating a budget is the most important step in controlling your money.The first rule of budgeting: **spend less than you earn!**
Example: If you received R50 allowance (pocket money) per month and another R30 for your birthday, you cannot spend more than R80 for the entire month.

Structuring your budget

1. Determine your income

Make a list of all your possible income and estimate the amount you will earn during the next month.

Income	Estimated amount
Estimated total income	

2. Estimate your expenses

Make a list of all your possible expenses and estimate the amount you will spend during the next month.

Expenses	Estimated amount
Estimated total expenses	



Spend less than you earn !

Net income is, like profit, the surplus remaining all costs are deducted from total (or **gross**) revenue. If the expenses exceed the income we call it a **shortage**.

3. Am I making a surplus?

Deduct your total expenses from your total income to determine if you are going to make a surplus or shortage.

	Estimated amount
Total income	
Total Expenses	
Net Income	

4. What can I do with my surplus?

Make a list of what you can do with your surplus.



It is always a bright idea to save for a rainy day !

5. Savings

If I manage to save R80 every month, how long must I save to buy myself a new computer game at R499.95?

months

6. Track your budget

Using the example below, draw up a budget in your writing book. Complete your budget and track your actual expenses for the next month.

Income	Actual amount	Estimated amount	Difference
Estimated total income			
Expenses			
Estimated total expenses			
Net Income			

Problem solving

Describe in your own words what you think of this saying: "A budget tells us what we can't afford, but it doesn't keep us from buying it."

79 Finances – Loans and Interest

What is a loan? What is interest?



A **loan** is a sum of money that an individual or a company lends to an individual or company with the objective of gaining profits from interest when the money is paid back.

Interest is the fee charged by a lender to a borrower for the use of borrowed money, usually expressed as an annual percentage of the amount borrowed, also called interest rate.



It is never a good idea to borrow money. Rather save until you can afford to buy something.



When someone lends money to someone else, the borrower usually pays a fee to the lender. This fee is called 'interest'. There are two kinds of interest: 'simple' and **'compound'**. **'Simple'** or **'flat rate'** interest is usually paid each year as a fixed percentage of the amount borrowed or lent at the start. With 'compound' interest you also pay interest on the interest!

The **simple interest** formula is as follows:

Interest = Principal × Rate × Time

where:

'Interest' is the total amount of interest paid,
'Principal' is the amount lent or borrowed,
'Rate' is the percentage of the principal charged as interest each year.
'Time' is the time in years to pay back the loan.

1. Calculating the interest amount

I want to buy a new bicycle to deliver newspapers. I do not have enough money but a friend offers to lend me the money. I agree to repay the money after 1 year with interest of 10 % per year. I borrow R1 500.

a. How much interest must I pay?_____

b. What will be the total amount that I need to repay to my friend? _____

c. If I decide to repay him weekly, what will my weekly instalment be?_____

d. If the interest rate was 12 % instead of 10 %, how much more would I have to pay for my bicycle?_____

2. Calculating the interest rate

I borrow R3 000 from the bank to buy a wheelchair for my sick brother. The contract stipulates that I have to repay the bank R3 900 after 2 years.

a. How much interest must I pay the bank per year?_____

b. What is the interest rate I have to pay?_____

c. If I decide to repay the bank weekly, what will my weekly instalment be?_____

d. If I repay the loan after one year the bank will only charge me R3 360. What will the interest rate be if I repay them after one year?_____

3.Calculating the repayment period

a. If the formula for calculating interest is: Interest = Principal x Rate x Time, what will the formula be for calculating the loan period?_____

b. I borrowed R5 000 from the bank and they charge me 10 % simple interest per year. The total amount I have to repay is R6 750. How long will it take me to repay the loan? _____

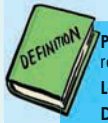
c. The interest rate changes to 12 % and the total repayment amount to R 8 360. What will the repayment period for the R5 000 loan be?_____

d. The total interest I will have to payon a loan of R 7 500 is R7 200 and the interest rate I am paying is 12 %. How many years will it take me to repay the loan?_____

Problem solving

I am repaying R452 per month on my loan. The interest rate the bank charged me was 15 % simple interest. I have to repay my loan over 48 months. I calculated that the total amount of interest I am paying over the 48 months is: R8 136. What was the original amount I borrowed at the bank?

Let us review these financial terms.



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Budget is the estimate of costs and revenues over a specified period

A **loan** is sum of money that an individual or a company lends to an individual or company with the objective of gaining profits when the money is paid back.

Interest is the fee charged by a lender to a borrower for the use of borrowed money, usually expressed as an annual percentage of the amount borrowed, also called interest rate.



1. You are starting your own lemonade stall.

You can get lemons from the neighbour at 10c per lemon and sugar at the local shop at R10 per packet. The paper cups will cost you 10c each and your brother is willing to sell the lemonade for 15c commission per cup. Your recipe needs 100 lemons, half a packet of sugar and water to make 15 cups of lemonade. You think you can sell one cup of lemonade for R2,50.

a. Complete the budget below to calculate if you will be able to make a profit if you sell 30 cups.

Income	Estimated amount
Lemonade sold	
Estimated total income	
Expenses	
Lemons	
Sugar	
Cups	
Commission (brother)	
Estimated total expenses	
Net Income	



b. Are you making a profit or a loss? _____

c. What percentage profit or loss do you make on the cost?
_____

d. If you decide to increase your profit by 15 %, what must your new selling price be?_____

e. Your brother does not want to sell the lemonade anymore and you have to sell it yourself. What will the effect on your profit be?_____
_____

2. It is going very well with your lemonade stall and you are still making 150 % profit. You decide to buy a lemonade maker.

The lemonade maker will cost you R1 750 and you asked your family to lend you the money. They agree to lend you the money at 15 % simple interest per year. You have to repay them within the next year. With the lemonade maker you will be able to sell 150 cups per month. Will you still be profitable? What percentage profit or loss will you make?

Problem solving

You are buying dried fruit in big bags and repacking them into smaller bags. A big bag of mixed dried fruit cost you R476 and you can repack it into 50 small bags. The trip to the market cost you R50 and the small bags 50c each. For how much must you sell the small bags of dried fruit to make a 33 % profit?

Notes