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STUDY Mate

Department of Education

GRADES 8–11 ISSUE 8 AUGUST 2007

Learning activities for Grades 8–11

English, Maths, Science, Accounting and more!

Education Minister Naledi Pandor

Content

Page 2:	Message from the Department of Education
Page 2-3:	English: Concord and punctuation
Page 4:	English: Comprehension
Page 5:	Physical Sciences: Grade 11 lesson notes
Page 6:	Mathematics: Learning Channel Grade 11
Page 7:	Mathematical literacy: Grade 11 lesson notes
Page 8-10:	Accounting: Grade 11 lesson notes
Page 11-15:	Chemistry: Grade 10 exam paper
Page 16:	Time keeping

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Dear Learner

We are pleased to bring you another issue of Study Mate. As we know that many of you are pursuing this line of study, this issue contains a lot of maths and science, including a Grade 10 Chemistry exam paper, which will give you an opportunity to self-test your knowledge. For the would-be accountants among you there are lessons on VAT and inventory control – knowledge that will come in handy for anyone planning to run their own business one day. We also get back to the basics of English grammar, and give you a comprehension exercise on an extract from a book by one of our most famous South African authors. We hope that you are all studying hard, but that you are keeping fit and healthy. Winter is almost behind us; if you haven't caught one of those nasty winter bugs don't do so now! We want you all to work hard and achieve your dreams. Good luck with that.

ENGLISH GRADE 11 LESSON NOTES

CONCORD

This refers to agreement between nouns and verbs: a singular noun is followed by the singular form of the verb (That *boy sings* for his supper), whereas a plural noun is followed by the plural form of the verb (Those *boys* also *sing* for their supper).

Exercise 1

Give the correct form of the verb in brackets.

1 My uncle always (wash) his hands before he (eat).

2 His children (brush) their teeth after supper and then he (read) them a bedtime story.

3 Then he and his wife (go) to bed and he (talk) to her about his day while she (listen) and (comment).

➢ There may be two or more nouns before the verb: which one is the headword (the subject of the verb)?

- Certain singular words (*each, every, everyone, everybody, someone, somebody, any, anyone, anybody, no one, nobody & something*) are sometimes followed by plural nouns (*If **anyone** among the new **students** …*). Many people – both first and second language speakers – mistakenly make the verb agree with *students* instead of with *anyone*. So they say **If anyone among the new **students want** …* instead of *If **anyone** among the new students **wants** …*

Exercise 4

Correct the errors in the following sentences:

1 Everyone who like chocolates know that they are nourishing too.

2 Each one of you have a chance now to choose three chocolates without nuts.

3 Something I don't like about imported chocolates are their price.

4 If anyone throw the wrappers around or litter the garden, Nell will be angry.

Concord: Answers

Exercise 1

1 My uncle always ***washes*** his hands before he ***eats.***

2 His children ***brush*** their teeth after supper and then he ***reads*** them a bedtime story.

3 Then he and his wife ***go*** to bed and he ***talks*** to her about his day while she ***listens*** and ***comments.***

Exercise 2

1 The *owner* of these fields ***is*** kind to animals.

2 Last week *he and his brother* ***were*** seen feeding sugar to a donkey.

3 They sometimes ***like*** to ***put*** some bananas out for birds to eat.

4 He ***say***s he never ***kill***s a snake if *he* ***can avoid*** it.

- The **girl** eating biscuits **lives** near me. (*girl*, not *biscuits*)
- The **biscuits** she eats **live** on in her memory. (*biscuits* is the subject of live; *she* is the subject of *eats*)

Exercise 2

Correct the errors in the following sentences:

1 The owner of these fields are kind to animals.

2 Last week he and his brother was seen feeding sugar to a donkey.

3 They sometimes likes to puts some bananas out for birds to eat.

4 He say he never kill a snake if he can avoids it.

➢ Certain auxiliaries have different forms for singular and plural (am/is/are; was/were; does/do; has/have), whereas others have only one form (may, might, must, can, could, shall, should).

- *The man **is** here* but *The men **are** here.*
- *The man **will** return* and *The men **will** return.*

Exercise 3

Use one of the following auxiliaries in the spaces below: *am/is/are; was/were; does/do; has/have*.

1 Three men … here to see Mr Platt.

2 They … here yesterday too.

3 "… they have an appointment?" is what Mr Platt asked.

4 He … no idea what they want.

5 He … not want anything to do with them.

Exercise 3

1 Three men ***are*** here to see Mr Platt.

2 They ***were*** here yesterday too.

3 "***Do*** they have an appointment?" is what Mr Platt asked.

4 He ***has*** no idea what they want.

5 He ***does*** not want anything to do with them.

Exercise 4

1 Everyone who ***likes*** chocolates ***knows*** that they are nourishing too.

2 Each one of you ***has*** a chance now to choose three chocolates without nuts.

3 Something I don't like about imported chocolates ***is*** their price.

4 If anyone ***throws*** the wrappers around or ***litters*** the garden, Nell will be angry.

PUNCTUATION

1 End punctuation

Many students make mistakes with sentence punctuation. For example, they will write two short sentences as if they were one longer sentence: *I feel hungry, let's have lunch early.* It isn't difficult to avoid this error: all languages are spoken in sentences. You therefore have a good instinct for what a sentence is, no matter what your first language might be. You can sense that *I feel hungry* is a complete sentence, and so is *Let's have lunch early.* Trust this instinct, and you will be able to use 'end' punctuation correctly.

The end of a sentence is marked by a full stop, a question mark or an exclamation mark. If two full sentences are closely linked in meaning then you can show this by linking them with a semi-colon:

I feel hungry; let's have lunch early.

The other common mistake with end punctuation is to treat an incomplete part of a sentence as if it were a full sentence. Here are two examples:

ENGLISH GRADE 11 LESSON NOTES

UNISA

- Hoping to hear from you soon.
- However much you may want to come with me to Uganda.

You should be able to sense that these are not full sentences.

Exercise 1

Rewrite the following so that they are correctly punctuated and are full sentences.

1.1 The sun is out at last, I think I'll go for a walk.
1.2 Past the tea factory, around the cemetery and back along the side of the golf course.
1.3 Look out for muggers they'll kill you for your earrings.
1.4 I know I read the newspapers too.
1.5 See you in an hour, then.

2 Commas

2.1 A comma is used to show the boundary between a sentence and additional words, phrases or clauses that are added before or after it, or inserted within it (in which case you use two commas - one at each boundary). These examples illustrate this rule:

- Unlike the book, the film does not try to explain Eli Mortov's motives.
- The film, which is showing only in Johannesburg, does not try to explain Eli Mortov's motives.
- The film does not try to explain Eli Mortov's motives, which is a pity.

An exception to this is when the additional words *define* a noun in the main sentence:

- The film which you saw does not include much violence.

2.2 A comma is used before a conjunction which joins two sentences. Here are two examples:

- I did not see him again, yet I thought of him often.
- I began to have dizzy spells, so I went to see my doctor.

The other 'co-ordinating' conjunctions are *and, or , but, nor* and *for.*

2.3 Commas are used to separate items in a list. When the items consist of several words, they must be 'parallel' in their grammatical structure. The following examples are all correct:

- I'd like nuts, bolts and washers, please.
- I'd like bolts three mm long, nuts to fit them and washers to match.
- Go to the bathroom, brush your teeth, comb your hair and try to look presentable.

When the items themselves are complicated or include lists, you can separate them with a semi-colon: *I'd like bolts 3mm long and 6mm thick; nuts to fit which can be tightened with a spanner or a screwdriver; and spring washers a size too big for the bolts.*

2.4 A comma marks the boundary between quoted words and the rest of the sentence. Note carefully exactly where the commas are placed in these examples:

- "He doesn't live here any more," she said. "He left suddenly."
- "If you'd like his cellphone number," she said helpfully, "you could wait here while I look it up."
- He hesitated before saying quietly, "No, thank you."

Exercise 2

Add commas where necessary in the sentences below.

2.1 "Before you sit down" Mr Elson said to Martin "please borrow some chalk from Mrs Zondi next door."

2.2 Martin brought back six bits of chalk: three white one yellow one red and one blue.

2.3 Mr Elson used the red chalk the shortest of the six bits for 'expenses'.

2.4 He needed a fourth colour but had to make do with the three which Mrs Zondi had given him.

3 Colon

A colon is used to signal that an explanation or a list or a direct quotation follows. Here is one example of each:

- A policeman's life is hazardous: a thief will kill you to prevent arrest, or to avoid identification, or simply for your firearm.
- The Minister said he looked for two things in a top policeman: courage and honesty.
- This is how he put it: "To be brave is good; to be incorruptible as well is even better."

4 Apostrophe

The apostrophe is used to show that one or more letters are missing from a word.

This applies to contractions that we use in speaking but not usually in formal writing, such as *don't, she's, they'd, we're* and *let's*.

Historically, this rule also applies to possessive nouns. The possessive affix used to be a full syllable: *-es. The boy's book* used to be pronounced *the boyes book*, for example, with two syllables, and the plural used to be *boyses books.*

In modern speech, however, the syllable *-es* has been contracted to just *-s* for singular nouns, and if the plural ends in an *s* then the whole affix *-es* is left off altogether: *boys' books.* Plural nouns which do not end in s behave like singular nouns: *children's; men's.*

A special case has been made of *its,* however. In order to distinguish between *It is* in *It's time to go* and the possessive *its* as in *The dog is wagging **its** tail*, the possessive *its* does not remind us that once upon a time it was pronounced *ites*. Only *it is* in its contracted form gets the apostrophe: *it's.*

Exercise 3

Write out the following contractions as they should be used in academic writing:

***they've** gone; **I'd** like to; **I'd** seen him before; **we're** coming; **he'll** never know; **he's** been here before; **he's** back again.*

Punctuation: Answers

Exercise 1

1.1 The sun is out at last. I think I'll go for a walk.

1.2 I plan to go past the tea factory, around the cemetery and back along the side of the golf course.

1.3 Look out for muggers. They'll kill you for your earrings.

1.4 I know. I read the newspapers too.

1.5 I'll see you in an hour, then.

Exercise 2

2.1 "Before you sit down," Mr Elson said to Martin, "please borrow some chalk from Mrs Zondi next door."

2.2 Martin brought back six bits of chalk: three white, one yellow, one red and one blue.

2.3 Mr Elson used the red chalk, the shortest of the six bits, for 'expenses'.

2.4 He needed a fourth colour, but had to make do with the three which Mrs Zondi had given him.

Exercise 3

***they have** gone; **I would** like to; **I had** seen him before; **we are** coming; **he will** never know; **he has** been here before; **he is** back again.*

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ENGLISH COMPREHENSION

From *Down Second Avenue*
by Ezekiel Mphahlele

1 The first day I went to school was not a particularly pleasant one. I was bewildered most of the time. We had to walk seven miles to and back.

2 There we were, a mighty crowd in a large hall, and the old teacher in front of us; an elderly, tired-looking gentleman. I still wonder how he managed us, if he did at all. There we were, chanting away the multiplication tables and word spelling. M-A-T, indicating each letter by clapping of hands. The teacher bellowed out: *'F-O-X, fokos; B-O-X, bokos; F-I-X, fikis,'* which we echoed while we marvelled at the look of the words on the board and the miraculous sound of them.

3 One of the families in the village kept their goat among ours. Their boy and I alternated in herding them and going to school. I began to detest the whole idea of school. I came to associate it with physical pain – with the rod, which the teachers applied liberally as a panacea for teaching and organizational ills. If I had any choice in the matter, I should rather have revelled in the sun, the music of the birds, a plunge into a cool stream than go to school.

4 Yes, I hated school, and swore to myself I would loathe it to the end of my life. The faces of those pedagogues seemed to tell a story of torture. And they seemed to want to work it off on us with a rod. So I rather enjoyed it whenever I went with my grandmother and paternal uncle to the fields beyond the school and spent a few days ploughing or hoeing or keeping the birds away or harvesting. I ceased to regard school as any place where a sensible person might spend a day. Indeed all other children attended school by fits and starts. And the teachers seemed to view it with nothing but boredom.

(from *Down Second Avenue,*: 12)

Question 1

Which of the following best summarizes the main idea of the text? The writer is describing:

1 the reasons why he never got an education.
2 his impoverished, rural childhood.
3 his contented childhood memories.
4 his early, negative experiences of school.

Question 2

How do you know that the writer is poor and from a rural background?

a the distance to be walked from his home to his school
b the word 'village'
c the occupation of goat herding
d the corporal punishment
e the reference to streams and birdsong
f the reference to fields, harvests and ploughing
g the boredom
h the need for child labour

1 a b c d e f g h
2 a b c d e f h
3 a b c e f h
4 b c e f h

Question 3

What is the writer trying to represent when he types 'F-O-X, *fokos*' etc?

1 The teacher's correct spelling and the children's incorrect spelling.
2 The children's correct pronunciation and incorrect spelling.
3 The teacher's correct spelling and incorrect pronunciation.
4 The teacher's correct pronunciation and the children's incorrect echo.

Question 4

What evidence is there, both direct and indirect, that the class was large?

a 'a mighty crowd'
b 'a large hall'
c 'I still wonder how he managed us'
d 'The teacher bellowed out'

1 a b c d
2 a b
3 b c
4 a b c

Question 5

What method of teaching does the teacher employ?

1 A lecturing style
2 Small group work
3 Rote learning
4 Remedial education

Question 6

Which sentence in the third paragraph best reflects the general point the writer is trying to make?

1 One of the families in the village kept their goat among ours.
2 Their boy and I alternated in herding them and going to school.
3 I began to detest the whole idea of school.
4 I came to associate it with physical pain – with the rod, which the teachers applied liberally as a panacea for teaching and organizational ills.

Question 7

What explanations does the writer give for the use of corporal punishment in the school?

a The teachers used punishment to cover up for their poor teaching skills.
b The teachers used punishment to cover up for their poor organizational skills.
c The teachers used punishment to release tension created by the 'torture' of their jobs.
d The learners were exceptionally naughty and deserved punishment.

1 a b c d
2 a b c
3 b c d
4 a b

Question 8

What evidence is there to suggest that the writer did not attend school regularly?

a The long walk to school meant that often he would not make it.
b On alternate days he would stay home to herd goats.
c At harvest time, he was occupied keeping birds away from the crops.
d At certain times his labour was required for hoeing and ploughing.

1 a b c d
2 b c d
3 c d
4 a c d

Answers

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

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PHYSICAL SCIENCES GRADE 11 LESSON NOTES

Physical and Chemical change; Representing chemical change; Balancing chemical equations

The universe as we see it is made up of matter. The air we breathe, toxic and non toxic gases, the chair you sit on, the food you eat, water, liquids, are all matter. But what is matter made up of? Matter is made up of tiny particles called atoms. Atoms in turn are made up of electrons, protons and neutrons.

Atoms differ from each other by the number of protons, neutrons and electrons that they have. The differences in electrons, protons and neutrons give atoms their characteristic physical and chemical properties.

Two very important things happen in the study of chemistry. 1. The description of substances and 2. the reaction of substances. This is a process where atoms combine to form products or when compounds break up to form new compounds or atoms. Not all atoms appear as atoms in nature. Most of them occur as parts of compounds that need to undergo a reaction in order to be released in their atomic state.

Physical change

When an object changes in size, shape or state, it undergoes a physical change. In physical change, some of the physical properties of matter may change, but its composition doesn't change.

Examples: Dissolving salt in water, dissolving sugar in tea, melting of ice, boiling of water, cutting paper, cutting wood

Chemical change

The changes in the molecular structure of matter are called chemical changes. In chemical change, the molecular structure of matter changes. Some molecules are broken down and new molecules are formed. One or more samples are converted to new samples with different composition. Heat, light or some other forms of energy lost or gained can be used to decompose or form compounds.

Examples: Burning sulphur, burning hydrogen, burning natural gas, rusting iron

Chemical Reactions

Changed and Unchanged Properties in

No Change

1. Types of atom
2. Total number of atoms
3. Total number of electrons
4. Total number of neutrons
5. Total number of protons
6. Mass

Changes

1. Total number of molecules
2. Electron configuration of atoms
3. For each atom their number of electrons (atom can give or receive electrons)
4. Volume
5. Physical properties (Colour, odour, taste.)
6. Chemical properties (what it can react with)

Task 1

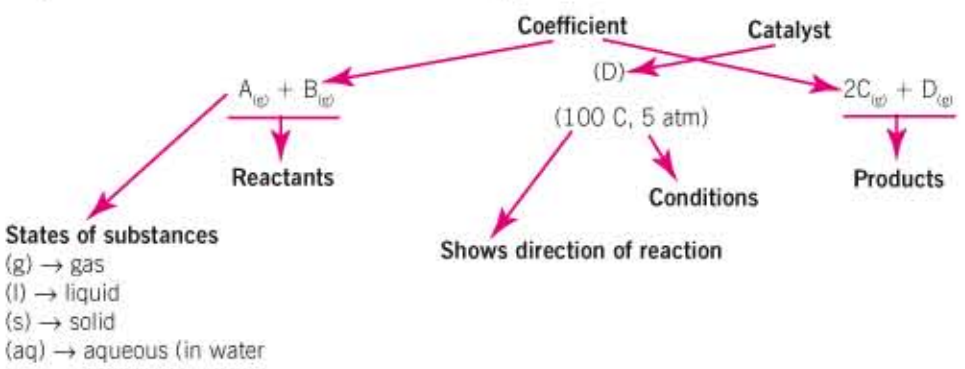
Classify the following changes as physical or chemical changes

1. breaking of glass
2. burning sulphur
3. cutting orange into slices
4. baking a cake
5. opening an envelope
6. dissolving salt in water
7. rusting iron
8. breaking of egg
9. boiling of water
10. changing of CO to CO_2
11. boiling of egg
12. tearing of paper
13. photosynthesis of plants
14. combustion of coal
15. souring of milk

Solutions

1. Physical	2. chemical	3. physical
4. chemical	5. physical	6. physical
7. chemical	8. physical	9. physical
10. chemical	11. chemical	12. physical
13. chemical	14. chemical	15. chemical

Representation of chemical change



(*We will ignore conditions when writing a chemical equation*)

The reactants are always on the left hand of a chemical equation and the products on the right.

If the coefficient is one, we do not write 1, we write the symbol only.

The following symbols are sometimes used in equations

1. ↑ Gas evolves
2. ↓ Precipitation Reaction
3. ⇌ Two direction equilibrium reaction.

Balancing equations

The law of conservation of mass

The law of conservation of mass/matter, also known as law of mass/matter conservation (or the Lomonosov-Lavoisier law), states that the mass of a closed system of substances will remain constant, regardless of the processes acting inside the system. An equivalent statement is that matter cannot be created nor destroyed, although it may change form. This implies that for any chemical process in a closed system, the mass of the reactants must equal the mass of the products.

Balance the following equations: (*ignore the states*)

1. $Cu + O_2 \text{----> } Cu_2O$
2. $CaCl_2 + AgNO_3 \text{----> } AgCl + Ca(NO_3)_2$
3. $H_2 + O_2 \text{----> } H_2O$
4. $Mg + P_4 \text{---> } Mg_3P_2$
5. $H_2SO_4 + NaOH \text{----> } H_2O + Na_2SO_4$

Solutions

1. $4Cu + O_2 \text{----> } 2Cu_2O$
2. $CaCl_2 + 2AgNO_3 \text{----> } 2AgCl + Ca(NO_3)_2$
3. $2H_2 + O_2 \text{----> } 2H_2O$
4. $6Mg + P_4 \text{---> } 2Mg_3P_2$
5. $H_2SO_4 + 2NaOH \text{----> } 2H_2O + Na_2SO_4$

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MATHEMATICS LEARNING CHANNEL GRADE 11 LESSON NOTES

TRIGONOMETRIC IDENTITIES

Lesson

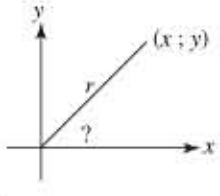
To simplify or prove trig expressions or identities, we need to change everything to sinθ and/or cosθ.

1. $\tan\theta = \frac{y}{x}$

$$\frac{\sin\theta}{\cos\theta} = \frac{\frac{y}{r}}{\frac{x}{r}} = \frac{y}{r} \times \frac{r}{x} = \frac{y}{x}$$

so $\tan\theta = \frac{\sin\theta}{\cos\theta}$

2. The magic **ONE** of trigonometry



By Pythagoras:

$x^2 + y^2 = r$

$\div r^2$: $\frac{x^2}{r^2} + \frac{y^2}{r^2} = \frac{r^2}{r^2}$

but $\frac{x}{r} = \cos\theta$ and $\frac{y}{r} = \sin\theta$

so $\cos^2\theta + \sin^2\theta = 1$

Very important

$\sin^2\theta = 1 - \cos^2\theta$; $\cos^2\theta = 1 - \sin^2\theta$

Let's use what we have learnt

1. ***Simplify***: $\frac{1}{\cos^2\theta}(1 - \sin^2\theta)$

Solution: $\frac{1}{\cos^2\theta} \times \cos^2\theta = 1$

2. ***Simplify***: $\tan^2\theta \cdot \cos^2\theta$

Solution: $\frac{\sin^2\theta}{\cos^2\theta} \times \cos^2\theta = \sin^2\theta$

Note: $\tan\theta = \frac{\sin\theta}{\cos\theta}$ so $\frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta}$

3. ***Prove***: $\frac{\sin\theta}{1+\cos\theta} + \frac{1}{\tan\theta} = \frac{1}{\tan\theta \cdot \cos\theta}$

Solution:

LHS

$$\frac{\sin\theta}{1+\cos\theta} + \frac{\cos\theta}{\sin\theta} = \frac{\sin^2\theta + \cos\theta(1+\cos\theta)}{(1+\cos\theta)\sin\theta} = \frac{\sin^2\theta + \cos^2\theta + \cos\theta}{(1+\cos\theta)\sin\theta} = \frac{1+\cos\theta}{(1+\cos\theta)\sin\theta} = \frac{1}{\sin\theta}$$

RHS

$$\frac{\sin\theta}{1+\cos\theta} + \frac{\cos\theta}{\sin\theta} = \frac{1}{\frac{\sin\theta}{\cos\theta} \times \cos\theta} = \frac{1}{\sin\theta}$$

4. ***Prove***: $\sqrt{1 + 2\sin\theta\cdot\cos\theta} = \sin\theta + \cos\theta$

Solution:

$$\sin\theta + \cos\theta = \sqrt{(\sin\theta + \cos\theta)^2} = \sqrt{\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta} = \sqrt{\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta} = \sqrt{1 + 2\sin\ \&\ \cos\theta}$$

5. ***Prove***:

$$\left(\frac{1}{\cos x} - \tan x\right)^2 = \frac{1-\sin x}{\sin x}$$

Solution:

$$\left(\frac{1}{\cos x} - \frac{\sin x}{\cos x}\right)^2 = \left(\frac{1-\sin x}{\cos x}\right)^2 = \frac{(1-\sin x)^2}{\cos^2 x} = \frac{(1-\sin x)^2}{1-\sin^2 x} = \frac{(1-\sin x)^2}{(1-\sin x)(1+\sin x)}$$

6. ***Prove***: $\tan^2\alpha - \sin^2\alpha = \tan^2\alpha \times \sin^2\alpha$

Solution:

LHS

$$\frac{\sin^2\alpha}{\cos^2\alpha} - \sin^2\alpha = \frac{\sin^2\alpha - \sin^2\alpha\cos^2\alpha}{\cos^2\alpha} = \frac{\sin^2\alpha(1-\cos^2\alpha)}{\cos^2\alpha} = \frac{\sin^2\alpha\cdot\sin^2\alpha}{\cos^2\alpha}$$

RHS

$$\frac{\sin^2\alpha}{\cos^2\alpha} \times \sin^2\alpha = \frac{\sin^2\alpha\cdot\sin^2\alpha}{\cos^2\alpha}$$

7. ***Prove***:

a) $\frac{\sin A}{1+\cos A} + \frac{1+\cos A}{\sin A} = \frac{2}{\sin A}$

b) Hence evaluate:

$$\frac{\sin 2007^\circ}{1+\cos 2007^\circ} + \frac{1+\cos 2007^\circ}{\sin 2007^\circ}$$

Solutions:

a) $\frac{\sin A}{1+\cos A} + \frac{1+\cos A}{\sin A} = \frac{2}{\sin A}$

$$\frac{\sin^2 A + (1+\cos A)^2}{\sin A(1+\cos A)}$$

$$\frac{\sin^2 A + (1+\cos A)^2}{\sin A(1+\cos A)} = \frac{\sin^2 A + 1 + 2\cos A + \cos^2 A}{\sin A(1+\cos A)} = \frac{2+2\cos A}{(\sin A)(1+\cos A)} = \frac{2(1+\cos A)}{\sin A(1+\cos A)} = \frac{2}{\sin A}$$

b) We proved:

$$\frac{\sin x}{1+\cos x} + \frac{1+\cos x}{\sin x} = \frac{2}{\sin x}$$

so $\frac{\sin 2007^\circ}{1+\cos 2007^\circ} + \frac{1+\cos 2007^\circ}{\sin 2007^\circ}$

$$= \frac{2}{\sin 2007^\circ} = \frac{2}{\sin 2007^\circ} = -4{,}405.$$

Activities

1. Simplify $\tan^2\theta - \frac{1}{\cos^2\theta}$
2. Simplify $1 - \sin^2\theta + \cos^2\theta$
3. Simplify $\tan\frac{1}{\sin A} - \frac{\cos A}{\tan A}$
4. Simplify $\tan^2\alpha\cos^2\alpha + \frac{\sin^2\alpha}{\tan^2\alpha}$
5. Prove $\frac{\sin A - \sin^3 A}{\cos A - \cos^3 A} = \frac{1}{\tan A}$
6. Prove $(1 - \sin^2\theta)(1 + \tan^2\theta) = 1$
7. Prove $(\sin\alpha + \cos\alpha)^2 = 1 + 2\sin\alpha\cos\alpha$
8. Prove $(2\cos^2\theta - 1)(1 + \tan^2\theta) = 1 - \tan^2\theta$
9. Prove $\frac{1}{1+\sin\alpha} + \frac{1}{1-\sin\alpha} = \frac{2}{\cos^2\alpha}$
10. Prove $\sqrt{1 + 2\sin\theta\cos\theta} = \sin\theta + \cos\theta$

Answers

1. $\frac{\sin^2\theta}{\cos^2\theta} - \frac{1}{\cos^2\theta} = \frac{\sin^2\theta - 1}{\cos^2\theta} = \frac{-\cos^2\theta}{\cos^2\theta} = -1$
2. $(1 - \sin^2 x) + \cos^2 x = \cos^2 x + \cos^2 x = 2\cos^2 x$
3. $\frac{1}{\sin A} - \cos A\cdot\frac{\cos A}{\sin A} = \frac{1-\cos^2 A}{\sin A} = \frac{\sin^2 A}{\sin A} = \sin A$
4. $\frac{\sin^2\alpha}{\cos^2\alpha}\cdot\cos^2\alpha + \sin^2\alpha\cdot\frac{\cos^2\alpha}{\sin^2\alpha} = 1$
5. LHS

$$\frac{\sin A.\cos^2 A}{\cos A\sin^2 A} = \frac{\cos A}{\sin A} = \frac{\cos A}{\sin A} = \frac{1}{\tan A}$$

6. LHS

$$\cos^2\theta\left(1 + \frac{\sin^2\theta}{\cos^2\theta}\right) = \frac{\cos^2\theta}{1}\left(\frac{\cos^2\theta + \sin^2\theta}{\cos^2\theta}\right) = 1 = \text{RHS}$$

7. $(\sin\alpha + \cos\alpha)^2 = \sin^2\alpha + 2\sin\alpha\cos\alpha + \cos^2\alpha = 1 + 2\sin\alpha\cos\alpha = \text{RHS}$
8. LHS

$$(2\cos^2\theta - 1)\left(\frac{1+\sin^2\theta}{\cos^2\theta}\right) = (2\cos^2\theta - 1)\left(\frac{\cos^2\theta + \sin^2\theta}{\cos^2\theta}\right) = (2\cos^2\theta - 1)\left(\frac{1}{\cos^2\theta}\right) = \frac{2\cos^2\theta - 1}{\cos^2\theta}$$

RHS

$$1 - \frac{\sin^2\theta}{\cos^2\theta} = \frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta} = \frac{\cos^2\theta - (1-\cos^2\theta}{\cos^2\theta)} = \frac{2\cos^2\theta - 1}{\cos^2\theta}$$

LHS = RHS

9. LHS

$$\frac{1-\sin\alpha + 1 + \sin\alpha}{(1+\sin\alpha)(1-\sin\alpha)} = \frac{2}{1-\sin^2\alpha} = \frac{2}{\cos^2\alpha} = \text{RHS}$$

10. LHS

$$\sqrt{\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta} = \sqrt{(\sin\theta + \cos\theta)^2} = \sin\theta + \cos\theta$$

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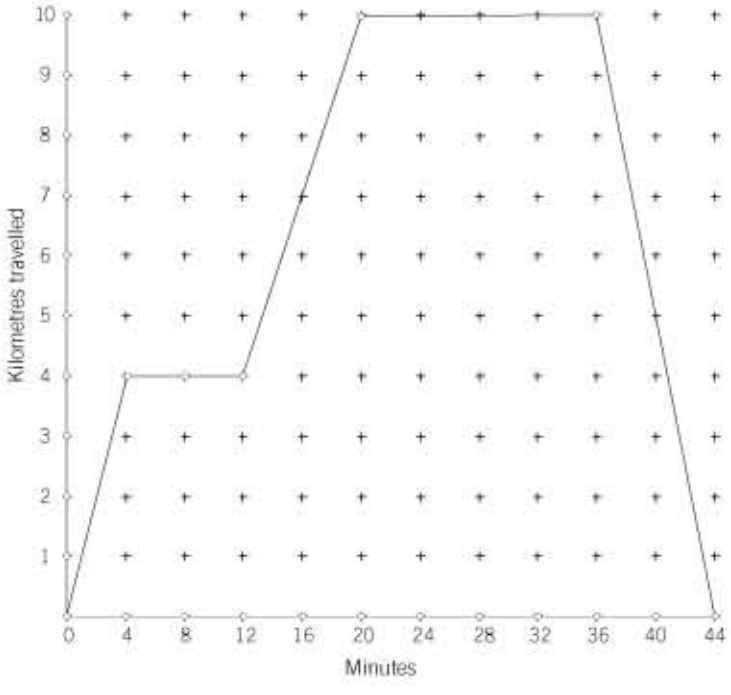
MATHEMATICAL LITERACY GRADE 11 LESSON NOTES

Activity 1: Interpretation of graphs and tables

David drives the school bus. The graph below shows the distance travelled by the school bus one afternoon when he takes the school's soccer players to a tournament.

NOTE: Distance = Speed × time; Speed = $\frac{\text{distance}}{\text{time}}$; time = $\frac{\text{distance}}{\text{speed}}$



The questions that follow are based on the graph.

1. How far is the venue for the soccer tournament from David's school?
2. What is his average speed for the first 4 km of his drive?
3. Write a short statement of what you think happened 4 minutes after he started his drive.
4. How many minutes did he spend at the tournament?
5. On his way back he passed through a speed trap. Do you think he received a fine? Justify your answer.

Possible solutions: Activity 1

1. 10 km
2. Average speed = $\frac{4 \text{ km}}{4 \text{ min}}$ = 1 km/min = 60 km/h
3. Accept any suitable response.

   Possible response: He probably stopped at a garage to fill petrol; there may have been a road block or there was an accident and all vehicles had to stop while the road was being cleared.
4. He spent 16 minutes at the tournament (36–20 = 16 minutes)
5. His return speed (average) = $\frac{10 \text{ km}}{8 \text{ min}}$ 1,25 km/min = 75 km/h

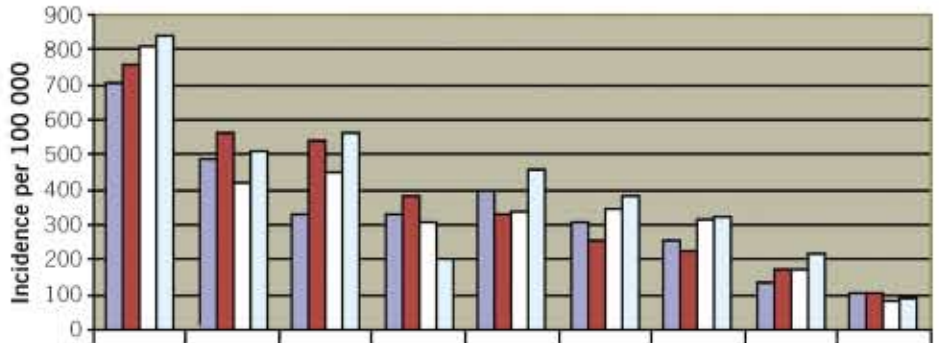
   Possible response: If the route used was in built-up urban area then speed limit is 60 km/h and he would have exceeded this speed. The graph shows that he did not stop so the only way he would have received a fine is if he was caught on camera.

Activity 2: Interpretation of graphs and tables

One of the most important policies that affect education is the HIV and AIDS policy. Since 1998 there was a general increase in the incidence of Tuberculosis as a result of advocacy, better case detection and as a result of increasing levels of HIV infection. The incidence in All types of Tuberculosis increased from 338 patients per 100 000 in 1998 to 362 patients per 100 000 in 2001. In the graph and table that follows, the increase per province is shown. [Information supplied by the National Council on AIDS]

Incidence of all TB patients per 100 000 per province

1998–2001



	WC	EC	NC	KZN	FS	NW	GP	MP	LP
1998	705	487	334	328	398	311	255	136	106
1999	757	565	537	386	327	254	224	174	109
2000	808	422	446	312	337	342	316	176	86
2001	841	510	561	206	460	383	320	222	91

1. Which image conveys a better picture of the incidence of TB, the graph or the table? Motivate your answer.
2. List 5 observations from the graph or table.
3. The table below shows the number of all types of Tuberculosis patients reported per province and for South Africa, annually from 1998 to 2001.

	EC	FS	GP	KZN	MP	NW	NC	LP	WC	SA
1998	31763	10857	19024	28637	3985	10814	2877	5500	28820	142277
1999	30990	8885	17450	34481	5226	9043	4698	5825	31566	148164
2000	28963	9414	24861	28039	5339	12191	3896	4735	33848	151286
2001	35702	13024	25698	18855	6902	13896	4946	6286	35803	161112

Using the table, calculate the percentage increase/decrease in TB patients from 1998 to 2001 in:

3.1 Eastern Cape

3.2 Kwazulu-Natal

3.3 Western Cape

3.4 South Africa

4. What do you think should be done by authorities to reduce the incidence of TB in South Africa?

Possible solutions: Activity 2

1. The graph conveys a better picture (visualization) as you can see the increase/decrease for each province; this could indicate to the health authorities the type/s of interventions needed in each province.
2. Accept any 5 suitable responses:

   Possible responses:

   - There is a steady increase in the Western Cape
   - There was a slight increase in Limpopo and this was followed by significant decreases
   - KZN peaked in 1999, then there was a significant drop
   - The incidence of TB patients in Gauteng dropped in 1999 but then increased dramatically; the same is true for North-West
   - The incidence of TB patients varies from province to province

   3.1 Eastern Cape: $\frac{35\,702 - 31\,763}{31\,763} \times 100\%$ = 12,4% increase

   3.2 KZN: $\frac{18\,855 - 28\,637}{28\,637} \times 100\%$ = –34,2% decrease

   3.3 Western Cape: $\frac{35\,803 - 28\,820}{28\,820} \times 100\%$ = 24,2% increase

   3.4 South Africa: $\frac{161\,112 - 142\,277}{142\,277} \times 100\%$ = 13,2% increase
4. ***Possible response***: Support prevention programmes; Improve access to health care; have school-feeding schemes/soup kitchens to ensure people have adequate access to nutrition.

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ACCOUNTING GRADE 11 LESSON NOTES

VALUE ADDED TAX
Lesson notes, tasks and solutions

Value Added Tax is a tax on the supply of goods and services which is eventually borne by the final consumer, but which is collected at each stage of the production and distribution chain. Currently the Standard rate of VAT in South Africa is 14% and **this is the rate to be used when answering all questions**.

Tasks

1. On 17 March, Tilly sells goods to the four customers shown in the table. The value of the goods is also shown. VAT has not yet been included in the invoice price of the goods.

   Calculate the value of VAT in each case and the total value of the invoice to be sent to each customer.

Customer	Value of goods sold	Vat	Invoice total
Nina	R 54.67		
Khentsane	R 132.91		
Phuti	R 17.54		
Bongi	R2 381.92		

2. On 4 September, Harry receives invoices for goods that he purchased. The invoices show the total price of the goods including VAT.

   Calculate the value of goods that Harry received and the amount of VAT added to this to produce the invoice total.

Seller	Invoice total	Value of goods purchased	Vat
Cindi	R 325.76		
Xolani	R 54.22		
Tenyeko	R4 571.09		
Azwindini	R 72.77		

3. Fill in the gaps.

   Two types of discount are used in the business world:

   a. _____ is a reduction in price when goods are supplied to other businesses (usually in the same line of business). This reduced price is not available to the general public.

   This type of discount is generally shown on the invoice (source document), but is not included in the double-entry records.

   b. _____ is an allowance that can be deducted from the total amount charged for goods if the debt is settled within a time specified by the supplier.

   This type of discount is only recorded when advantage is taken of the reduction.

4. Bernard sells goods valued at R2 760 to Aileen. Aileen is allowed a 25% trade discount.

   Calculate:

   a. the amount that Bernard will show on his sales invoice for the goods sold and the amount that he will enter in his sales journal

   b. the amount that Aileen will enter in her purchases journal

Notes:

One of the trickiest calculations that you will come across during your accounting studies involves the calculation of VAT on goods that are subject to both trade and cash discount. Learn it and practice it several times.

VAT is always calculated *after* deducting cash discount. If the customer does not pay before the date stipulated on the purchase invoice, they lose the benefit of the cash discount.

Example

Corinne sells goods on 3 March valued at R1, 276.84 to Dolly. The terms are a trade discount of 25% and a cash discount of 5% if Dolly settles her account within 30 days.

Calculate the total value of the sales invoice sent to Dolly.

Solutions

Price of goods	R1, 276.84	
Less trade discount	319.21	
Selling price to Dolly	957.63	R 957.63
Less cash discount		47.88
		909.75
VAT	159.21	159.21
Total value of invoice	**R 1,116.84**	

The total value shown on the copy sales invoice (**source document**) is entered in the seller's (Corinne's) **sales journal**.

The invoice will be received by the purchaser (Dolly) as a purchases invoice (**source document**) and will be entered in his **purchases journal**.

All the subsidiary books must record any VAT included in the source documents.

5. On 3 October Otto sells goods to Pierre with a catalogue value of R7, 500. The goods are subject to a trade discount of $33\frac{1}{3}\%$ and if Pierre settles the outstanding amount before the end of the month he may deduct a $2\frac{1}{2}\%$ cash discount (invoice no. 1 234).
   On 4 October Otto sells goods to Mapule with a catalogue price of R376. He allows Mapule 25% trade discount and 3% cash discount for settlement within 30 days (invoice no. 1 235). Also, on 4 October Otto sells goods to Bongani with a catalogue price of R518. Bongani's order is subject to 50% trade discount and a cash discount of 1% if the debt is settled by the end of the month (invoice no. 1 236).

   Calculate:

   a the total of the sales invoice sent to Pierre

   b the total of the sales invoice sent to Mapule

   c the total of the sales invoice sent to Bongani

   d Prepare the entries in Maleka sales day book for 3 and 4 October.

Maleka: Sales Journal					
Date	**Particulars**	**Invoice no.**	**Sales**	**Vat**	**Invoice total**
3 October	Pierre	1 234	R	R	R
4 October	Mapule	1 235			
4October	Bongani	1 236			

Solution

1. Calculate the value of VAT in each case and the total value of the invoice to be sent to each customer.

CUSTOMER	VALUE OF GOODS SOLD	VAT	INVOICE TOTAL
Nina	R 54.67	R 7.65	R 62.32
Khentsane	R 132.91	R 18.61	R 151.52
Phuti	R 17.54	R 2.46	R 20.00
Bongi	R2 381.92	R333.47	R2 715.39

2. Calculate the value of goods that Harry received and the amount of VAT added to this to produce the invoice total.

SELLER	INVOICE TOTAL	VALUE OF GOODS PURCHASED	VAT
Cindi	R 325.76	R 280.15	R 45.61
Xolani	R 54.22	R 46.63	R 7.59
Tenyeko	R4 571.09	R3931.14	R639.95
Azwindini	R 72.77	R 62.58	R 10.19

3. Fill in the gaps.

   A. Trade discount

   B. Cash discount

4. Bernard sells goods valued at R2 760 to Aileen. Aleen is allowed a 25% trade discount.

   a. R2 060

   b. R2 060

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ACCOUNTING GRADE 11 LESSON NOTES

5

a **b** **c**

A. Pierre	B. Mapule	C. Bongani
R7 500.00	R375.00	R 581.00
Less Trade discount 2 497.50	Less Trade discount 94.00	Less Trade discount 259.00
5 002.00	282.00	259.00
Less discount 125.06	Less Cash discount 8.46	Less Cash discount 2.59
4877.44	273.54	256.41
Add VAT 882.84	Add VAT 38.30	Add VAT 35.90
Total value of invoice 5560.28	Total value of invoice 311.64	Total value of invoice 292.31

d Prepare the entries in Maleka Sales Journal for 3 and 4 October.

Maleka: Sales Journal					
Date	Particulars	Invoice no.	Sales	VAT	Invoice total
3 October	Pierre	1 234	R 4677.44	R 682.84	R 5560.28
4 October	Mapule	1 235	273.54	38.30	311.64
4October	Bongani	1 236	256.41	35.90	292.31

*** Under periodic inventory system, the following journal entry is recorded at the end of accounting period.**

31/5/06	Trading stock	24 000	
	Purchases		24 000

Quantity of merchandise on hand: = 1,000 units purchased - 200 units sold
= 800 units left

Cost of merchandise on hand: = 800 units x R30 per unit cost = R24 000

31/5/06	Cost of goods sold	6 000	
	Purchases		6 000

Note: The **periodic inventory adjustment** at the end of the period adjusts inventory to the physical count, closes out any purchase accounts, and runs any difference through cost of goods sold.

Cost of goods sold: = Total purchases - stock at the end
= 1,000 units x R30 per unit cost - 800 units xR30 per unit cost
= R30 000 - R24 000 = R6 000

Stock on hand at the end and Cost of goods of sold:

Stock at the end: = Beginning stock + Purchases during the period - Cost of goods sold
= R0 + R30 000 - R6 000 = R24 000

Cost of goods sold: = Beginning stock + Purchases during the period - Ending stock
= R0 + R30 000 - R24 000 = R6 000

Posting to the Ledger

Dr **Purchases Account** **Cr**

1/5/06	Creditors control	CJ	30 000				

Dr **Purchases Account** **Cr**

				1/5/06	Purchases	GJ	30 000

Dr **Purchases Account** **Cr**

6/5/06	Sales	GJ	10 000				

INVENTORY CONTROL SYSTEM

What is a Periodic Inventory system?

A **periodic inventory system** is a method of finding the value of merchandise at periodic intervals by taking a physical count of the stock. It provides inventory and cost of goods sold data only when inventory is counted (for example, at year end).

- Inventory purchase or sale is recorded in "Purchases" account.
- There is no continuous recording of trading stock movement. Trading Stock account is updated on a periodic basis at the end of each accounting period (e.g., monthly, quarterly).
- It is not possible to ascertain from the books/inventory accounts, what the stock on hand should be.
- Costs of materials used and costs of goods sold cannot be calculated until stock at the end, determined by physical count, are subtracted from the sum of opening stock and purchases.
- The stock on hand is counted periodically, usually at the end of the accounting period.

Example 1:

On May 1, 2006: Purchased 1000 units of goods at R30 per unit. On May 6, 2006: Sold 200 units of goods at R50 per unit on credit. Record the transaction in the subsidiary journal and post to the purchases, sales, debtors and creditors accounts.

Periodic inventory system

		Debit	Credit
1/5/2006	Purchases	30 000	
	Creditors Control		30 000

* Under periodic inventory system, all purchases during the accounting period are recorded in the "Purchases" account.

		Debit	Credit
6/5/2006	Debtors Control	10 000	
	Sales		10 000

Dr **Purchases Account** **Cr**

31/5/06	Trading Account		10 000	6/5/06	Debtors Control	DJ	10 000

Advantages

- This system is not costly and requires little work.

Disadvantages

- Profit or loss is determined only at the end of the period.
- Stock loss/gain is only noticed at the end of year when the physical count of the inventory is taken.
- Lacks readily available inventory data
- Sales revenues is booked when a sale is made, but not cost of goods sold
- Records documenting quantity and per unit cost of individual inventory items are not maintained
- Stock on hand is determined via a physical count, and then cost of goods sold is worked out.

Task

1. On June 5, 2006: Purchased 600 units of merchandise at R35 per unit. On June 16, 2006: sold 400 units of merchandise at R55 per unit on credit.

   Required: Use periodic inventory system to record the above transaction in the subsidiary journal and post to the **purchases, sales, creditors and debtors ledger** accounts.

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ACCOUNTING GRADE 11 LESSON NOTES

SUMMARY: COMPARISON BETWEEN PERPETUAL AND PERIODIC INVENTORY SYSTEMS

Entries in the general ledger when the two systems are used

NO	TRANSACTION	PERPETUAL INVENTORY SYSTEM		PERIODIC INVENTORY SYSTEM	
		Debit	Credit	Debit	Credit
1	Credit purchases of merchandise	Trading stock	Creditors control	Purchases	Creditors control
2	Merchandise purchases by cheque	Trading stock	Credit Bank	Purchases	Credit Bank
3	Merchandise returned to suppliers /purchases returns	Creditors control	Trading stock	Creditors control	Creditors allowances
4	Carriage on purchases – merchandise for credit/ for cash	Trading stock	Bank/ creditors control	Carriage on purchases	Bank/ creditors control
5	Merchandise withdrawn for personal use	Drawings	Trading stock	Drawings	Purchases
6	Credit sales of merchandise	Debtors control	Sales	Debtors control	Sales
		Cost of sales	Trading stock	No entry	No entry
7	Merchandise returned by customers/sales returns	Debtors allowances	Debtors control	Debtors allowances	Debtors control
		Trading stock	Cost of sales		

COMPLETED THE TASK? SOLUTION

TASK:

On June 5, 2006: Purchased 600 units of merchandise at R35 per unit. On June 16, 2006: Sold 400 units of merchandise at R55 per unit on credit.

Periodic inventory system

		Debit	Credit
5/6/2006	Purchases	21 000	
	Creditors Control		21 000

* Under periodic inventory system, all purchases during the accounting period are recorded in the "Purchases" account.

		Debit	Credit
16/6/2006	Debtors Control	22 000	
	Sales		22 000

* Under periodic inventory system, the following journal entry is recorded at the end of accounting period.

30/6/06	Trading stock	7 000	
	Purchases		7 000

Quantity of merchandise on hand: = 600 units purchased - 400 units sold
= 200 units left

Cost of merchandise on hand: = 200 units x R35 per unit cost = R7 000

30/6/06	Cost of goods sold	14 000	
	Purchases		14 000

Note: The periodic inventory adjustment at the end of the period adjusts inventory to the physical count, closes out any purchase accounts, and runs any difference through cost of goods sold.

Cost of goods sold: = Total purchases - stock at the end
= 600 units x R35 per unit cost - 200 units xR35 per unit cost
= R21 000 – R14 000 = R7 000

Stock on hand at the end and Cost of goods of sold:

Stock at the end: = Beginning stock + Purchases during the period - Cost of goods sold
= R0 + R21 000 – R7 000 = R14 000

Cost of goods sold: = Beginning stock + Purchases during the period - Ending stock
= R0 + R21 000 – R7 000 = R14 000

Posting to the Ledger

Dr **Purchases Account** **Cr**

1/5/06	Creditors control	CJ	21 000				

Dr **Purchases Account** **Cr**

				1/5/06	Purchases	GJ	21 000

Dr **Purchases Account** **Cr**

6/5/06	Sales	GJ	22 000				

Dr **Purchases Account** **Cr**

				6/5/06	Debtors Control	DJ	22 000

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CHEMISTRY GRADE 10 EXAMINATION PAPER

Section A

Question 1: One-word answers

Write only the correct word/term for each of the following descriptions next to the question number (1.1–1.5). In some questions you may need to choose from the terms given in brackets.

1.1 Oceans, lakes, rivers, ice caps et cetera on earth form the ... sphere. **(1)**
1.2 Melting points, boiling points and densities of substances are classified as (physical/chemical) properties. **(1)**
1.3 The particles within diamonds are held together by (covalent/ionic) bonds. **(1)**
1.4 Absorbed infra-red radiation can cause (physical/chemical) changes in a substance. **(1)**
1.5 The measure of the average kinetic energy of particles in a substance. **(1)**
[5]

Question 2: Matching items

Match the information in COLUMN A with the information in COLUMN B by writing only the letter (A—J) next to the question number (2.1–2.5).

COLUMN A		COLUMN B	
2.1	Electron configuration of the Na^+ ion	A	number of unpaired electrons in the outermost energy level of an atom
		B	nitrogen cycle
2.2	SO_4^{2-}	C	conservation of atoms
		D	$1s^2\ 2s^2\ 2p^6$
2.3	Valence electrons	E	sulphate ion
		F	total number of electrons in the outermost energy level of an atom
2.4	Chemical reaction	G	$1s^2\ 2s^2\ 2p^6\ 3s^2$
		H	conservation of molecules
2.5	A global cycle that consists of physical changes only	I	sulphite ion
		J	water cycle [5]

4.3 The jam in a hot jam tart always feels hotter than the pastry because ...
A pastry absorbs latent heat from the jam.
B jam has a higher specific heat capacity than pastry.
C pastry has a higher specific heat capacity than jam.
D jam absorbs latent heat from the pastry. **(3)**

4.4 A compound consists of the ions A^{3+} and B^{2-}. A possible formula of the compound could be ...
A A_3B_2.
B A_2B_3.
C $(AB)_6$.
D 2A3B. **(3)**

4.5 Twenty five grams (25 g) of reactant P reacts completely with forty five grams (45 g) of reactant Q. Which ONE of the following statements is CORRECT?
A The total mass of products will be equal to 70 g.
B The total mass of products plus any unreacted reactants will be 70 g.
C The total mass of products plus any unreacted reactants will be less than 70 g.
D The total mass of products plus any unreacted reactants will be greater than 70 g. (3)
[15]
TOTAL SECTION A: 35

Section B

Instructions

1. Answer this section in the ANSWER BOOK.
2. In ALL calculations, formulae and substitutions must be shown.
3. Round off your answers to TWO decimal places.

Question 5

5.1 Write down the chemical formulae of the following:
5.1.1 Sodium chloride **(1)**
5.1.2 Copper(II) sulphate **(1)**

5.2 What is the household (common) name of sodium chloride? **(1)**

5.3 Write down the name of the group of metals to which copper belongs. **(1)**

Question 3: True or False

Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number (3.1 - 3.5). If the statement is FALSE, write down the correct statement.

3.1 The electrical conductivity of metalloids (semi-metals) increases with decreasing temperature. **(2)**
3.2 Ionisation energy is the amount of energy given off by an atom in the gaseous phase when an electron is released. **(2)**
3.3 Molecules form because they are more stable than individual atoms. **(2)**
3.4 Every time potatoes are harvested from a section of soil, some nitrogen is lost from the soil. **(2)**
3.5 Explosions can cause bodily harm because they are endothermic reactions. **(2)**
[10]

Question 4: Multiple-choice questions

Four possible options are provided as answers to the following questions. Each question has only ONE correct answer. Choose the answer, which in your opinion is the correct or best one, and mark the appropriate block with a cross (✗).

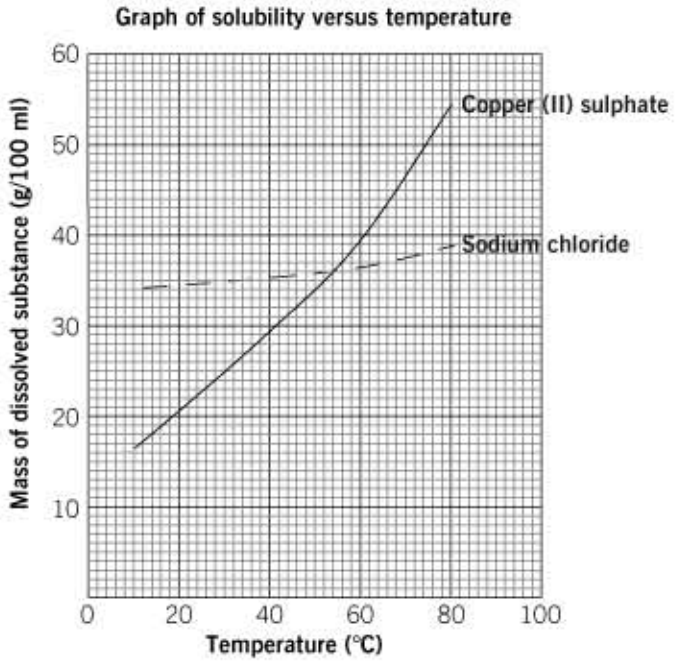
4.1 Water can be classified as a(n) ...
A element.
B compound.
C homogeneous mixture.
D heterogeneous mixture. **(3)**

4.2 Which ONE of the following regarding the thermal conductivity and electrical conductivity of metals is TRUE?

	Thermal conductivity	Electrical conductivity
A	Good	Good
B	Good	Poor
C	Poor	Good
D	Poor	Poor

(3)

An investigation is carried out to determine the mass of sodium chloride and copper(II) sulphate that can dissolve in the same volume of water at different temperatures. The results obtained are shown on the graph below.



Use the graph to answer the following questions:

5.4 Write down the factor that was kept constant during the investigation. **(2)**

5.5 Which ONE of the two substances is more soluble at room temperature (25 °C)? **(2)**

5.6 Write down the temperature at which the solubility of these substances is equal. **(2)**

5.7 What mass of the salts is soluble at the temperature mentioned in question 5.6? **(2)**

5.8 What conclusion can you draw from the graph about the solubility of copper (II) sulphate? **(2)**
[14]

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CHEMISTRY GRADE 10 EXAMINATION PAPER

Question 6

Uranium is found in two *isotopic* forms: uranium-235 ($^{235}_{92}U$) and uranium-238 ($^{238}_{92}U$). Enriched uranium-235, which is highly reactive, is used in the generation of electricity and in nuclear weapons. When a country acquires enriched uranium-235, their neighbouring countries become nervous and suspicious.

Uranium-235 makes up approximately 0,7% of the total uranium content on earth. Stable uranium-238, which is not suitable for use in nuclear reactors, makes up 99,3%.

6.1 Define the term 'isotope'. **(2)**

6.2 Explain why $^{238}_{92}U$, although more abundant, is not suitable for use as fuel in nuclear reactors. **(2)**

6.3 Calculate the relative atomic mass of uranium. **(4)**

6.4 Copy the table in your answer book. Tabulate ONE benefit and ONE disadvantage of $^{235}_{92}U$ to humanity.

Benefit of $^{235}_{92}U$ to humanity	Disadvantage of $^{235}_{92}U$ to humanity

(4)
[12]

Question 7

Boiling points and melting points of substances are a measure of the strength of intermolecular forces. The table below shows the melting points and boiling points of the hydrides of Groups 4 (IV) and 6 (VI).

Hydrides of Group 4 (IV)	Melting point (°C)	Boiling point (°C)
CH_4	-182	-164
SiH_4	-185	-112
GeH_4	-165	-89
SnH_4	-150	-52

Hydrides of Group 6 (VI)	Melting point (°C)	Boiling point (°C)
H_2O	0	+100
H_2S	-85	-61
H_2Se	-60	-42
H_2Te	-49	-2

7.1 Draw two water molecules. Use your diagram to explain the difference between intermolecular and intramolecular forces. **(4)**

7.2 Refer to the boiling points of CH_4 and SiH_4. Which hydride has stronger intermolecular forces? **(2)**

7.3 Molecular size increases from top to bottom in a group. What is the relationship between boiling points and the size of molecules in Group 4 (IV)? **(2)**

7.4 Do the boiling points of the hydrides of Group 6 (VI) follow the same pattern as the boiling points of the hydrides of Group 4 (IV)? Explain your answer. **(3)**

7.5 Write down the phase for each of the hydrides of Group 6 (VI) at room temperature (25 °C). **(2)**

7.6 Water has a difference of 100 °C between its melting point and boiling point. Explain how this property is useful in sustaining life on earth. **(2)**

[15]

Question 8

Copy the table shown below into your answer book. Write each of the items below under the correct heading:

- Fermentation of mealie meal
- Boiling of water
- Frying an egg
- Burning of petrol
- Sublimation of dry ice

PHYSICAL CHANGE	CHEMICAL CHANGE

[5]

Question 9

Write balanced chemical equations for each of the following descriptions:

9.1 The carbon monoxide gas from motorcar engines combines with the oxygen gas in the air to produce carbon dioxide gas. **(3)**

9.2 When sulphur dioxide gas combines in the atmosphere with water vapour it causes acid rain. **(3)**

9.3 Natural gas is mainly methane (CH_4). When this gas burns in oxygen, carbon dioxide gas and water are produced. **(3)**
[9]

Question 10

Fizzy drinks and soda water contain carbonic acid (H_2CO_3). When a can of fizzy drink is opened, water and carbon dioxide gas are released. A simplified equation for the reaction is:

$H_2CO_3(aq) \rightarrow H_2O(\ell) + CO_2(g)$

10.1 Is this reaction a synthesis or a decomposition reaction? **(1)**

10.2 Use this equation and explain why fizzy drinks can cause burping (belching). **(2)**

10.3 Some people say that fizzy drinks have a harmful effect on the teeth, causing tooth decay. How would you investigate this? Include the following in your report:

- The investigative question
- How you would carry out this investigation (Method)
- What you would look for (Results)
- How you would interpret your results (Conclusion) **(5)**

[8]

Question 11

Methane (CH_4) is a gas produced by decaying organic matter.

11.1 State the Law of Constant Composition. **(2)**

11.2 Calculate the percentage carbon and hydrogen in methane. **(4)**

11.3 What should be the percentage composition of carbon in a 10 g sample of methane gas? **(2)**

[8]

Question 12

Test tubes **X** and **Y** each contain 20 cm^3 of hydrochloric acid ($HC\ell$).

Powdered sodium hydrogen carbonate (sodium bicarbonate, $NaHCO_3$) is added to test tube **X**.

The same mass of sodium carbonate (Na_2CO_3) is added to test tube **Y**.

The following results are recorded:

TEST TUBE X	TEST TUBE Y
Effervescence (bubbles form)	Effervescence (bubbles form)
Colourless solution	Colourless solution
Test tube feels warm	Test tube feels cold

12.1 In which test tube does an exothermic reaction take place? Explain your answer. **(3)**

12.2 Complete and balance the equation:

$Na_2CO_3 + HC\ell \rightarrow$ _____ $+ H_2O + CO_2$ **(3)**

[6]

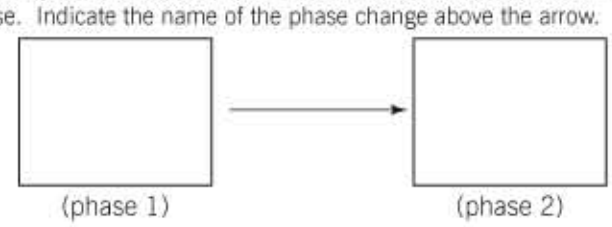
Question 13

During strenuous exercise athletes sweat. In this process, the breeze helps their bodies to cool down.

13.1 Explain the meaning of latent heat. **(3)**

13.2 Explain how the breeze helps athletes' bodies cool down when they sweat. **(2)**

13.3 Copy the diagram below in your answer book. During the cooling process the molecules undergo a phase change. Use circles (○) to represent the molecules in each phase. Indicate the name of the phase change above the arrow. **(4)**



13.4 Name the heat involved in the phase change mentioned in QUESTION 13.3. **(2)**

[11]

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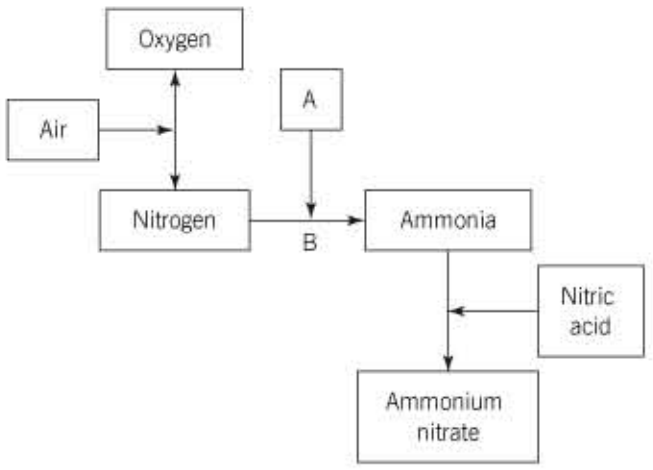
Question 14

Nitrogen is one of the most important elements in our world. The flow diagram below shows how nitrogen is used to prepare other nitrogen compounds. Study the diagram and answer the questions that follow:



14.1 Name the gas represented by the letter A. **(2)**

14.2 Name the process represented by the letter B. **(2)**

14.3 Explain briefly what you understand by the term nitrogen fixation. **(2)**

14.4 What is the importance of the industrial fixation of nitrogen for humans and animals? **(3)**

14.5 Ammonium nitrate is a water-soluble fertilizer. A small farming community lives very close to a river, which is their only source of water. Excessive use of this fertilizer over a long period of time may have a harmful effect on this community. Explain how this practice may affect the community. **(4)**
[13]

Question 15

A learner collects rainwater every 15 minutes on a rainy day in separate containers. The learner determines the pH of the rainwater and records the results in the table below.

Container	1	2	3	4	5
pH of rainwater	5,2	5,4	5,3	5,6	5,9
Time of collection (minutes)	0	15	30	45	60

15.1 What does the learner conclude about the acidity of the rainwater from the table? **(2)**

15.2 Write down a possible reason why the pH of the rainwater increases with time. **(2)**

15.3 What could be the possible reasons for the low pH of rainwater in this area? **(4)**

15.4 What effect will this type of environment have on each of the following:

15.4.1 Human beings

15.4.2 Aquatic life

15.4.3 Buildings **(6)**
[14]

TOTAL SECTION B: 115
GRAND TOTAL: 150

THE PERIODIC TABLE OF ELEMENTS

KEY

Atomic number → 29
Electronegativity → 1,9 Cu ← Symbol
Approximate relative atomic mass → 63,5

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
1 2,1 H 1																	2 He 4
3 1,0 Li 7	4 1,5 Be 9											5 2,0 B 11	6 2,5 C 12	7 3,0 N 14	8 3,5 O 16	9 4,0 F 19	10 Ne 20
11 0,9 Na 23	12 1,2 Mg 24											13 1,5 Aℓ 27	14 1,8 Si 28	15 2,1 P 31	16 2,5 S 32	17 3,0 Cℓ 35,5	18 Ar 40
19 0,8 K 39	20 1,0 Ca 40	21 1,3 Sc 45	22 1,5 Ti 48	23 1,6 V 51	24 1,6 Cr 52	25 1,5 Mn 55	26 1,8 Fe 56	27 1,8 Co 59	28 1,8 Ni 59	29 1,9 Cu 63,5	30 1,6 Zn 65	31 1,6 Ga 70	32 1,8 Ge 73	33 2,0 As 75	34 2,4 Se 79	35 2,8 Br 80	36 Kr 84
37 0,8 Rb 86	38 1,0 Sr 88	39 1,2 Y 89	40 1,4 Zr 91	41 Nb 92	42 1,8 Mo 96	43 1,9 Tc	44 2,2 Ru 101	45 2,2 Rh 103	46 2,2 Pd 106	47 1,9 Ag 108	48 1,7 Cd 112	49 1,7 In 115	50 1,8 Sn 119	51 1,9 Sb 122	52 2,1 Te 128	53 2,5 I 127	54 Xe 131
55 0,7 Cs 133	56 0,9 Ba 137	57 La 139	72 1,6 Hf 179	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 1,8 Tℓ 204	82 1,8 Pb 207	83 1,9 Bi 209	84 2,0 Po	85 2,5 At	86 Rn
87 0,7 Fr	88 0,9 Ra 226	89 Ac															

58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

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Answers

Section A

Question 1

1.1 hydro(sphere) ✓ (1)

1.2 physical✓ (1)

1.3 covalent ✓ (1)

1.4 physical ✓ (1)

1.5 temperature ✓ (1)

[5]

Question 2

2.1 D ✓ (1)

2.2 E ✓ (1)

2.3 F ✓ (1)

2.4 C ✓ (1)

2.5 J ✓ (1)

[5]

Question 3

1.1 False. It increases with increase in temperature. ✓✓ (2)

3.2 False. ✓✓ It's the amount of energy absorbed. (2)

3.3 True ✓✓ (2)

4.4 True ✓✓ (2)

4.5 False. The reaction is exothermic ✓✓ (2)

[10]

Question 4

4.1 B ✓✓✓ (3)

4.2 A ✓✓✓ (3)

4.3 B ✓✓✓ (3)

4.4 B ✓✓✓ (3)

4.5 A ✓✓✓ (3)

[15]

Total Section A = [35]

Section B

Question 5

5.1.1 NaCℓ ✓ (1)

5.1.2 $CuSO_4$ ✓ (1)

5.2 Table salt ✓ (1)

5.3 Transition ✓ (1)

5.4 Volume of water ✓✓ (2)

5.5 Sodium chloride✓✓ (2)

5.6 54 °C ✓✓ (2)

5.7 36 g ✓ ✓ (2)

5.8 Solubility increases with temperature. ✓✓ (2)

[14]

Question 6

6.1 Atoms of the same element ✓ with different mass number / number of neutrons / number of nucleons. ✓ (2)

6.2 Less reactive / More stable ✓✓ (2)

6.3 Relative atomic mass $= \frac{99{,}3(238) + 0{,}7(235)}{100} = 237{,}98$ ✓ (4)

6.4

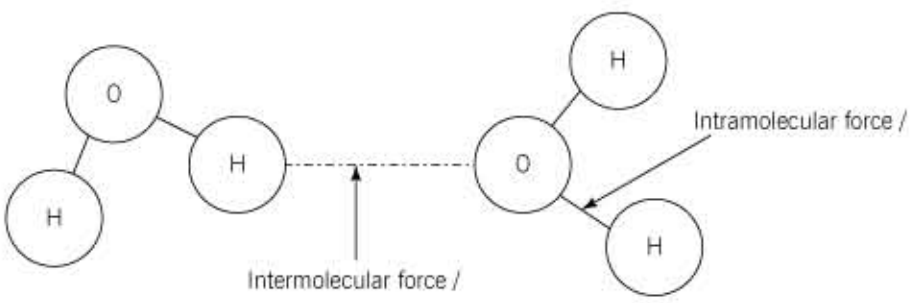
Benefit of $^{235}_{92}U$ to humankind	Disadvantage of $^{235}_{92}U$ to humankind
Generation of electricity/energy ✓✓	Radiation can cause illness or death ✓✓

(4)

[12]

Question 7

7.1



	Checklist	1	0
1	Structure of water molecules correctly drawn.		
2	Forces between atoms and between molecules indicated.		
3	Intermolecular forces correctly labelled.		
4	Intramolecular forces correctly labelled.		
	Total out of 4		

(4)

7.2 SiH_4 ✓✓ (2)

7.3 Boiling points increase with molecular size. ✓✓ (2)

7.4 No ✓

Water deviates from the pattern in having the highest boiling point in the group. ✓✓ (3)

7.5 H_2O – liquid✓

H_2S – gas
H_2Se – gas
H_2Te – gas } ✓ (2)

7.6 Water is a liquid at any temperature between these two temperatures – available as liquid to life on earth. OR Wide range in temperature for water to be in a liquid state in order to sustain life.✓✓ (2)

[15]

Question 8

PHYSICAL CHANGE	CHEMICAL CHANGE
Boiling of water ✓	Fermentation of mealie meal ✓
Sublimation of dry ice ✓	Frying an egg ✓
	Burning of petrol ✓

(5)

[5]

Question 9

9.1 $2CO + O_2$ ✓$\rightarrow 2CO_2$✓ (✓ - balancing) (3)

9.2 SO_2 ✓ + H_2O✓ $\rightarrow H_2SO_3$✓ (3)

9.3 $CH_4(g)$ ✓ + $2O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell)$ ✓ (✓ - balancing) (3)

[9]

Question 10

10.1 Decomposition ✓ (1)

10.2 Bubbles of carbon dioxide gas form in the stomach. ✓✓

OR

CO_2 gas in the stomach (2)

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CHEMISTRY GRADE 10 EXAMINATION PAPER

10.3

	Checklists	1	0
1	**Investigative question**		
	Question that is relevant to investigation; refers to dependent and independent variables and can be solved practically.		
2	**Method**		
	Stepwise method suggested to answer question		
	Method is suitable and can be performed practically		
3	**Results**		
	Suitable table suggested for collection of information or recording of results.		
4	**Conclusion/**		
	Suitable graph / other form indicated to seek a pattern in results		
	Total out of 5		

Example

Investigative question

What is the relationship between fizzy drinks consumed and tooth decay?

Method

Select 20 persons (ask your dentist for assistance

For each person:

- Enquire how much fizzy drinks he/she drinks per month or week.
- Enquire how many teeth in his/her mouth give problems.

OR

- Get hold of two milk teeth.
- Soak one milk tooth in fizzy drink.
- Soak the second in distilled water for a certain time to serve as reference.
- Close both containers.
- Observe the teeth over a period of time.
- Record any changes to enamel.

Results

Method 1: Collection of information

Name of Persons	Amount of fizzy drinks (ℓ or cans)	Number of problematic teeth

Method 2: Recording of results

Time (days)	Change to enamel in comparison to reference

Interpretation of results

Draw a graph (e.g. fizzy drinks consumed vs decay) or describe the pattern seen in results to answer the investigative question (5)

[8]

Question 11

11.1 Different samples ✓of a pure compound always contain the same elements in the same composition ✓/proportion. (2)

11.2 Percentage H: $\frac{4}{16} \times 100$ ✓ = 25% ✓

Percentage C: $\frac{12}{16} \times 100$ ✓ = 75% ✓ (4)

11.3 Same (25% of C) ✓✓ (2)

[8]

Question 12

12.1 Reaction in test tube X✓

Heat is produced by the reaction. ✓✓ (3)

12.2 $Na_2CO_3 + 2HC\ell \rightarrow 2NaC\ell$ ✓ $+ H_2O + CO_2$✓✓ - balancing (3)

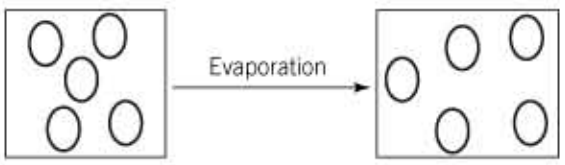
[6]

Question 13

13.1 Heat absorbed or released ✓during a phase change ✓ without a change in temperature. ✓ (3)

13.2 Evaporation ✓of sweat leaves the skin cool as the more energetic particles leave the liquid. ✓ (2)

13.3



	Checklist	1	0
1	Spaces between liquid molecules (first block) smaller than in second block.		
2	Spaces between vapour molecules (second block) bigger than in first block.		
3	Evaporation correctly indicated.		
4	Sketch completely correct and neat.		
	Total out of 4		

(4)

13.4 Latent heat of vaporisation ✓✓ (2)

[11]

Question 14

14.1 Hydrogen ✓✓ (2)

14.2 Haber process ✓✓ (2)

14.3 Process which converts nitrogen into compounds that can be used by plants. ✓✓ (2)

14.4 Man uses the nutrients faster than it can be replenished, hence it is necessary to produce the nutrients artificially. ✓✓✓

OR

More food can be produced at a faster rate for an increasing consumption.

(3)

14.5 Any two:

Excess of nitrates in water can cause:

Fast growth of algae

Depletion of oxygen in water – death of aquatic life ✓✓

Health hazard to humans ✓✓

Increase in acidity of water - death of aquatic life✓✓

(4)

[13]

QUESTION 15

15.1 Acidic ✓✓ (2)

15.2 Pollutants in air decrease as rain keeps falling. ✓✓ (2)

15.3 Any two: ✓✓✓✓

Industries (Factories) releasing CO_2, SO_2 or NO_x

Gases released by cars.

Gases released by coal-fired power stations. (4)

15.4

15.4.1 Respiratory problems ✓✓ (2)

2.2.2 Increase in pH of water – death of aquatic life ✓✓ (2)

15.4.3 Eroding of buildings ✓✓ (2)

[14]

TOTAL MARKS OF QUESTION PAPER = 150

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2007 SENIOR CERTIFICATE EXAMINATION TIMETABLE

DEPARTMENT OF EDUCATION

2007 SENIOR CERTIFICATE EXAMINATION TIMETABLE FOR THE NATIONAL QUESTION PAPERS

OCTOBER/NOVEMBER 2007

Week 1	09h00	14h00
Monday 08/10		
Wednesday 10/10	English 1st & 2nd Lang HG/SG P1 Language	
Thursday 11/10	English 1st & 2nd Lang HG/SG P2 Literature	English 1st & 2nd Lang HG/SG P3 Creative writing (Part-time learners)
Friday 12/10		
Week 2	**09h00**	**14h00**
Monday 15/10	Mathematics HG/SG P1 Functional Mathematics P1 Commercial Mathematics	
Tuesday 16/10		
Wednesday 17/10	Mathematics HG/SG P2 Functional Mathematics P2	
Thursday 18/10	Geography Theory	Geography Mapwork
Friday 19/10	(Navratri)	
Week 3	**09h00**	**14h00**
Monday 22/10	Accounting HG/SG	
Tuesday 23/10		
Wednesday 24/10	Business Economics	
Thursday 25/10		
Friday 26/10 Afrikaans	1st & 2nd Lang HG/SG P1 Language	

Week4	09h00	14h00
Monday 29/10	Afrikaans 1st & 2nd Lang HG/SG P2 Literature	Afrikaans 1st & 2nd Lang HG/SG P3 Creative writing (Part-time learners)
Tuesday 30/10		
Wednesday 31/10	Economics	
Thursday 01/11		
Friday 02/11	Physical Science HG/SG P 1 Functional Physical Science P1	
Week 5	**09h00**	**14h00**
Monday 05/11	Physical Science HG/SG P2 Functional Physical Science P2	
Tuesday 06/11		
Wednesday 07/11	Biology HG/SG P1 Physiology HG/SG	
Thursday 08/11	(Diwali)	
Friday 09/11	(Diwali)	
Week 6	**09h00**	**14h00**
Monday 12/11	Biology HG/SG P2	
Tuesday 13/11		
Wednesday 14/11	Agricultural Science P1	
Thursday 15/11		
Friday 16/11	Agricultural Science P2	
Week 7	**09h00**	**14h00**
Monday 19 /11	History HG/SG P1	
Tuesday 20/11		
Wednesday 21/11	History HG/SG P2	

Catch a wake up

In the last issue of Study Mate we promised that we would give you some tools to help you with time keeping. Remember: until you value your time, you will not do anything with it. Especially now that exams are around the corner it is crucial that you learn to use every hour of the day a productively as possible. Take a look at the activity below.

Time-keeping activity

Test the accuracy of these estimations by keeping a record of how much time you actually spend on these activities.

For a whole week during the school term, keep a schedule of what you do for five weekdays and the two days of the weekend.

At the end of each day, write up a list of all the things you did in the day and how long you spent doing them.

Below is an example of a daily schedule:

25 Feb

Woke up – slept 8½ hours

06h00 - 06h30	Washed & dressed – ½ hour
07h00 – 07h10	Made bed – 10 minutes
07h20 – 07h35	Ate breakfast – 15 minutes
07h40 – 08h10	Travelled to school – ½ hour
08h10 – 14h00	At school – 6 hours
14h00 – 15h00	Sport practice – 1 hour
15h00 – 15h30	Travelled home – ½ hour
15h30 – 17h00	Hung out with friends – 1½ hours
17h00 – 19h00	Homework – 2 hours
19h00 – 19h30	Ate evening meal – ½ hour
19h30 – 20h00	Washed pots and plates – ½ hour
20h00 –21h00	Watched TV – 1 hour
21h00 – 21h30	Did fitness programme - ½ hour
21h30 – 22h00	Washed & got ready for bed - ½ hour

Went to sleep

Do you make your time count?

After writing up your daily schedule for a week, decide whether you think you are making the most of the time you have. Be honest with yourself.

Ask someone you trust and who you consider to be successful to look at your schedule and suggest how you can use your time more effectively.

Most successful people make sure they get the most out of the time they have. Here are some ideas of how make the most of your time:

- Multi-task, which means doing more than one thing at the same time. For example, revise your study notes while travelling to school.
- Give all tasks your full attention: sitting with your books for two hours doesn't add up to two hours of study if you're only thinking about the next party.
- If you have scheduled three hours of study, don't waste time by delaying getting down to work, or convince yourself you don't need to study.