STUDY Mate

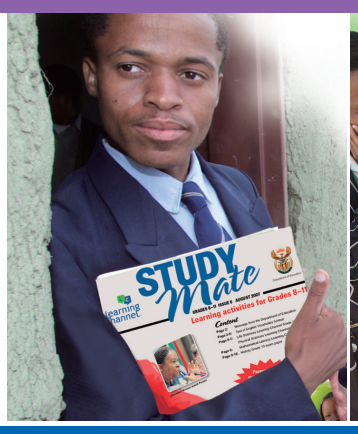
GRADE 12

Mathematics · Mathematical Literacy · English FAL · Afrikaans FAL · Physical Science · Life Sciences · Accounting · Business Studies · History · Geography

70 DAYS before final exams!

ISSUE 19 2008

Learning channel
defining your destiny.



Dear Learners

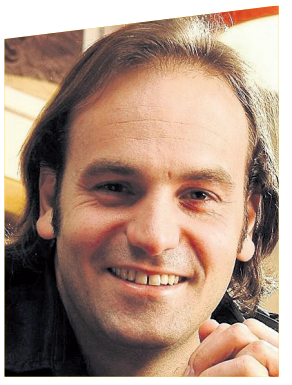
This month we celebrate Maths Week. The purpose of this week is to highlight the importance of Maths as part of the curriculum and but more especially the impact it will have on your career and your life. It is therefore important that you work hard and ensure that you obtain excellent results in the 2008 National Senior Certificate Examinations. This year we have set the target for a 50% pass rate for Maths and are hoping that as many learners as possible are able to achieve this. I therefore encourage you to work through the exemplar question paper you will find in this edition of *Study Mate* as well as other papers from your school and province. You will find another Maths paper in the next 48 page edition of *Study Mate*. Make sure you get your copy and work every day. The more you practise the easier it will become. We would like to wish you luck as you prepare for your forthcoming examinations.

I would also like to thank the South African Maths Foundation for their support for our learners and Dinaledi schools.

My warmest best wishes,

Mr Enver Surty, MP
Deputy Minister of Education

READ ...what **Mark Shuttleworth** has to say to our readers!



"I'd like to inspire you to spend a little extra time on Maths and Science this year. Studies have shown, in several different countries, that the amount of time we spend on Maths and Science at school directly correlates to income levels later on in life. It's not that calculus will make you rich – it's that studying Maths and Science will help you develop analytical skills that will make you more effective whatever your choice of career later on in life.

So whether you want to be an artist or a scientist, whether you want to go into business, government or the academic life, whether you want to be a rock star or a geologist –some extra time on Maths and science today will give you a better chance of success. And if you don't yet know exactly what you want to do in life, Maths and Science will keep the most doors open for you to choose from later. Mark"

MARK SHUTTLEWORTH

The Department of Education

Celebrates

NATIONAL MATHEMATICS WEEK

25 TO 29 AUGUST 2008 ESKOM CONVENTION CENTRE, HALFWAY HOUSE, GAUTENG

Background

The main purpose of the Mathematics Week is to popularise mathematics, to increase public awareness, understanding and appreciation of mathematics and create an opportunity for learners, parents, educators and general public to together share the excitement of mathematics.

Learners and educators can visit the exhibition and take part in the activities from Tuesday, 26 August to Thursday, 28 August from 9:00 to 14:30. For more information, contact the Organiser – Mr Khangelani Mdakane at 082 352 8893.

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MATHEMATICS

Instructions

Always read the instructions through carefully before you answer the questions.

1. This question paper consists of 13 questions. Answer all the questions.
2. Clearly show ALL calculations, diagrams and graphs that you have used in determining the answers.
3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Diagrams are NOT necessarily drawn to scale.

Question 1

Solve for x:

1.1 $(2x + 3)(x - 1) = 2$ (Give your answer correct to one decimal place.) (5)

1.2 $\frac{3}{x+1} + x + 3 = -4$ by completing the square (6)

1.3 $\frac{2x-5}{x-3} \geq 3$ (4)

[15]

Question 2

The speed (w) in metres per second at which a soda leaves a can-dispensing machine is given by the equation $w(t) = 3t^2 - 6t + 6$, t seconds after observation begins.

2.1 After how many seconds does the soda can move the slowest? (2)

2.2 What does it mean if $t = 0$ and $w = 6$? (1)

2.3 Do the necessary calculations to show that in this situation the soda can will never stop moving. (3)

[6]

Question 3

3.1 Calculate $\lim_{x \to 2a} \frac{x^2 - px + 2ax - 2ap}{2x + 4a}$, if $a \neq 0$. (4)

3.2 Find the derivative of $f(x) = -7x^2 + 3x$ from first principles. (5)

3.3 Find the derivative of the following functions:

3.3.1 $f(x) = \sqrt[3]{x^2} + \frac{1}{x^2}$ (3)

3.3.2 $y = \frac{2x-1}{x}$ (2)

3.4 The line $y = 4x + q$ is a tangent to the curve defined by $f(x) = 2x^3 + 3x + 4$. Calculate the value(s) of q. (6)

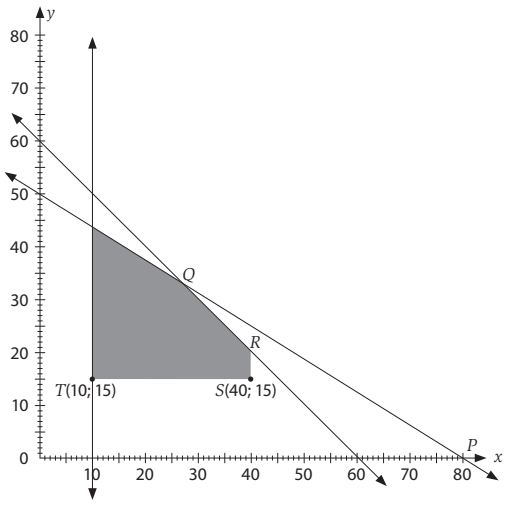
[20]

Question 4

Consider the following equation: $f(x) = x^3 - 6x^2 + 9x$
Sketch the graph of f and indicate clearly all the coordinates of the turning points and intercepts with the axes. [11]

Question 5

A stall owner at a flea market sells two different products, product A and product B. The shaded area in the diagram below represents the feasible region of the conditions under which the stall owner sells her goods. She sells x articles of product A and y articles of product B.



5.1 Use the information given in the diagram to write down inequalities for the constraints. (4)

5.2 If the stall owner sells product A at a profit of R7 and product B at a profit of R5, what is her maximum profit? (4)

5.3 If the stall owner sells product A at a profit of Rk and product B at a profit of R5, find the possible values of k if the maximum profit occurs at the point Q, shown on the diagram. (3)

[11]

Question 6

6.1 If $f(x) = -2x^2 + 3x + 5$, sketch the curves of f and f^{-1}. Clearly indicate the intercepts of the curves with the axes and the turning point of the curves. (11)

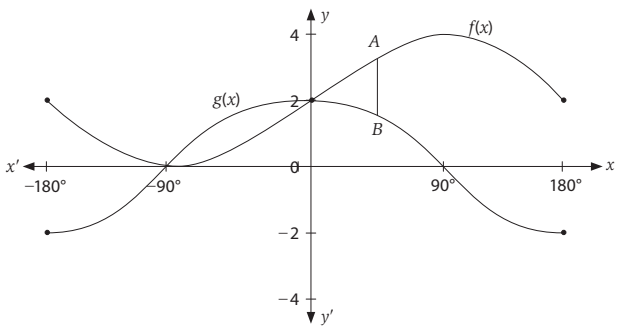
6.2 Determine the equation of f^{-1}. (5)

6.3 Determine the domain of f^{-1}. (1)

[17]

Question 7

The graph below represents the curves of $f(x) = a \sin x + b$ and $g(x) = c \cos dx$ for $-180° \leq x \leq 180°$.



Answer the following questions by using the graphs for $-180° \leq x \leq 180°$:

7.1 Determine the values of a, b, c and d. (4)

7.2 Determine the following:

7.2.1 the period of f (1)

7.2.2 the amplitude of f (1)

7.3 Determine the minimum value of $g(x)$. (1)

7.4 Calculate the length of AB when $x = 60°$.
(Leave your answer in surd form.) (3)

7.5 For which values of x is $g(x) \geq f(x)$ (1)

[11]

Question 8

Prove $\sum_{r=1}^{n} (3r - 2)^2 = \frac{n}{2}(6n^2 - 3n - 1)$. [5]

Question 9

The sum of the first seven consecutive terms of an arithmetic progression (AP) consisting of positive terms is 147. The product of the first and last of these seven terms is 297. Calculate the common difference of the AP. [7]

Question 10

The first two terms of a geometric progression (GP) are 3 and 2.

10.1 Which term is the first term that will be less than $\frac{3\,000}{19\,683}$? (8)

10.2 Evaluate $\lim_{n \to \infty} \frac{a(1 - r_n)}{1 - r}$ for the GP. (4)

10.3 Find the sum to infinity of the GP by using an appropriate formula. (3)

[15]

Question 11

Given: $f(x) = a \cdot b^x$. Under what conditions on a and b will $f(x)$ represent exponential decay? [3]

Question 12

12.1 The current value of a certain share in the stock market is R2 000 per share. Financial predictions are that this stock will increase in value by 9% per annum. Find a model for the share value as a function of time (t) in years. (3)

12.2 Calculate after how many years the stock will be worth approximately R3 000 per share. (3)

[6]

Question 13

A loan of R120 000 is approved by Super Save Bank at an interest rate of 13% per annum compounded monthly. The recipient of this loan has to repay the loan by making equal monthly deposits into the account, for a period of 4 years.

13.1 Determine the size of the monthly payment if the first payment is due at the end of the first month. (6)

13.2 If the recipient decides to pay R4 000 per month instead of the amount calculated in **13.1**, how long will it take to pay back the loan? (5)

13.3 How will you advise the loan recipient regarding the loan payments, based on the information above? (3)

13.4 After how many years will a share that costs R450 be worth R900 if it increases in value by 7,5% p.a.? (7)

13.5 If the share increases in value by 7,5% p.a. but inflation is set at around 6% p.a., how does this affect the value of the share? (2)

[23]

[150]

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MEMORANDUM

Answers: Paper 1

1.1. $(2x+3)(x-1) = 2$

$\therefore 2x^2 - 2x + 3x - 3 - 2 = 0$

$\therefore 2x^2 + x - 5 = 0$ ✓ standard form

$\therefore x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ ✓ quadratic formula

$= \frac{-1 \pm \sqrt{1^2 - 4(2)(-5)}}{2(2)}$ ✓ substitution

$= \frac{-1 \pm \sqrt{1+40}}{4}$

$= \frac{-1 \pm \sqrt{41}}{4}$ ✓ simplify to 41

$\therefore x = 1{,}4$ or $x = -1{,}9$ ✓ answers (5)

1.2 $\frac{3}{x+3} + x + 3 = -4$

$3x + (x+3)(x+3) = -4(x+3)$ ✓ × LCD: $x+3$

$3 + x^2 + 6x + 9 + 4x + 12 = 0$

$x^2 + 10x + 24 = 0$

$x^2 + 10x = -24$ ✓ standard form

$\therefore x^2 + 10x + \left(\frac{1}{2} \times 10\right)^2 = -24 + \left(\frac{1}{2} \times 10\right)^2$ ✓ complete the square

$(x+5)^2 = -24 + 25$ ✓ calculation

$(x+5)^2 = 1$

$x + 5 = \pm\sqrt{1}$

$\therefore x = -5 \pm 1$

$\therefore x = -5 + 1$ or $\therefore x = -5 - 1$

$\therefore x = -4$ or $\therefore x = -6$ ✓✓ answers (6)

1.3 $\frac{2x-5}{x-3} \geq 3$

$\frac{2x-5-3(x-3)}{x-3} \geq 0$

$\frac{2x-5-3x+9}{x-3} \geq 0$

$\frac{-x+4}{x-3} \geq 0$

$\frac{x-4}{x-3} \geq 0$ ✓ simplify

		3		4	
$x-3$	−	0	+		+
$x-4$	−		−	0	+
	+	‖	−	‖	+

✓ standard form ✓ expand

$3 < x \leq 4;\ x \in \mathbb{R}$ ✓ answer (4)

2.1 The speed is at a minimum if $w'(t) = 0$.

$w'(t) = 6t - 6 = 0$ ✓ substitution

$6t = 6$

$t = 1$ ✓ answer

So, after 1 second the soda moves the slowest. (2)

2.2 If $t = 0$ and $w = 6$, it means that the speed is 6 m/s before observation starts. ✓ answer (1)

2.3 $w(t) = 3t^2 - 6t + 6$ has a minimum value at $t = 1$ (from **2.1**)

$w(1) = 3(1)^2 - 6(1) + 6$ ✓ substitution

$= 3 - 6 + 6$

$= 3$ m/s ✓ answer

$w(x) \geq 3$ ✓ deduction

$\therefore$ the soda can will never stop under these conditions. (3)

3.1 $\lim\limits_{x\to 2a} \frac{x^2 - px + 2ax - 2ap}{2x + 4a} = \lim\limits_{x\to 2a} \frac{x(x-p) + 2a(x-p)}{2(x+2a)}$ ✓ factorise

$= \lim\limits_{x\to 2a} \frac{(x-p)(x+2a)}{2(x+2a)}$

$= \lim\limits_{x\to 2a} \frac{(x-p)}{2}$ ✓ simplify

$= \frac{2a-p}{2}$ ✓ standard form

$= a - \frac{1}{2}p$ ✓ answer (4)

3.2 $f(x) = -7x^2 + 3x$

$\therefore f(x+h) = -7(x+h)^2 + 3(x+h)$

$= -7(x^2 + 2xh + h^2) + 3x + 3h$

$= -7x^2 - 14xh - 7h^2 + 3x + 3h$ ✓ standard form

$\therefore f'(x) = \lim\limits_{h\to 0} \frac{f(x+h) - f(x)}{h}$ (first principles formula)

$= \lim\limits_{h\to 0} \frac{-7x^2 - 14xh - 7h^2 + 3x + 3h - (-7x^2 + 3x)}{h}$ ✓ substitution

$= \lim\limits_{h\to 0} \frac{-7x^2 - 14xh - 7h^2 + 3x + 3h + 7x^2 - 3x}{h}$

$= \lim\limits_{h\to 0} \frac{-14xh - 7h^2 + 3h}{h}$ ✓ simplify

$= \lim\limits_{h\to 0} \frac{h(-14x - 7h + 3)}{h}$

$= \lim\limits_{h\to 0} (-14x - 7h + 3)$ ✓ simplify

$= -14x - 7(0) + 3$

$= -14x + 3$ ✓ answer (5)

3.3.1 $f(x) = \sqrt[3]{x^2} + \frac{1}{x^2}$

$= x^{\frac{3}{2}} + x^{-2}$ ✓ $x^{\frac{3}{2}}$

$\therefore f'(x) = \frac{2}{3}x^{-\frac{1}{3}} - 2x^{-3}$ ✓ $\frac{2}{3}x^{-\frac{1}{3}}$

$= \frac{2}{3x^{\frac{1}{3}}} - \frac{2}{x^3}$ ✓ answer (3)

3.3.2 $f(x) = y = \frac{2x-1}{x}$

$= \frac{2x}{x} - \frac{1}{x}$

$= 2 - x^{-1}$

$\therefore f'(x) = x^{-2}$

$= \frac{1}{x^2}$ ✓✓ answer (2)

3.4 $f(x) = 2x^3 + 4x + 4$ ✓ curve

$f'(x) = 6x^2 + 4$

$y = 4x + q$ ✓ tangent

$\therefore$ gradient of tangent $= 4$

$\therefore 6x^2 + 4 = 4$

$6x^2 = 0$

$x = 0$ ✓ simplify

Substitute $x = 0$ into $f(x)$.

$f(0) = 2(0)^3 + 4(0) + 4$

$= 4$

$\therefore$ tangent is at $(0; 4)$ ✓ values

Substitute $(0; 4)$ into $y = 4x + q$. ✓ substitution

$\therefore q = 4$ ✓ answer (6)

4.1 We have the function $f(x) = x^3 - 6x^2 + 9x$.

For the x-intercept, put $f(x) = 0$.

$x^3 - 6x^2 + 9x = 0$

$x(x^2 - 6x + 9) = 0$

$x(x-3)(x-3) = 0$

$x = 0$ or $x = 3$ ✓✓ answers

For the y-intercept, put $x = 0$.

$f(0) = 0^3 - 6(0)^2 + 9(0)$

$= 0$

$\therefore y = 0$ ✓✓ answer

The turning points are at $f'(x) = 0$.

$f'(x) = 3x^2 - 12x + 9 = 0$

$\therefore x^2 - 4x + 3 = 0$ (divide by 3)

$(x-3)(x-1) = 0$

$x = 3$ or $x = 1$

$f(1) = 1^3 - 6(1)^2 + 9(1)$

$= 1 - 6 + 9$

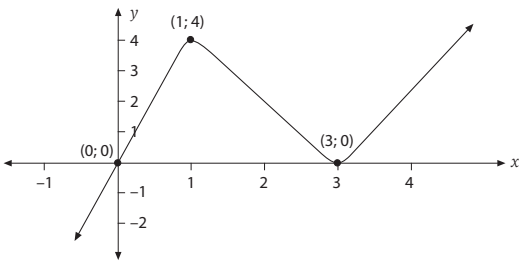
$= 4$

$f(3) = 3^3 - 6(3)^2 + 9(3)$

$= 27 - 54 + 27$

$= 0$ ✓✓ turning points

So, we have the following diagram: ✓✓ diagram correct



✓✓✓ coordinates included [11]

5.1 $m_{PQ} = -\frac{50}{80} \therefore PQ = y \leq \frac{5}{8}x + 50$: ✓ inquality

$\therefore 8y \leq 5x + 400$ $(\times 8)$

$m_{RQ} = -\frac{60}{60} = -1 \therefore QR = y \leq -x + 60$ ✓ calculation

Also, $10 \leq x \leq 40$ ✓ answer

and $y \geq 15$ ✓ answer (4)

5.2 $P = 7x + 5y$ ✓ profit equation

$\therefore y = -\frac{7}{5}x + \frac{P}{50}$

$\therefore m = -\frac{7}{5}$

We find the maximum at $R(40; 20)$. ✓ maximum

$\therefore P = 7(40) + 5(20)$ ✓ substitution

$= 280 + 100$

$= 380$

So, she will make a profit of R380. ✓ answer (4)

5.3 $P = kx + 5y$ ✓ profit equation

$\therefore y = -\frac{k}{5}x + \frac{P}{5}$

$\therefore m = -\frac{k}{5}$

From the diagram we can see that at the maximum Q, the gradient of QR is less than $-\frac{k}{5}$, which is less than the gradient of PQ. So we get the following inequality:

Max. at Q: $m_{QR} < -\frac{k}{5} < m_{PQ}$ ✓ inequality

$-1 < -\frac{k}{5} < -\frac{5}{8}$

$-40 < -8k < -25$ $(\times 40)$

$3\frac{1}{8} < k < 5$ ✓✓ answer (3)

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6.1 $f(x) = -2x^2 + 3x + 5$

Turning point (TP): $x = \frac{-b}{2a} = \frac{-3}{2(-2)} = \frac{3}{4}$

$\therefore y = -2\left(\frac{3}{4}\right)^2 + 3\left(\frac{3}{4}\right) + 5$

$= -2\left(\frac{9}{16}\right) + \frac{9}{4} + 5$

$= 6\frac{1}{8}$

$\therefore$ TP $= (\frac{3}{4}; 6\frac{1}{8})$

For the x-intercepts put $y = 0$:

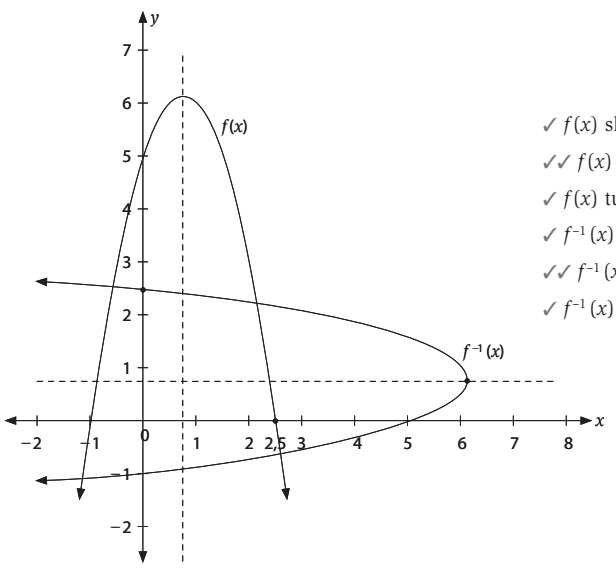
$2x^2 - 3x - 5 = 0$

$(2x - 5)(x + 1) = 0$ ✓✓✓ show calculations

$\therefore x = \frac{5}{2} = 2\frac{1}{2}$ or $x = -1$

For the y-intercept put $x = 0$ $\therefore y = 5$

To find the intercepts of f^{-1} swap the x and y values of f.



✓ $f(x)$ shape
✓✓ $f(x)$ intercepts
✓ $f(x)$ turning point
✓ $f^{-1}(x)$ shape
✓✓ $f^{-1}(x)$ intercepts
✓ $f^{-1}(x)$ turning point

(11)

6.2 $f(x) = -2x^2 + 3x + 5$

$\therefore y = -2\left[x^2 - \frac{3}{2}x - \frac{5}{2}\right]$ ✓ standard form

$= -2\left[x^2 - \frac{3}{2}x + \left(\frac{1}{2} \times \frac{3}{2}\right)^2 - \frac{5}{2} - \left(\frac{1}{2} \times \frac{3}{2}\right)^2\right]$

$= -2\left[\left(x - \frac{3}{4}\right)^2 - \frac{5}{2} - \frac{9}{16}\right]$ ✓ complete the square

$= -2\left[\left(x - \frac{3}{4}\right)^2 - 3\frac{1}{16}\right]$

$\therefore y = -2\left(x - \frac{3}{4}\right)^2 + 6\frac{1}{8}$ ✓ simplify

$\therefore f^{-1}: x = -2\left(y - \frac{3}{4}\right)^2 + 6\frac{1}{8}$

$\therefore x - 6\frac{1}{8} = -2\left(y - \frac{3}{4}\right)^2$

$\therefore -\frac{x}{2} + 3\frac{1}{16} = \left(y - \frac{3}{4}\right)^2$

$\therefore \pm\sqrt{3\frac{1}{16} - \frac{x}{2}} = y - \frac{3}{4}$ ✓ $\sqrt{\ }$ correct

$\therefore \frac{3}{4} \pm \sqrt{3\frac{1}{16} - \frac{x}{2}} = y$ ✓ answer (5)

6.3 $x \leq 6\frac{1}{8}; x \in \mathbb{R}$ ✓ answer (1)

7.1 $a = 2; b = 2; c = 2; d = 1$ ✓✓✓✓ answers (4)

7.2.1 period $= 360°$ ✓ answer (1)

7.2.2 amplitude $= 2$ ✓ answer (1)

7.3 min. $g(x) = -2$ ✓ answer (1)

7.4 $AB = 2 \sin x + 2 - 2 \cos x$ ✓ difference between graphs

$= 2 \sin 60° + 2 - 2 \cos 60°$

$= 2 \cdot \frac{\sqrt{3}}{2} + 2 - 2 \times \frac{1}{2}$ ✓ calculation

$= \sqrt{3} + 2 - 1$

$= \sqrt{3} + 1$ ✓ answer (3)

7.5 $g(x) \geq f(x)$ for $-90° \leq x \leq 0°$ ✓ answer (1)

8. Using the formulae for the sum of *AP* and *GP* series we get

$\sum_{r=1}^{n}(3r-2)^2 = \sum_{r=1}^{n}(9r^2 - 12r + 4)$ ✓ formula

$= 9\sum_{r=1}^{n} r^2 - 12\sum_{r=1}^{n} r + 4\sum_{r=1}^{n} 1$ ✓ expansion

$= 9\left[\frac{n}{6}(n+1)(2n+1)\right] - 12\left[\frac{n}{2}(n+1)\right] + 4n$ ✓ expansion

$= \frac{n}{2}[3(2n^2 + 3n + 1) - 12n - 12 + 8]$ ✓ simplify

$= \frac{n}{2}(6n^2 - 3n - 1)$ ✓ answer (5)

9. Given: $S_7 = 147$

$\therefore \frac{7}{2}(2a + 6d) = 147$ ✓ sum formula

$\therefore a + 3d = 21$ ✓ simplify

Also given: $a(a + 6d) = 297$ ✓ $T_1 = a$

$\therefore (21 - 3d)(21 + 3d) = 297$ ✓ $a = 21 - 3d$ from above

$\therefore -9d^2 = 144$

$d = \pm\frac{12}{3} = \pm 4$ ✓ simplify

But $d > 0$ ✓ positive progression

$\therefore d = 4$ ✓ answer (7)

10.1 $T_1 = 3$ and $T_2 = 2$ $\therefore r = \frac{2}{3}$ ✓ deduction

Want to find n for $3\left(\frac{2}{3}\right)^{n-1} < \frac{3\,000}{19\,683}$

$\therefore \left(\frac{2}{3}\right)^{n-1} < \frac{1\,000}{19\,683}$ ✓ substitution

$\therefore n - 1 > \frac{\log\left(\frac{1\,000}{19\,683}\right)}{\log\left(\frac{2}{3}\right)} > 7{,}3489 + 1$ ✓✓ logarithm

$\therefore n > 8{,}35$ ✓✓ n correct

$\therefore$ for $n = 9$, $T_n < \frac{3\,000}{19\,683}$ ✓✓ answer (8)

10.2 $\lim_{n\to\infty}\frac{a(1-r^n)}{1-r} = \lim_{n\to\infty}\frac{3\left[1-\left(\frac{2}{3}\right)^n\right]}{1-\frac{2}{3}} \times \frac{3}{3}$ ✓ multiply by $\frac{3}{3}$

$= \lim_{n\to\infty} 9\left[1 - \left(\frac{2}{3}\right)^n\right]$ ✓ simplify

$= 9 - \lim_{n\to\infty}\left(\frac{2}{3}\right)^n$ ✓ simplify

$= 9 - 0$

$= 9$ ✓ answer (4)

10.3 $S_\infty = \frac{a}{1-r}$ ✓ formula

$= \frac{3}{1-\frac{2}{3}} \cdot \frac{3}{3}$ ✓ substitution

$= 9$ ✓ answer (3)

11. $a > 0; 0 < b < 1$ ✓✓✓ answers (3)

12.1 The value of the share is given by

$F_v = 2\,000(1{,}09)^t$ ✓✓✓ formula (3)

12.2 $3\,000 = 2\,000(1{,}09)^t$ ✓ substitution

$\therefore t = \frac{\log\frac{3}{2}}{\log 1{,}09} = 4{,}705$ ✓ logarithm

$\therefore$ the share will be worth R3 000 after 5 years. ✓ answer (3)

13.1 $P = \frac{x[1-(1+i)^{-n}]}{i}$ ✓✓ formula

$\therefore 120\,000 = x\left(\frac{1-(1{,}01083\dot{3})^{-48}}{0{,}01083\dot{3}}\right)$ ✓✓ substitution; $n = 48$ months

$\therefore x =$ R3 219,30 ✓✓ answer (6)

13.2 $P = \frac{x[1-(1+i)^{-n}]}{i}$ ✓ formula

$\therefore 120\,000 = 4\,000\left(\frac{1-(1{,}01083\dot{3})^{-n}}{0{,}01083\dot{3}}\right)$ ✓✓ $x = 4\,000$

$\therefore -n = \frac{\log 0{,}675}{\log 1{,}01083\dot{3}}$ ✓ logarithm

$= -36{,}477$

$\therefore$ after $n = 37$ months the loan will be paid off. ✓ answer (5)

13.3 Paying an extra R781 a month for 27 months pays the loan off eleven months early. It also saves R6 512,00 overall.

Calculations: $37 \times$ R800 $=$ R28 800 ✓✓ calculations; explanation

11 months $\times$ R3 219 $=$ R35 409

Difference $=$ R6 512

So, you should advise the loan recipient to pay more per month, if possible. ✓ answer (3)

13.4 $F_v = P_v(1+i)^n$ ✓ formula

$P_v = 450$

$i = 0{,}075$

$n =$ unknown

$F_v = 900$

$900 = 450(1 + 0{,}075)^n$ ✓ substitution

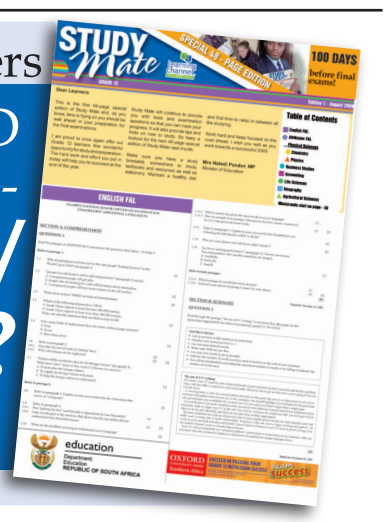
$\therefore 900 = 450(1{,}075)^n$ ✓ simplify

$\therefore \frac{900}{450} = (1{,}075)^n$ ✓ simplify

$\therefore 2 = (1{,}075)^n$ ✓ answer

$\therefore n = 10$ ✓✓ trial and error (7)

13.5 Inflation decreases the value of money, so although the share increases in price, it is worth less than its monetary value. ✓✓ answer (2)



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