education

Department:
Education
PROVINCE OF KWAZULU-NATAL

GRADE 12

NATIONAL SENIOR CERTIFICATE

MATHEMATICS P1

COMMON TEST

JUNE 2019

MARKS: 150

TIME: 3 hours

N.B. This question paper consists of 9 pages and an information sheet.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 13 questions.

2. Answer **ALL** questions.

3. Clearly show **ALL** calculations, diagrams, graphs, et cetera that you have used in determining your answers.

4. Answers only will not necessarily be awarded full marks.

5. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.

6. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.

7. Diagrams are NOT necessarily drawn to scale.

8. Number the answers correctly according to the numbering system used in this question paper. Write neatly and legibly.

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QUESTION 1

1.1 Solve for x:

1.1.1 $(x+3)(9+x)=0$ (2)

1.1.2 $-4x^2+9x=3$. to TWO decimal places. (4)

1.1.3 $2^{x+2}-3.2^{x-1}=80$ (5)

1.1.4 $\frac{x-4}{2}-\sqrt{x-3}=1$ (5)

1.2 Solve for x and y simultaneously given $x-3y=1$ and $x^2-2xy+9y^2=17$. (6)

1.3 Solve $x^2-5x+4<0$ (3)

[25]

QUESTION 2

The first four terms of the first difference of a quadratic sequence are 5; 9 ; 13 ; 17 ;... and the 61st term of the quadratic sequence is 7383.

2.1 Calculate the n^{th} term of the quadratic sequence. (5)

2.2 Determine between which two consecutive terms is the 1st difference equal to 2021? (3)

[8]

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QUESTION 3

Given $-3\ ;\ -1;\ 1\ ;\ 3\ ;\ ...$ are the first four terms of an arithmetic sequence.

3.1 Write down the value of the next term of the sequence. (1)

3.2 If the last term of the sequence is 7997, calculate the value of n. (2)

3.3 Given the last term is 7997, determine the sum of the terms that are divisible by 5. (4)

[7]

QUESTION 4

4.1 $1\ ;\ 4\ ;\ 16\ ;\ 64\ ;\ \ldots$ are the first four terms of a geometric sequence.

4.1.1 Write down the value of the common ratio. (1)

4.1.2 Calculate the sum to 16 terms of the sequence. (3)

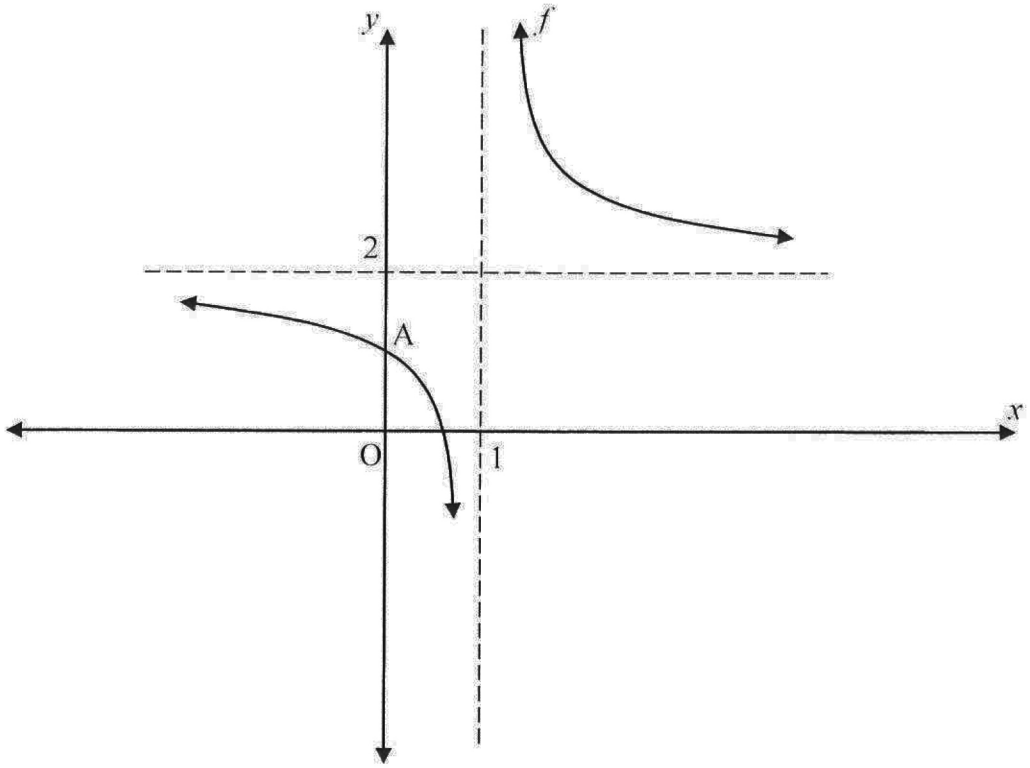
4.2 The sum of the first 3 terms of geometric series is $1\frac{8}{49}$. If the first term is 1, then calculate the value of the common ratio, $r\ (r > 0)$. (5)

[9]

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QUESTION 5

Given $f(x)=\frac{a}{x-b}+c$; $A\left(0;\frac{1}{2}\right)$ is the y – intercept of the graph. The asymptotes to the graph intersects the x – axis at 1 and the y – axis at 2 respectively.



5.1 Write down the equations of the vertical and horizontal asymptotes of f. (2)

5.2 Calculate the value of a. (3)

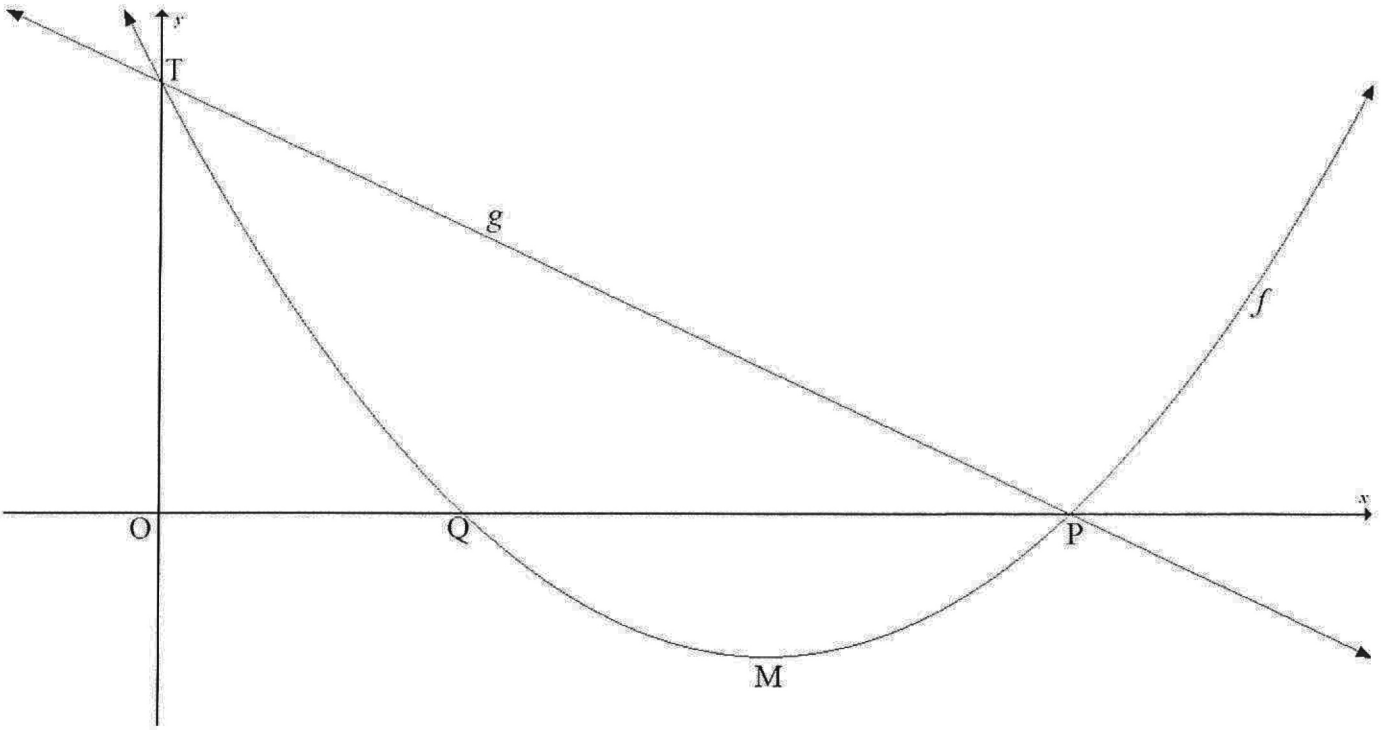
5.3 Determine the coordinates of A$'$, the image of A, if it is reflected about $(1;2)$. (4)

5.4 Determine the equation of g if $g(x)=f(x-3)$. (2)

[11]

QUESTION 6

The graphs of $f(x) = ax^2 + bx + c;\ a \neq 0$ and $g(x) = mx + k$ are sketched below. The x – intercepts of f are Q(2;0) and P(6;0), and the y – intercept is T(0;12). The graph of g intersects f at T and P. M is the turning point of f.



6.1 Show that the values of $a = 1$, $b = -8$ and $c = 12$. (4)

6.2 Calculate the co-ordinates of M, the turning point of f. (2)

6.3 Write down the range of f. (1)

6.4 Write down the value(s) of x for which $\frac{f(x)}{g(x)} \leq 0$. (3)

6.5 Determine the values of k for which $f(x) = k$ has two positive unequal real roots. (2)

6.6 Determine the values of x for which the graph of g is a tangent to f. (3)
[15]

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QUESTION 7

Given $t(x) = 8^x$

7.1 Write down the equation of t^{-1}, the inverse of t, in the form $y = \ldots$ (2)

7.2 Show that $t\left(x + \frac{1}{3}\right) = 2.t(x)$. (3)

7.3 Sketch t and t^{-1} in the same system of axes, showing the line of reflection and intercepts with the axes). (4)

[9]

QUESTION 8

8.1 R80 000 was invested in an off-shore company at r % per annum interest rate compounded half yearly. After 5 years the investment grew to R146 338,09. Calculate the interest rate. (4)

8.2 Samuel invested R200 000 with the bank at 11 % per annum, compounded quarterly.

- After two years he withdrew R60 000 from the investment to buy a car.
- After a further three years later he withdrew R45 000 to begin his studies.
- After the last withdrawal the bank increases the interest rate to 12 % per annum compounded monthly.
- Two years later Samuel decides now he wants to withdraw the entire amount of his investment.

Calculate the total amount of his final withdrawal. (8)

[12]

QUESTION 9

9.1 Determine $f'(3)$ from first principles given $f(x) = 5x^2 + 4$. (5)

9.2 Differentiate:

9.2.1 $g(x) = \left(2x - \frac{1}{2x}\right)^2$ (4)

9.2.2 $D_x\left[\frac{x^3 - 1}{1 - x}\right]$ (4)

[13]

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QUESTION 10

Given: $f(x) = (x+2)^2(x-3)$ is a cubic function.

10.1 Write down the x - intercepts and the y - intercept of f. (3)

10.2 Determine the local maximum and minimum turning points of f. (4)

10.3 Sketch f showing the coordinates of the turning points and the intercepts with the axes. (4)

10.4 If $f(x) = k$ has one root equal to 0, write down the value of k. (2)

10.5 Given $g(x) = f(x-4)$, write down the coordinates of the new maximum point. (2)

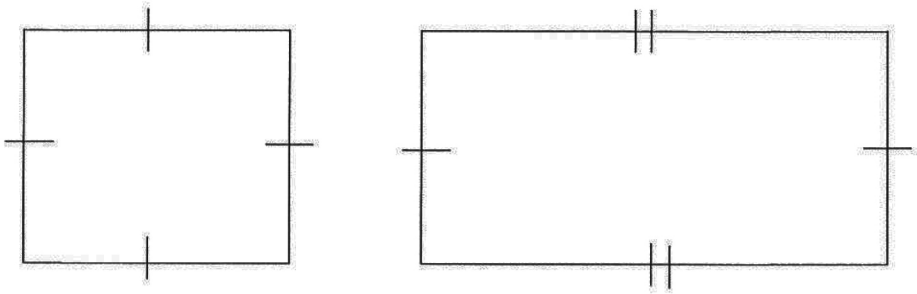
10.6 Write down the values of x for which f is concave up. (2)

10.7 Determine the equation of $g(x)$ if $g(x) = f\left(x+\frac{1}{2}\right)$. (2)

[19]

QUESTION 11

A piece of wire 10 metres long is cut into two pieces. One piece is bent into a square and the other is bent into the shape of a rectangle. The rectangle has the width the same length as the square.



11.1 The length of the wire used to make the square is x metres. Write down in terms of x the length of the side of the square. (1)

11.2 Show that the sum of the areas(S) of the square and the rectangle is given by

$$S = -\frac{1}{8}x^2 + \frac{5}{4}x$$ (4)

11.3 Determine the value of x for which the sum of the areas is a maximum. (3)

[8]

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QUESTION 12

An airplane company transports passengers to a holiday resort daily. Upon boarding this flight beverages are given. Each passenger chooses exactly one beverage from the given list.

	MALE	FEMALE	TOTAL
TEA	35	45	80
COFFEE	x	y	90
FRUIT JUICE	z	w	30
TOTAL	80	120	p

12.1 Write down the value of p. (1)

12.2 Calculate the probability that a random selected passenger is a female. (2)

12.3 Given the event of choosing fruit juice is independent of being a male, calculate the value of z. (6)
[9]

QUESTION 13

If it is given that P(A) = 0,34, P(B) = 0,26 and P(A or B) = 0,55, determine:

13.1 P(A and B) (3)

13.2 Are the events A and B mutually exclusive? Explain. (2)
[5]

TOTAL: 150

INFORMATION SHEET: MATHEMATICS

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

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}(2a + (n-1)d)$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r-1} \; ; \quad r \neq 1 \qquad S_\infty = \frac{a}{1-r} \; ; \; -1 < r < 1$$

$$F = \frac{x\left[(1+i)^n - 1\right]}{i} \qquad P = \frac{x[1-(1+i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{M}\left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

In ΔABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ $\qquad a^2 = b^2 + c^2 - 2bc.\cos A$ $\qquad area\ \Delta ABC = \dfrac{1}{2}ab.\sin C$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta \qquad \cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases} \qquad \sin 2\alpha = 2\sin\alpha.\cos\alpha$$

$$\bar{x} = \frac{\sum x}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$$

$$\text{P}(A) = \frac{n(\text{A})}{n(\text{S})} \qquad \text{P(A or B)} = \text{P(A)} + \text{P(B)} - \text{P(A and B)}$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$

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MATHEMATICS

PAPER 1

JUNE COMMON TEST

MARKING GUIDELINE

NATIONAL SENIOR CERTIFICATE

GRADE 12

MARKS: **150**

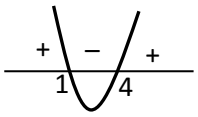
TIME: **3 hours**

This memorandum consists of 14 pages.

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QUESTION 1

1.1.1	$x = -3 \quad or \quad x = -9$	A✓ -3 A✓ -9	(2)
1.1.2	$-4x^2 + 9x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(9) \pm \sqrt{(9)^2 - 4(-4)(-3)}}{2(-4)}$ $= 0{,}41 \quad or \quad 1{,}84$	A✓standard form CA✓substitution in correct formula CACA✓✓answers (penalize 1 mark if rounding off is incorrect-once for entire paper)	(4)
1.1.3	$2^{x+2} - 3.2^{x-1} = 80$ $2^x\left(2^2 - 3.2^{-1}\right) = 80$ $2^x\left(\frac{5}{2}\right) = 80$ $2^x = 80 \times \frac{2}{5} = 32$ $2^x = 2^5$ $x = 5$	A✓factorization CA✓simplifying bracket CA✓ $2^x = 32$ CA✓Exponential form CA✓answer	(5)
1.1.4	$\frac{x-4}{2} - \sqrt{x-3} = 1$ $x - 4 - 2\sqrt{x-3} = 2$ $x - 6 = 2\sqrt{x-3}$ $x^2 - 12x + 36 = 4x - 12$ $x^2 - 16x + 48 = 0$ $(x-4)(x-12) = 0$ $x = 4 \quad or \quad x = 12$ n/a	A✓Isolating surd CA✓ squaring CA✓standard form CA✓factors CA✓x – values and rejecting	(5)

1.2	$x-3y=1 \quad \rightarrow (1)$ $x^2-2xy+9y^2=17 \quad \rightarrow (2)$ (1): $x=3y+1 \quad \rightarrow (3)$ $(3y+1)^2-2y(3y+1)+9y^2=17$ $9y^2+6y+1-6y^2-2y+9y^2-17=0$ $12y^2+4y-16=0$ $3y^2+y-4=0$ $(3y+4)(y-1)=0$ $y=\frac{-4}{3} \quad or \quad y=1$ $x=-3 \quad or \quad x=4$	A✓making x the subject CA✓substitution into equation (2) CA✓standard form CA✓factors CA✓y values CA✓x values	(6)
1.3	 $x^2-5x+4<0$ $(x-1)(x-4)<0$ $1<x<4$	A✓factors CA✓ Critical Values A✓ Notation	(3)
			[25]

QUESTION 2

2.1	**T₁ T₂ T₃ T₄** **1D 5 9 13** **2D 4 4** $2a=4 \quad a=2$ $3a+b=5 \quad b=-1$ $T_n=2n^2-n+c$ $T_{61}=2(61)^2-(61)+c=7383$ $c=7383-7381$ $c=2$ $T_n=2n^2-n+2$	A✓ a value CA✓b value CA✓Substitution of 61and equating to 7383 CA✓ c value CA✓answer	(5)

2.2	$4n+1=2021$ $4n=2020$ $n=505$ Between T_{505} and T_{506} **OR** $T_n - T_{n-1} = 2021$ $2n^2 - n + 2 - [2(n-1)^2 - (n-1) + 2]$ $= 2021$ $2n^2 - n + 2 - [2n^2 - 4n + 2 - n + 1 + 2]$ $= 2021$ $4n = 2024$ $n = 506$ Between 505^{th} and 506^{th} **OR** $T_{n+1} - T_n = 2021$	A✓equating nth term to 2021 CA✓value of *n* CA✓ answer **OR** A✓substitution CA✓value of *n* CA✓ answer **OR**	(3) (3)
			[8]

QUESTION 3

3.1	5	A✓ answer	(1)
3.2	$2n-5=7997$ $2n=8002$ $n=4001$	A✓equating n^{th} term to 7997 CA✓answer (n must be natural)	(2)
3.3	Pattern : 5 ; 15 ; 25 ; 35 ; ….;7995 $10n-5=7995$ $n=800$ $S_{800}=\frac{800}{2}[5+7995]$ $=3\ 200\ 000$	A✓Sequence A✓n^{th} term CA✓n – value (n must be natural) CA✓answer	(4)
			[7]

QUESTION 4

4.1.1	4	A✓answer	(1)
4.1.2	$S_n=\frac{a(r^n-1)}{r-1}$ $S_{16}=\frac{1(4^{16}-1)}{4-1}$ $=1\ 431\ 655\ 765$	A✓ substitution a into correct formula CA✓substitution of r into correct formula CA✓answer	(3)
4.2	$a=1$ $a+ar+ar^2=S_3$ $1+r+r^2=1\frac{8}{49}=\frac{57}{49}$ $49r^2+49r-8=0$ $(7r-1)(7r+8)=0$ $r=\frac{1}{7}or=-\frac{7}{8}$ n/a	A✓ substituting a =1 A✓ equating to $1\frac{8}{49}$ CA✓standard form CA✓factors CA✓answers and rejecting	(5)
			[9]

QUESTION 5

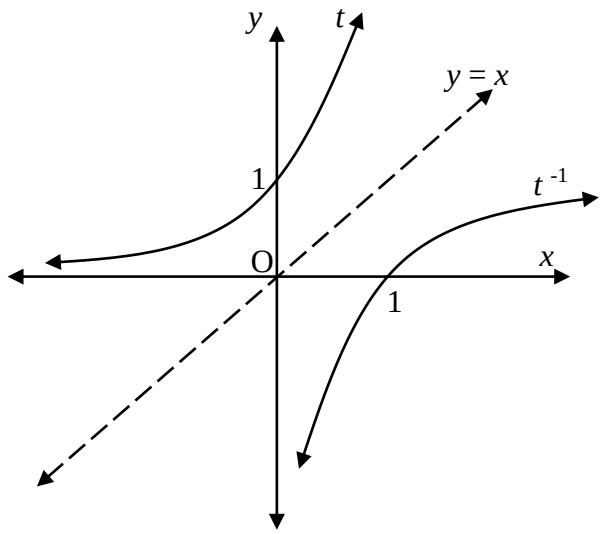
5.1	$x=1 \quad and \quad y=2$	AA✓✓both asymptote equations	(2)
5.2	$y=\frac{a}{x+p}+q$ $y=\frac{a}{x-b}+c$ $y=\frac{a}{x-1}+2$ $A\left(0\,;\,\frac{1}{2}\right)$: $\frac{1}{2}=\frac{a}{0-1}+2$ $-\frac{3}{2}=-a$ $a=\frac{3}{2}$	CA✓substitution of *b* and *c* values A✓substitution of point A CA✓a – value(must be positive)	(3)
5.3	By using the gradient method From point A move 1 unit horizontally to the right and 1,5 unit vertically upward. Move 1,5 unit vertically upward and 1 unit horizontally to the left $A'\left(2\,;\,3\frac{1}{2}\right)$ Answer only – full marks **OR** By using the midpoint of line segment AA' and that AA' passes through the point of intersection of the asymptotes $A\left(0\,;\,\frac{1}{2}\right)$ and $(1;\,2)$ $A'\left(2(1)-0\,;\,2(2)-\frac{1}{2}\right)$ $A'\left(2\,;\,3\frac{1}{2}\right)$	A✓transformation comment A✓transformation comment CACA✓✓coordinates **OR** A✓ comment A✓midpoint formula CACA✓✓coordinates Answer only – full marks	(4) (4)

5.4	$g(x)=\frac{\frac{3}{2}}{x-4}+2$ or $g(x)=\frac{3}{2(x-4)}+2$	CACA✓✓answer	(2)
			[11]

QUESTION 6

6.1	$y=a(x-x_1)(x-x_2)$ $12=a(0-2)(0-6)$ $12=12a$ $a=1$ $y=x^2-8x+12$ $b=-8\ and\ c=12$	A✓formula A✓substituting *x* and *y* intercepts. A✓simplifying A✓equation	(4)
6.2	$x=\frac{2+6}{2}=4$ **or** $x=-\frac{b}{2a}=-\frac{(-8)}{2(1)}=4$ **or** $f'(x)=2x-8=0$ $x=4$ $y=(4)^2-8(4)+12=-4$ $M(4;-4)$	CA✓axis of symmetry (*x* must be positive) CA✓minimum value (*y* must be negative)	(2)
6.3	$y\in(-\infty;-4)$ **OR** $y\geq-4$	CA✓answer	(1)
6.4	$2\leq x<6\ or\ x>6$ $x\geq2\ ;x\neq6$	A✓✓ $2\leq x<6$ ✓ $x>6$ A✓$x\neq6$ ✓✓ $x\geq2$	(3)
6.5	$-4<k<12$	CA✓ critical values A✓notation	(2)
6.6	$f'(x)=2x-8=-2$ $2x=6$ $x=3$	A✓derivative A✓equating to – 2 CA✓*x* – value	(3)
			[15]

QUESTION 7

7.1	$y = \log_8 x$	AA✓✓ answer	(2)
7.2	$t(x) = 8^x$ $t\left(x+\frac{1}{3}\right) = 8^{x+\frac{1}{3}}$ $= 8^x \,.\, 8^{\frac{1}{3}}$ $= 8^x \,.\, \left(2^3\right)^{\frac{1}{3}}$ $= 8^x.2$ $= 2.t(x)$	A✓substituting $\left(x+\frac{1}{3}\right)$ A✓ $8^x \,.\, 8^{\frac{1}{3}}$ A✓writing in exponential form	(3)
7.3		Exponential: A✓shape A✓ intercepts of both graphs with the axes Log graph: A✓shape A✓ line of reflection	(4)
			[9]

QUESTION 8

8.1	$A = P(1+i)^n$ $146338{,}09 = 80000\left(1+\frac{i}{2}\right)^{10}$ $\left(1+\frac{i}{2}\right)^{10} = \frac{146338{,}09}{80000}$ $i = 2\left(\sqrt[10]{\frac{146338{,}09}{80000}} - 1\right)$ $i = 0.1244999989$ Therefore, the interest rate = 12,45 % p.a. compounded half yearly	A✓substitution into formula CA✓making *i* the subject CA✓decimal value CA✓answer	(4)
8.2	$A = P_1(1+i_1)^{n_1}(1+i_2)^{n_2} - P_2(1+i_1)^{n_3}(1+i_2)^{n_4} - P_3(1+i_2)^{n_5}$ $A = 200000\left(1+\frac{11}{400}\right)^{20}\left(1+\frac{12}{1200}\right)^{24} - 60000\left(1+\frac{11}{400}\right)^{12}\left(1+\frac{12}{1200}\right)^{24} - 45000\left(1+\frac{12}{12000}\right)^{24}$ = R274 260,98 **OR** $A = P(1+i)^n$ $A = 200\,000\left(1+\frac{11\%}{4}\right)^{8}$ =R 248 476,1104 $A = 188\,467{,}1104\left(1+\frac{11\%}{4}\right)^{12}$ R260 998,6597 $A = 215\,998{,}6597\left(1+\frac{12\%}{12}\right)^{24}$ R274 260,98	AAAAAAAA✓✓✓✓✓✓✓✓ **OR** A✓substitution of *i* and *n* CA✓answer A✓substitution of *i* and *n* CA✓P value A✓substitution of *i* and *n* CA ✓P value CA✓answer	(8) (8)
			[12]

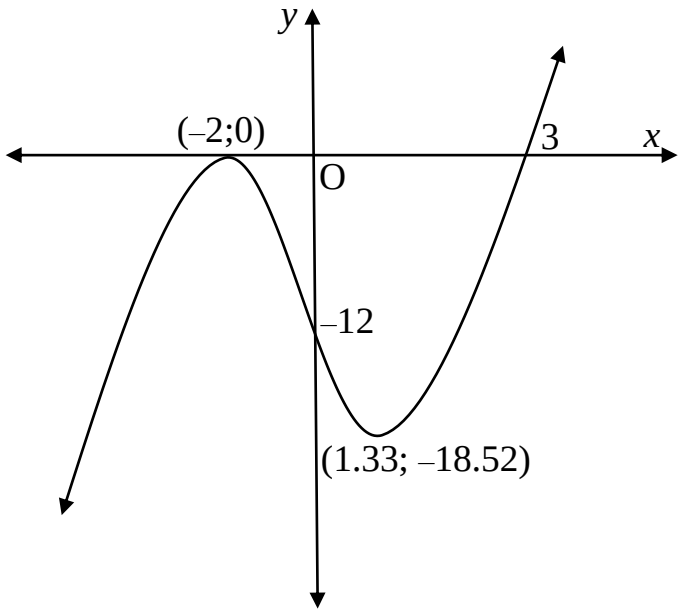
QUESTION 9 (penalize 1 mark once for incorrect notation in this question)

9.1	$f'(3) = \lim_{h\to 0} \frac{f(3+h)-f(3)}{h}$ $= \lim_{h\to 0} \frac{5(3+h)^2+4-(5(3)^2+4)}{h}$ $= \lim_{h\to 0} \frac{45+30h+5h^2+4-49}{h}$ $= \lim_{h\to 0} \frac{h(30+5h)}{h}$ $= 30$ OR $f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ $f'(x) = \lim_{h\to 0} \frac{5(x+h)^2+4-(5x^2+4)}{h}$ $f'(x) = \lim_{h\to 0} \frac{5x^2+10xh+5h^2+4-5x^2-4}{h}$ $f'(x) = \lim_{h\to 0} \frac{10xh+5h^2}{h}$ $f'(x) = \lim_{h\to 0} \frac{h(10x+5h)}{h}$ $f'(x) = 10x$ $f'(3) = 10(3) = 30$	A✓formula A✓substitution CA✓ simplification of numerator CA✓factorization CA✓answer OR A✓formula A✓substitution CA✓factorization CA✓value of derivative CA✓ answer	(5) (5)
9.2.1	$g(x) = \left(2x - \frac{1}{2x}\right)^2$ $= 4x^2 - 2 + \frac{1}{4}x^{-2}$ $g'(x) = 8x - \frac{1}{2}x^{-3}$	A✓first and last terms A✓middle term CACA✓✓ derivatives	(4)

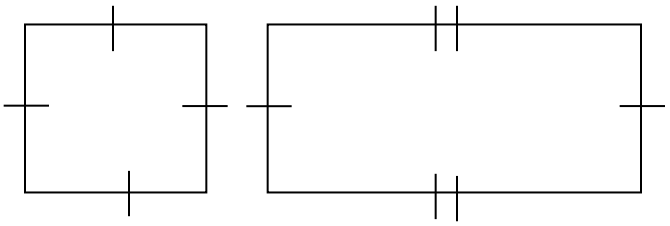
9.2.2	$D_x\left[\frac{x^3-1}{1-x}\right]$ $=D_x\left[\frac{(x-1)(x^2+x+1)}{-(x-1)}\right]$ $=D_x\left[-x^2-x-1\right]$ $=-2x-1$	A✓factorizing numerator A✓factorizing denominator CACA✓✓each derivative	(4)
			[13]

QUESTION 10

10.1	$x=-2$ *or* $x=3$ *and* $y=-12$ OR $(\mathbf{-2}\,;\mathbf{0})\,;\ (\mathbf{3}\,;\mathbf{0})\,;\ (\mathbf{0}\,;\mathbf{-12})$	A✓✓x - intercepts A✓y - intercept.	(3)
10.2	$f(x)=(x+2)^2(x-3)$ $=(x^2+4x+4)(x-3)$ $=x^3-3x^2+4x^2-12x+4x-12$ $=x^3+x^2-8x-12$ $f'(x)=3x^2+2x-8=0$ $(3x-4)(x+2)=0$ $x=\frac{4}{3}$ *or* $x=-2$ $y=-18{,}52$ *or* $y=0$ Maximum $:(-2\,;0)$ Minimum $:\left(\frac{4}{3}\,;-18{,}52\right)$	A✓expression CA✓derivative equal to 0 CA✓x – values CA✓ y – values	(4)

10.3		CA✓x – intercepts CA✓y – intercept CA✓turning points A✓shape	(4)
10.4	$k = -12$	CACA✓✓answer	(2)
10.5	(2 ; 0)	CA ✓x – value CA ✓y – value	(2)
10.6	$f'(x) = 3x^2 + 2x - 8$ $f''(x) = 6x + 2 = 0$ $x > -\frac{1}{3}$	CA✓second derivative and equal to 0 CA✓answer	(2)
10.7	$f(x) = (x+2)^2(x-3)$ $f\left(x+\frac{1}{2}\right) = \left(x+2\frac{1}{2}\right)^2\left(x-2\frac{1}{2}\right)$	AA✓✓for each bracket	(2)
			[19]

QUESTION 11

11.1	$\frac{x}{4}$	A✓answer	(1)
11.2	 Length of side of square = $\frac{x}{4}$ Length of rectangle = $\frac{10-x-\frac{x}{2}}{2}=\frac{20-3x}{4}$ $S=\frac{x^2}{16}+\frac{x}{4}\left(\frac{20-3x}{4}\right)$ $=\frac{x^2}{16}+\frac{20x-3x^2}{16}$ $=\frac{-2x^2+20x}{16}$ $=-\frac{1}{8}x^2+\frac{5}{4}x$	A✓length of rectangle A✓✓each area A✓simplifying	(4)
11.3	$S=-\frac{1}{8}x^2+\frac{5}{4}x$ $S'(x)=-\frac{1}{4}x+\frac{5}{4}=0$ $x=5$ metres	A✓derivative A✓derivative equal to 0 CA✓answer	(3)
			[8]

QUESTION 12

12.1	200	A✓answer	(1)
12.2	$\frac{120}{200}$ *or* $\frac{3}{5}$ *or* 0,6 *or* 60%	A✓120 A✓answer	(2)
12.3	$\text{P(Male)} = \frac{80}{200} = \frac{2}{5} = 0{,}4 = 40\%$ $\text{P(Choosing Fruit Juice)} = \frac{30}{200} = \frac{3}{20} = 0{,}15 = 15\%$ $\text{P(Male choosing Fruit Juice)} = \frac{z}{200}$ P(Male choosing Fruit Juice) $= \text{P(Male)} \times \text{P(Choosing Fruit Juice)}$ $\frac{z}{200} = \frac{2}{5} \times \frac{3}{20}$ $\frac{z}{200} = \frac{6}{100}$ $100z = 1200$ $z = 12$	A✓ $\frac{80}{200} = \frac{2}{5} = 0{,}4 = 40\%$ A✓ $\frac{30}{200} = \frac{3}{20} = 0{,}15 = 15\%$ A✓ $\frac{z}{200}$ A✓Condition of independent events CA✓substitution in the condition of independent events CA✓answer	(6)
			[9]

QUESTION 13

13.1	$\text{P (A or B)} = \text{P(A)} + \text{P(B)} - \text{P (A and B)}$ $0{,}55 = 0{,}34 + 0{,}26 - \text{P (A and B)}$ $\text{P (A and B)} = \frac{1}{20} = 0{,}05$	A✓ Formula A✓substitution A✓answer	(3)
13.2	No $\text{P (A and B)} \neq 0$	A✓No A✓Justification	(2)
			[5]

TOTAL: 150

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