education

Department:
Education
PROVINCE OF KWAZULU-NATAL

ENQUIRIES: MRS E. COETZEE	DATE: 17 May 2017

NATIONAL SENIOR CERTIFICATE: **COMMON TEST JUNE 2017: GRADE 12**

TO: THE CHIEF INVIGILATOR OF ALL SCHOOLS OFFERING MATHEMATICS P1

ERRATA

Please take note of the following change:

PAGE	NUMBER	ERROR	CORRECTION
5	QUESTION 5 Instruction (Line 4)	*h* anf *g* ...	*h* and *g* ...
6	QUESTION 6 Instruction (Line 1)	$g(x)=a(x-p)+q$	$g(x)=a(x-p)^2+q$
9	QUESTION 10 Instruction (Line 1)	After driving **40** kilometres ...	After driving **80** kilometres ...

Kindly ensure that candidates are informed of the Errata.

MS N.V. MCAMBI
DEPUTY MANAGER
PROVINCIAL EXAMINATIONS SERVICES

6/06/2017
DATE

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Please take note of the following change:

PAGE	NUMBER	ERROR	CORRECTION
5	QUESTION 5 Instruction (Line 1)	The graphs of the functions $f(x)=\frac{3}{x+1}+q$	The graphs of the functions $f(x)=-\frac{3}{x+1}+q$
5	QUESTION 5 Instruction (Line 4)	*h* anf *g* ...	*h* and *g* ...
6	QUESTION 6 Instruction (Line 1)	$g(x)=a(x-p)+q$	$g(x)=a(x-p)^2+q$
9	QUESTION 10 Instruction (Line 1)	After driving **40** kilometres ...	After driving **80** kilometres ...

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MS N.V. MCAMBI
DEPUTY MANAGER
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13/5/2017
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KwaZulu-Natal Department of Education

REPUBLIC OF SOUTH AFRICA

MATHEMATICS P1

COMMON TEST

JUNE 2017

NATIONAL SENIOR CERTIFICATE

GRADE 12

Marks: 125

Time: 2.5 hours

N.B: This question paper consists of 9 pages and 1 information sheet

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of **10** questions.
2. Answer **ALL** the 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 in each of the following:

1.1.1 $x(2x+5)=0$ (2)

1.1.2 $2x^2-3x=7$ (Give answer correct to TWO decimal places) (4)

1.1.3 $x-7-\sqrt{x-5}=0$ (4)

1.1.4 $\frac{1}{2}x(3x+1)<0$ (2)

1.2 Solve for x, **without using a calculator.** $\sqrt[3]{\frac{1}{x^7}}=128$ (4)

1.3 Solve for x and y simultaneously:

$2x+y=3$ *and*

$x^2+y+x=y^2$ (6)

[22]

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QUESTION 2

The first difference sequence of the quadratic sequence is 3; 7; 11; . . . and the 51st term of the quadratic sequence is 5052.

2.1 Calculate the n^{th} term of the quadratic sequence. (6)

2.2 Which term of the quadratic sequence is equal to 20102? (4)

[10]

QUESTION 3

3.1 Given the geometric sequence:

2 + 6 + 18 + ... to 50 terms

3.1.1 Write down the next **TWO** terms in the sequence. (2)

3.1.2 Write down the series in sigma notation. (3)

3.1.3 Calculate the sum of the first 50 terms of the sequence. (2)

[7]

QUESTION 4

4.1 Prove that the sum to n terms of the arithmetic series whose first is "a" and its common difference is "d" is given by

$$S_n = \frac{n}{2}[2a+(n-1)d]$$ (4)

4.2 In a series, $S_n = \frac{3}{2}n^2 + 4n$, calculate the value of the eighth term in the series. (4)

4.3 Given the arithmetic sequence
4 ; 9 ; 14 ; 19 ; ....

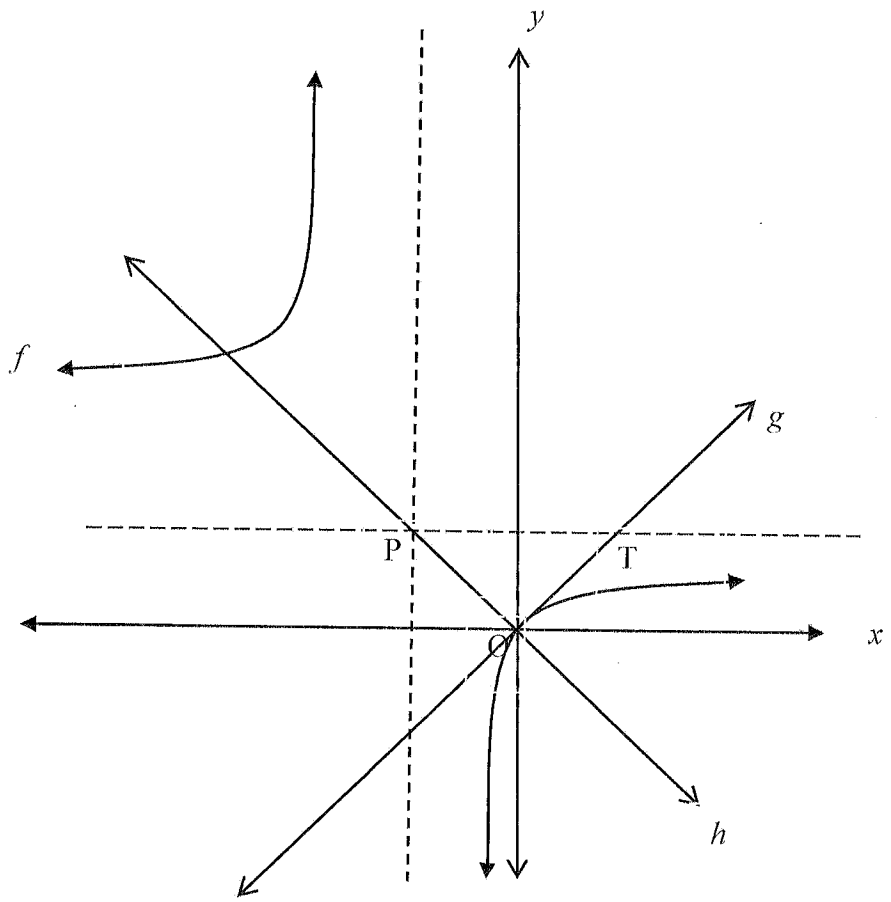
Determine the first term in the sequence that will be greater than 2017. (3)

[11]

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QUESTION 5

The graphs of the functions $f(x)=\frac{3}{x+1}+q$, $g(x)=mx+c$ and $h(x)=-x$ are sketched below.
The graphs of f, g and h passes through the origin. The line g is a tangent to f at O.
P is the point of intersection the vertical and horizontal asymptotes of the graph of f.
h anf g intersects the horizontal asymptote of f at P and T respectively and $P\hat{O}T = 90°$.



5.1 Write down the values of q. (2)

5.2 Determine the equation of g. (2)

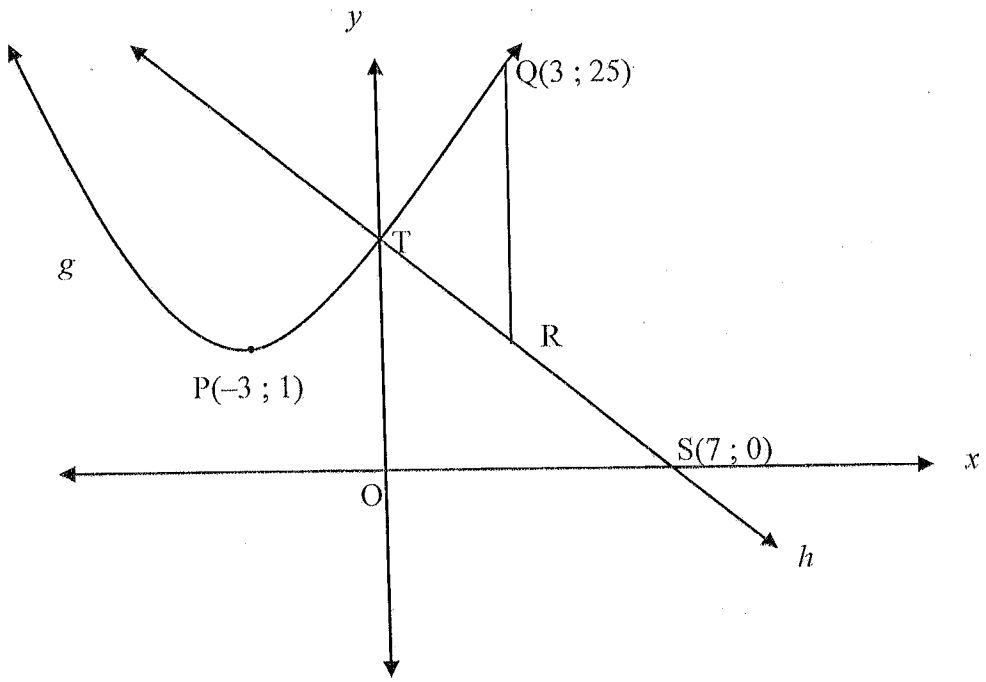
5.3 Determine the area of ΔPOT. (4)

[8]

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QUESTION 6

The sketch below shows the graphs of $g(x) = a(x-p)+q$ and $h(x) = mx+t$. The graphs have a common y – intercept, T. The graph of h intersects the x – axis at S(7 ; 0). The graph of g has a turning point at P(–3 ; 1). Q(3;25) is a point on g and R is a point on h such that QR is parallel to the y – axis.



6.1 Write down the value(s) of p and q. (2)

6.2 Determine the equation of g. (4)

6.3 Write down the values of t and m. (2)

6.4 Calculate the length of QR (2)

6.5 Write down the turning point of p, if $p(x) = -g(x)+5$. (2)

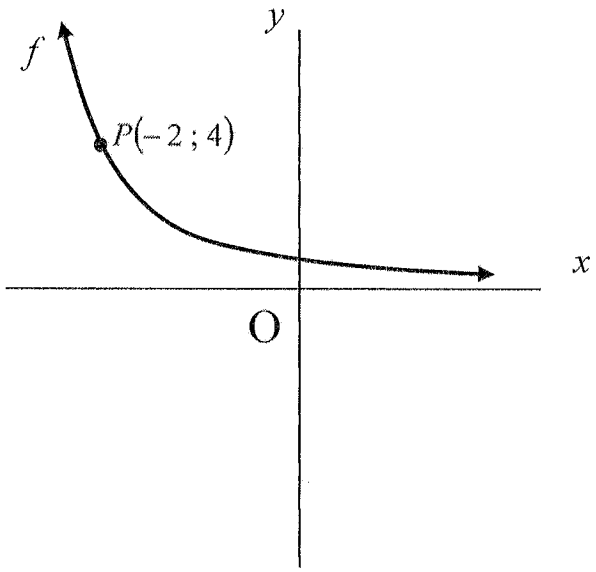
6.6 For which values of k will $g(x) = k$ have two unequal real roots. (2)

[14]

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QUESTION 7

The graph of $f(x) = a^x$ passes through the point P(–2;4).



7.1 Calculate the value of a. (3)

7.2 Write down the equation of f^{-1}, the inverse of f, in the form y = … (2)

7.3 Determine the values of x for which $f^{-1}(x) > -2$. (3)

7.4 Write down the equation of g if $g(x) = f^{-1}(-x)$. (2)

7.5 Sketch the graphs of f and f^{-1} on the same system of axes (including the line of reflection). (3)

[13]

QUESTION 8

8.1 Given $f(x) = \frac{2}{3x}$ Determine the derivative of f from first principles. (5)

8.2 8.2.1 $f'(x)$ if $f(x) = 3(x^2 - 5)^2$ (4)

8.2.2 $\frac{dy}{dx}$ *if* $x^2 - 3 = \sqrt[3]{y}$ (5)

[14]

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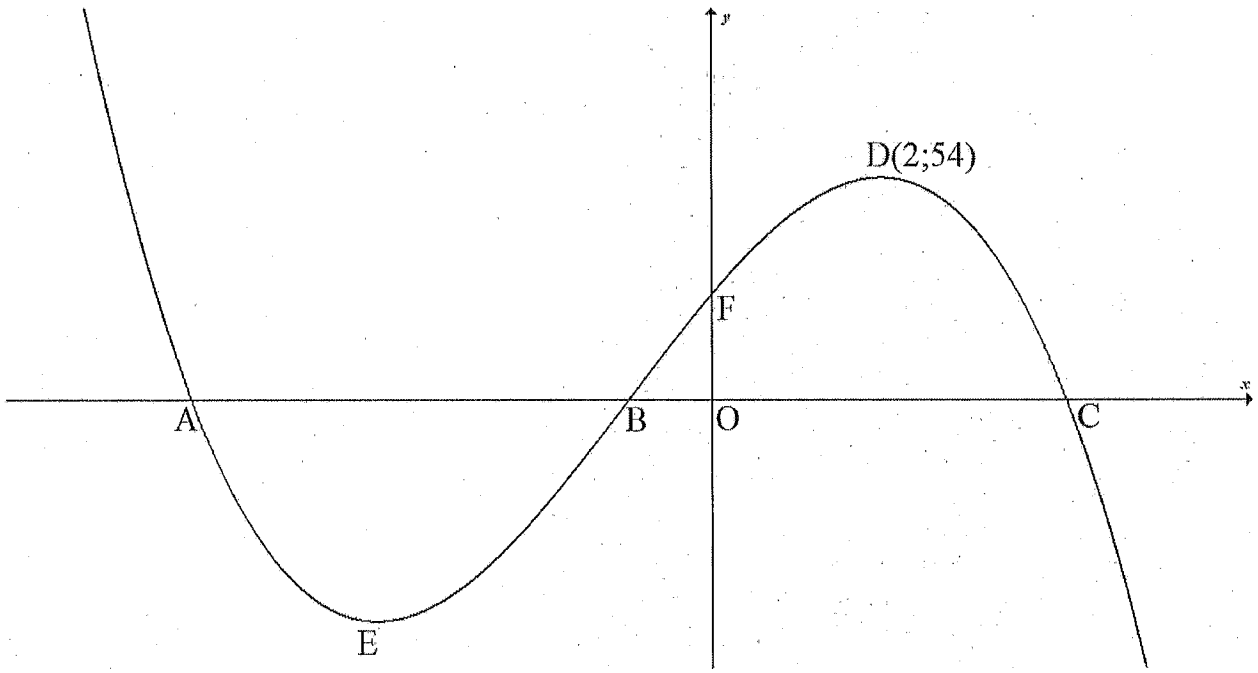
QUESTION 9

9.1 Given $g(x) = ax^3 + bx + c, a \neq 0$, which has the following properties.

$f'(x) > 0$ if $x < -3$ *or* $x > 3$
$f'(x) < 0$ if $-3 < x < 3$
$f'(-3) = f'(3) = 0$
$f(0) > 0$

Use the above information to draw a sketch of g. (4)

9.2 The graph of a cubic function with equation $f(x) = -x^3 + mx^2 + nx + 26$ has turning points D(2 ; 54) and E. f intersects the x – axis at A,B and C and the y – axis at F.



9.2.1 Write down the coordinates of F. (1)

9.2.2 Show that $m = -3$ and $n = 24$. (6)

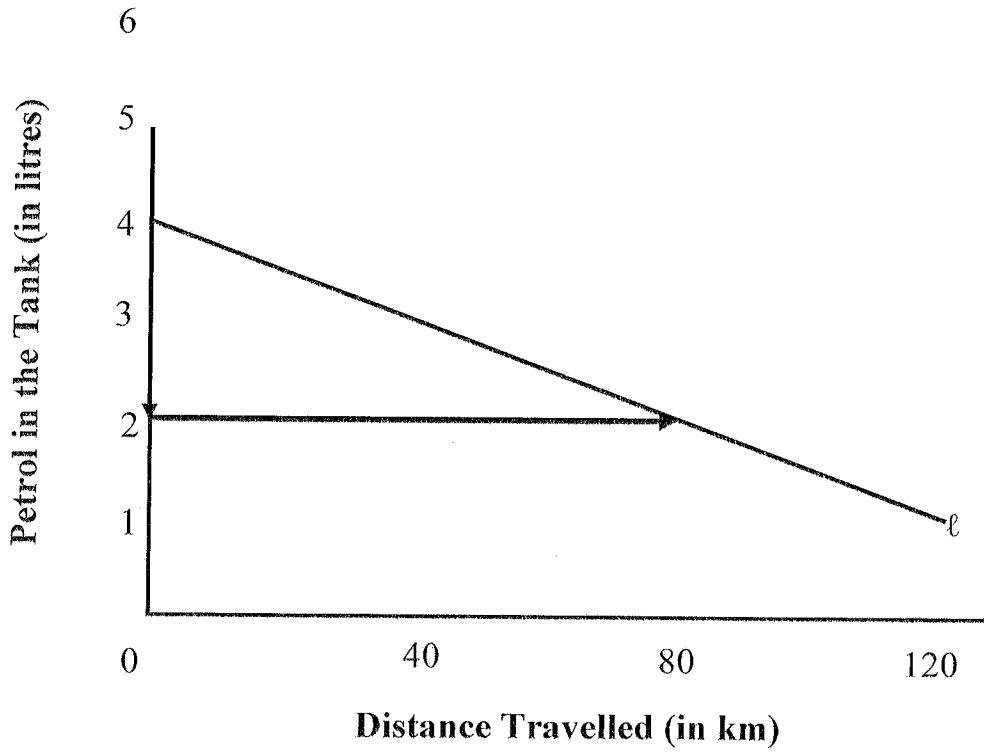
9.2.3 Determine the coordinates of E. (4)

9.2.4 Calculate the point of inflection of the graph of f. (3)

9.2.5 Determine the values of x for which f is concave up. (2)
[20]

QUESTION 10

A car has 4 litres of petrol in the tank. After driving 40 kilometres, the car has 2 litres of petrol left. The graph below shows the car's petrol consumption and distance travelled.



10.1 Determine the gradient of the line ℓ. (2)

10.2 Explain the significance of the value of the gradient obtained. (4)
[6]

TOTAL MARKS: 125

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INFORMATION SHEET: MATHEMATICS

INLIGTINGSBLAD: WISKUNDE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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GR 12 MATHS + MLIT - P1

Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P1

COMMON TEST

JUNE 2017

MARKING MEMORANDUM

NATIONAL SENIOR CERTIFICATE

GRADE 12

MARKS: 125

This memorandum consists of 12 pages.

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QUESTION 1

1.1.1	$x=0$ or $x=-\frac{5}{2}$	AA✓✓ Answers	(2)
1.1.2	$2x^2-3x=7$ $2x^2-3x-7=0$ $x=\frac{-(-3)\pm\sqrt{(-3)^2-4(2)(-7)}}{2(2)}$ $x=2{,}77$ or $x=-1{,}27$	A✓ equation in std. form CA✓ substitution CACA✓✓ answers (If non-real roots max 2/4) Penalize once for rounding off in this question	(4)
1.1.3	$x-7-\sqrt{x-5}=0$ $x-7=\sqrt{x-5}$ $(x-7)^2=(\sqrt{x-5})^2$ $x^2-14x+49=x-5$ $x^2-15x+54=0$ $(x-9)(x-6)=0$ $x=9$ or $x=6$ n/a	A✓ squaring both sides CA✓ standard form CA✓factors CA✓answers and rejecting	(4)
1.1.4	$\frac{1}{2}x(3x+1)<0$ $-\frac{1}{3}<x<0$ or $x\in\left(-\frac{1}{3};0\right)$	AA✓✓ $-\frac{1}{3}<x<0$ [1 mark for end points 1 mark for interval]	(2)

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1.2	$\sqrt[3]{\frac{1}{x^7}} = 128$ $\frac{1}{x^7} = (128)^3$ $\frac{1}{x^7} = (2^7)^3$ $\frac{1}{x} = 2^3$ $x = \frac{1}{8}$ **OR** $\sqrt[3]{\frac{1}{x^7}} = 128$ $x^{-\frac{7}{3}} = 128$ $x^{-\frac{7}{3}} = (2^7)$ $\left(x^{-\frac{7}{3}}\right)^{-\frac{3}{7}} = (2^7)^{-\frac{3}{7}}$ $x = 2^{-3}$ $x = \frac{1}{8}$	M✓ raising both sides to the power 3 A✓ writing 128 as a power of 2 CA✓excluding power 7 CA✓answer **OR** A✓writing LHS in exponential form M✓raising both sides to the same power CA✓2^{-3} CA✓answer	(4) (4)
1.3	$2x + y = 3 \rightarrow (1)$ $x^2 + y + x = y^2 \rightarrow (2)$ From (1) : $y = 3 - 2x \rightarrow (3)$ subst (3) into (2) $x^2 + 3 - 2x + x = (3 - 2x)^2$ $x^2 + 3 - 2x + x = 9 - 12x + 4x^2$ $3x^2 - 11x + 6 = 0$ $(3x - 2)(x - 3) = 0$ $x = \frac{2}{3}$ or $x = 3$ $y = \frac{5}{3}$ or $y = -3$ **OR**	A✓making y the subject CA✓substitution into equation CA✓standard form CA✓factors CA✓x values CA✓y values **OR**	(6)

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	$2x + y = 3 \rightarrow (1)$ $x^2 + y + x = y^2 \rightarrow (2)$ From (1) : $x = \frac{3 - y}{2} \rightarrow (3)$ subst (3) into (2) $\left(\frac{3 - y}{2}\right)^2 + y + \frac{3 - y}{2} = y^2$ $\frac{9 - 6y + y^2}{4} + y + \frac{3 - y}{2} = y^2$ $9 - 6y + y^2 + 4y + 6 - 2y = 4y^2$ $3y^2 - 4y + 15 = 0$ $(3y - 5)(y + 3) = 0$ $y = \frac{5}{3}$ or $y = -3$ $x = \frac{2}{3}$ or $x = 3$	A✓making x the subject CA✓substitution into equation CA✓standard form CA✓factors CA✓y values CA✓x values	(6)
			[22]

QUESTION 2

2.1	$2a = 4 \quad \therefore a = 2$ $3a + b = 3 \quad \therefore b = -3$ $T_{51} = 5052$ $an^2 + bn + c = T_n$ $(2)(51)^2 + (-3)51 + c = 5052$ $5202 - 153 + c = 5052$ $c = 5052 - 5049$ $c = 3$ $T_n = 2n^2 - 3n + 3$ **OR**	A✓a – value CA✓b – value CA✓substitution of a and b values into the 51st term CA✓simplifying CA✓c – value CA✓nth term(provided quadratic) **OR**	(6)

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	$T_k = 4k-1$ $T_n = an^2+bn+c$ $T_{51} = 51^2a+51b+c \rightarrow (1)$ $T_{50} = 50^2a+50b+c \rightarrow (2)$ $T_{52} = 52^2a+52b+c \rightarrow (3)$ $T_{51} - first\ diff = 203$ $T_{50} - first\ diff = 199$ $T_{52} - first\ diff = 207$ $(1)-(2):$ $101a+b = 199 \rightarrow (4)$ $(3)-(1)$ $103a+b = 203 \rightarrow (5)$ $(5)-(4)$ $2a = 4$ $a = 2$ $202+b = 199$ $b = -3$ But $T_{51} = 5052$ $2601(2)+51(-3)+c = 5052$ $5202-153+c = 5052$ $c = 5052-5049$ $c = 3$ $T_n = 2n^2-3n+3$	A✓a – value CA✓b – value CA✓substitution of a and b values into the 51st term CA✓simplifying CA✓c – value CA✓nth term(provided quadratic)	(6)
2.2	$T_n = 2n^2-3n+3 = 20102$ $2n^2-3n-20099 = 0$ $(n-101)(2n+199) = 0$ $n = 101 \quad or \quad n = -\frac{199}{2}$ n/a	CA✓equating nth term to 20102 CA✓standard form CA✓factors CA✓answer and rejecting (n∈N)	(4)
			[10]

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QUESTION 3

3.1.1	54 ; 162	AA✓✓answers	(2)
3.1.2	$\sum_{k=1}^{50} 2(3)^{k-1}$	A✓a and r values A✓$k=1$ and $k=50$ A✓ expression for $2(3)^{k-1}$	(3)
3.1.3	$S_n = \frac{a(r^n-1)}{r-1}$ $S_{50} = \frac{2(3^{50}-1)}{3-1}$ $= 3^{50}$	CA✓substitution into formula CA✓answer	(2)
			[7]

QUESTION 4

4.1	$S_n = a+(a+d)+...[a+(n-2)d]+[a+(n-1)d]$ ...(1) $S_n = [a+(n-1)d]+[a+(n-2)d]+...(a+d)+a$....(2) $(1)+(2):$ $2S_n = [2a+(n-1)d+[2a+(n-1)d]+...to\ n\ terms$ $2S_n = n[2a+(n-1)d]$ $S_n = \frac{n}{2}[2a+(n-1)d]$	A✓equation (1) A✓equation (2) A✓adding (1) and (2) A✓$2S_n = n[2a+(n-1)d]$	(4)
4.2	$T_8 = S_8 - S_7$ $= \left[\frac{3}{2}(8)^2+4(8)\right]-\left[\frac{3}{2}(7)^2+4(7)\right]$ $= 128-101.5$ $= 26.5$ **OR** $S_1 = T_1 = 5.5$ $S_2 = T_1+T_2 = 14 \quad \therefore T_2 = 8.5$ $S_3 = T_1+T_2+T_3 = 25.5 \quad \therefore T_3 = 11.5$ $S_4 = T_1+T_2+T_3+T_4 = 40 \quad \therefore T_4 = 14.5$ $a = 5.5$ and $d = 3$ $T_8 = 5.5+7(3) = 26.5$	A✓formula CACA✓✓substitution CA✓answer **OR** A✓calculating the first 4 terms CA✓a and d values CA✓substitution CA✓answer	(4) (4)

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4.3	$T_n = 5n-1$ $5n-1 > 2017$ $5n > 2018$ $n > \frac{2018}{5}$ $\therefore n > 403{,}6$ The 404th term will be greater than 2017	M✓ $5n-1>2017$ CA✓403,6 CA✓conclusion($n\in N$)	(3)
			[11]

QUESTION 5

5.1	$P(-1;1)$ $q=1$	A✓coordinates of P CA✓q – value (positive) Answer only full marks	(2)
5.2	m *of* $g=1$ $c=0$ $y=x$	A✓m of g A✓answer	(2)
5.3	$OP=\sqrt{1+1}=\sqrt{2}$ $OT=\sqrt{1+1}=\sqrt{2}$ Area of $\Delta POT=\frac{1}{2}b\times h$ $=\frac{1}{2}\sqrt{2}\sqrt{2}$ $=1$ *square unit*	CA✓OP value CA✓OT value CA✓substitution into formula CA✓answer	(4)
			[8]

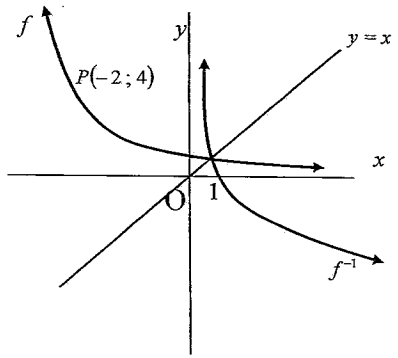
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QUESTION 6

6.1	$p=-3$ $q=1$	A✓p value A✓q value	(2)
6.2	$y=a(x-p)^2+q$ $25=a(3+3)^2+1$ $36a=24$ $a=\frac{24}{36}=\frac{2}{3}$ $y=\frac{24}{36}(x+3)^2+1 / y=\frac{2}{3}(x+3)^2+1$	A✓substitution of Q(3 ; 25) A✓substitution of turning point CA✓a value CA✓equation of g.($a>0$)	(4)
6.3	$t=7$ $m=-1$	CA✓t – value CA✓m – value ($m<0$)	(2)
6.4	At R : $y=-(3)+7=4$ QR = 25 – 4 = 21 units	CA✓y – value CA✓length	(2)
6.5	New TP.$(-3;4)$	AA✓✓answer	(2)
6.6	$k>1$	AA✓✓answer	(2)
			[14]

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QUESTION 7

7.1	$y = a^x$ $4 = a^{-2}$ $2^2 = a^{-2}$ $a = \frac{1}{2}$	A✓substitution of (-2 ; 4) A✓writing in exponential form A✓a – value	(3)
7.2	$y = \log_{\frac{1}{2}} x = -\log_2 x$	CACA✓✓answer (2marks or 0)	(2)
7.3	$\log_{\frac{1}{2}} x = -2$ $x = \left(\frac{1}{2}\right)^{-2} = 4$ $0 < x < 4$	CA✓equating log graph to –2 CA✓x – value CA✓answer	(3)
7.4	$g(x) = \log_{\frac{1}{2}}(-x)$	CACA✓✓equation of g	(2)
7.5		A✓ $y = x$ line (must pass through intersection point & origin) A✓graph of inverse A✓ x – intercept = 1	(3)
			[14]

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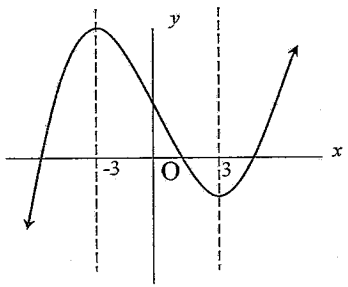
QUESTION 8 (PENALIZE ONCE FOR NOTAIONAL ERROR IN Q8,9 &10)

8.1	$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ $= \lim_{h\to 0} \frac{\frac{2}{3(x+h)} - \frac{2}{3x}}{h}$ $= \lim_{h\to 0} \frac{2x-2(x+h)}{3x(x+h)}$ $= \lim_{h\to 0} \frac{2x-2x-2h}{3x(x+h)} \times \frac{1}{h}$ $= -\frac{2}{3x^2}$ **OR** $f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ $= \lim_{h\to 0} \frac{\frac{2}{3} - \frac{2}{3}}{\frac{(x+h)}{h} - \frac{x}{h}}$ $= \lim_{h\to 0} \frac{\frac{2}{3}x - \frac{2}{3}(x+h)}{x(x+h)}$ $= \lim_{h\to 0} \frac{\frac{2}{3}x - \frac{2}{3}x - \frac{2}{3}h}{x(x+h)} \times \frac{1}{h}$ $= \frac{-\frac{2}{3}}{x^2} / -\frac{2}{3x^2}$	A✓formula A✓substitution A✓LCD and numerator CA✓simplification CA✓answer **OR** A✓formula A✓substitution A✓LCD and numerator CA✓simplification CA✓answer	(5) (5)
8.2.1	$f(x) = 3(x^2-5)^2$ $f(x) = 3(x^4-10x^2+25)$ $f(x) = 3x^4-30x^2+75$ $f'(x) = 12x^3-60x$	A✓squaring the binomial CA✓simplifying CACA✓✓each answer	(4)

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8.2.2	$x^2-3=\sqrt[3]{y}$ $y=(x^2-3)^3$ $y=x^6-9x^4+27x^2-27$ $\frac{dy}{dx}=6x^5-36x^3+54x$	A✓cube both sides A✓expression for y CA✓CA✓CA✓each term	(5)
			[14]

QUESTION 9

9.1		A✓shape A✓Max at $x=-3$ A✓Min at $x=3$ A✓positive y intercept	(4)
9.2.1	$F(0\,;26)$	A✓answer	(1)
9.2.2	$D(2;54)$: $54=-(2)^3+m(2)^2+n(2)+26$ $54=-8+4m+2n+26$ $36=4m+2n$ $18=2m+n \quad \rightarrow (1)$ $f'(x)=-3x^2+2mx+n$ $f'(2)=-3(2)^2+2m(2)+n=0$ $12=4m+n \quad \rightarrow (2)$ $(2)-(1): \ -6=2m$ $m=-3$ *Subst. in* (1) : $18=2(-3)+n \ \therefore \ n=24$	A✓substituting D(2 ; 54) A✓$36=4m+2n$ A✓derivative A✓substituting $x=2$ into derivative and equating to 0 A✓$-6=2m$ A✓substituting into (1)	(6)

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9.2.3	$f(x)=-x^3-3x^2+24x+26$ $f'(x)=-3x^2-6x+24=0$ $x^2+2x-8=0$ $(x+4)(x-2)=0$ $x=-4 \quad$ or $\quad x=2$ $y=-(-4)^3-3(-4)^2+24(-4)+26$ $y=-54$ $E(-4\,;-54)$	A✓derivative and equal to 0 CA✓factors CA✓ x – values CA✓y value of – 54 (negative)	(4)
9.2.4	$f'(x)=-3x^2-6x+24$ $f''(x)=-6x-6=0$ $x=-1$ $y=1-3-24+26=0$ $(-1\,;0)$ $x=-\frac{b}{3a}=-\frac{(-3)}{3(-1)}=-1$ OR $x=\frac{-4+2}{2}=-1$	CA✓2nd derivative and equal to 0 CA✓ x – value CA✓ y – value	(3)
9.2.5	$-6x-6>0$ $x<-1$	CA✓$-6x-6>0$ CA✓answer Answer only full marks	(2)
			[20]

QUESTION 10

10.1	(0; 4) and (80 ; 2) $m=\frac{4-2}{0-80}$ $m=\frac{2}{-80}=-\frac{1}{40}=-0{,}025$	A✓substitution into gradient formula CA✓answer(negative)	(2)
10.2	Since $-\frac{1}{40}=-0{,}025$, we know that the car is burning 0,025 litres of petrol for every kilometre that the car travels. The negative value of the gradient tells us that the amount of petrol in the tank is decreasing.	AA✓✓(petrol decreasing) A A✓✓(negative gradient)	(4)
			[6]