Name:
Maths Class:

YEARLY EXAMINATION
YEAR 10 2018
MATHEMATICS

Time Allowed – 120 minutes
(Plus 5 minutes Reading time)

Section	A	B	C	D	E	MC	Total
Trigonometry		1-2 /11			1 /2		/13
Probability				1-2 /7			/7
Algebra & Quadratics	1-2 /4	3-4 /5	1-3 /11	3-4 /5			/25
Statistics	3-4 /7						/7
Polynomials	5 /4	5 /4	4 /6		2 /3		/17
Coord Geom & Graphing	6 /5			5 /8	3 /9		/22
Geometry			5 /3		4 /6		/9
Other						/10	/10
Total	/20	/20	/20	/20	/20	/10	/110

INSTRUCTIONS:

- All questions may be attempted.
- Write your **name** and **Maths class** at the top of each page.
- **Write** in **Pen** and draw diagrams in **Pencil.**
- Answers to Multiple choice are to be entered onto the answer sheet provided.
- Answers to Sections A to E are to be returned in separate bundles.
- Department of Education approved calculators are permitted.
- Show all necessary working.
- Marks may not be awarded for untidy or carelessly arranged work.
- No grid paper is to be used unless provided with the examination paper.

Multiple Choice (1 mark each)

Answer on multiple choice sheet provided

1. $A = 6x + 10$, and x is increased by 2, what will be the corresponding increase in A?

   A. $2x$
   C. 2
   B. $6x$
   D. 12

2. Which of the following correctly expresses n as the subject of $v = \frac{3mn^2}{r}$?

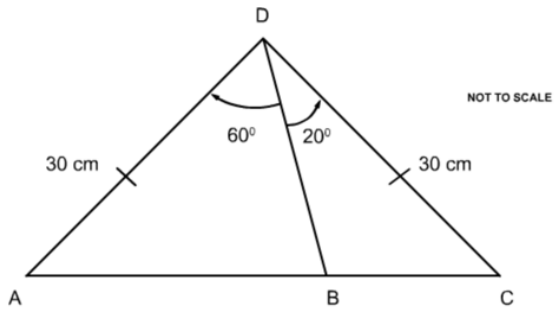
   A. $n = \pm\frac{\sqrt{rv}}{3m}$
   C. $n = \pm\frac{r\sqrt{v}}{3m}$
   B. $n = \pm r\sqrt{\frac{v}{3m}}$
   D. $n = \pm\sqrt{\frac{rv}{3m}}$

3. The eye colours of a sample of children were recorded. When analysing the data, which of the following could be found?

   A. Mean
   C. Mode
   B. Median
   D. Range

4. In the diagram below, AD and DC are both equal to $30cm$. What is the length of AB to the nearest centimetre?

   A. $28cm$
   B. $31cm$
   C. $34cm$
   D. $39cm$



5. Bag A contains 2 red balls, 3 green balls and 4 white balls while bag B contains 2 red balls, 3 green balls and 4 yellow balls. If one ball is drawn randomly from each bag, what is the probability that the two balls drawn are different colours?

   A. $\frac{13}{81}$
   C. $\frac{52}{81}$
   B. $\frac{29}{81}$
   D. $\frac{68}{81}$

6. Let p and q be constants. If $x^2 + p(x+5) + q \equiv (x-2)(x+5)$, then $q =$

   A. -25 C. 5

   B. -10 D. 3

7. It is given that z varies directly as x and inversely as y. When $x = 3$ and $y = 4$ then $z = 18$. Find the value of y when $x = 2$ and $z = 8$.

   A. 1 C. 6

   B. 3 D. 9

8. 39 people can repair a road in 12 days, working 5 hours a day. In how many days will 30 people, working 6 hours a day, complete the work?

   A. 10 C. 14

   B. 13 D. 15

9. $\frac{sin\theta}{cos60^\circ} + \frac{\cos(180^\circ - \theta)}{tan45^\circ} =$

   A. $sin\theta$ C. $2sin\theta - cos\theta$

   B. $3sin\theta$ D. $2sin\theta + cos\theta$

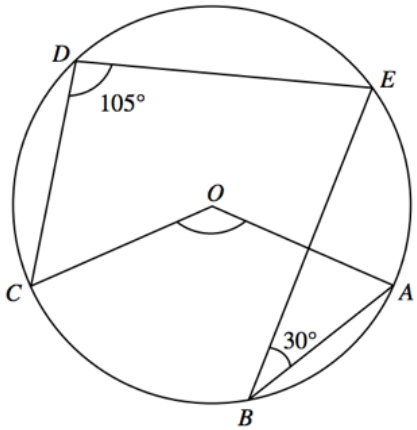
10. In the diagram below, O is the centre of the circle $ABCDE$. If $\angle ABE = 30^\circ$ and $\angle CDE = 105^\circ$, then $\angle AOC =$

    A. 120°

    B. 135°

    C. 150°

    D. 165°



Section A (20 marks) Answer on your own paper

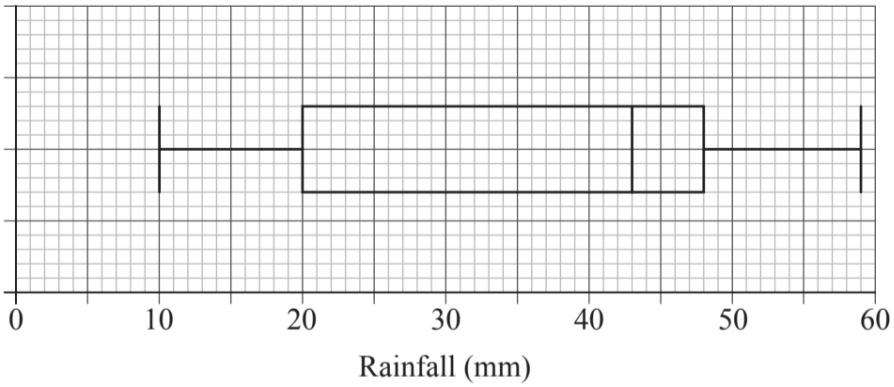
1. Simplify $\frac{(x^3y)^2}{x^2y^{-4}}$ with positive indices. **1**

2. Solve for x:

   a. $log_x 8 = 3$ **1**

   b. $4^x = 6$ (to 2 decimal places) **2**

3. The distribution of rainfall in a town over 80 days is displayed on the box-and-whisker plot below.



   a. Determine the median rainfall and the interquartile range of the rainfall. **2**

   b. Write down the number of days in which the rainfall will be between $20mm$ and $59mm$ inclusive. **1**

4. The price, in cents per litre, of petrol in 10 city petrol stations are shown below:

   84.2, 84.4, 85.1, 83.9, 81.0, 84.2, 85.6, 85.2, 84.9, 84.8

   a. Calculate the mean and standard deviation of these prices, to 1 decimal place. **2**

   b. In 10 rural petrol stations, the petrol prices have a mean of 88.8 and a standard deviation of 2.4. How do the rural prices compare with the city prices? **2**

5. Given that the roots of the equation $3x^2 - 4x + 2 = 0$ are α and β. Write the value of:

   a. $\alpha + \beta$ **1**

   b. $\alpha\beta$ **1**

   c. $\frac{1}{\alpha} + \frac{1}{\beta}$ **1**

   d. $\alpha^2 + \beta^2$ **1**

6. The points $P(-5, -2), Q(-1,6), R(7,7)$ and $S(3, -1)$ are the vertices of a parallelogram.

   a. Find the exact length of PQ. **1**

   b. Find the coordinate of M, the midpoint of PQ. **1**

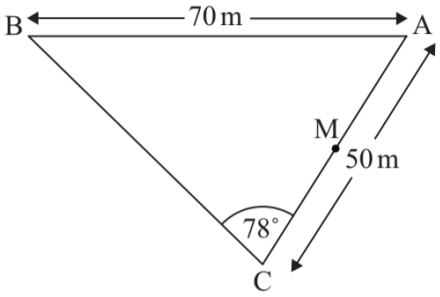
   c. Show that MS is perpendicular to PQ. **1**

   d. Hence or otherwise, find the area of the parallelogram. **2**

Section B continues on next page

Section B (20 marks) Start a new page

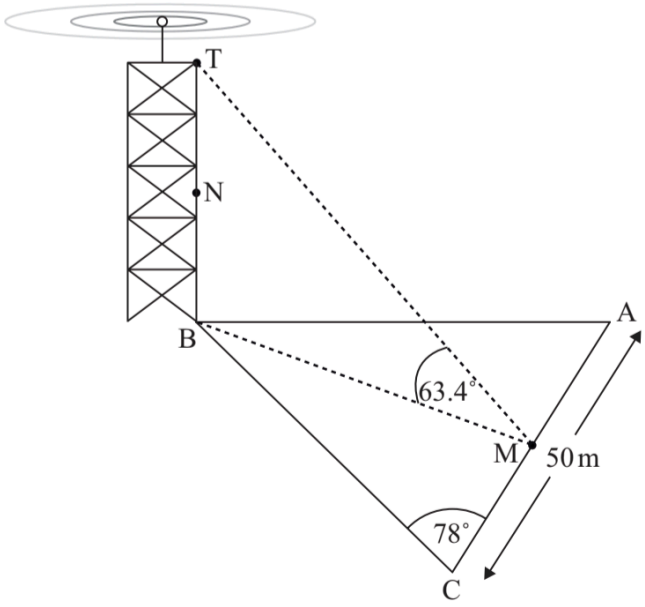
1. ABC is a triangular field on horizontal ground. The lengths of AB and AC are $70m$ and $50m$ respectively and $\angle BCA = 78°$.



a. Find the size of $\angle ABC$, to the nearest minute. **1**

b. Find the area of the triangular field, to 2 decimal places. **2**

c. M is the midpoint of AC. Find the length of BM, to 2 decimal places. **2**



d. A vertical mobile phone tower TB, is built next to the field with its base at B. The angle of elevation of T from M is $63.4°$. N is the midpoint of the tower. Calculate the angle of elevation of N from M, to the nearest degree. **2**

2. Find the value of θ where $0° \leq \theta \leq 360°$ for $2cos\theta = -3tan\theta$. **4**

3. Solve for x, y and z: $2^x 3^y 5^z = \frac{\sqrt[3]{40} \times 12^2}{\sqrt{15}}$ **3**

4. A quadratic equation has roots at $x = -\frac{2}{3}$ and $x = 1$. If the constant term is -2, find the equation. **2**

5. The polynomial $P(x)$ is defined by: $P(x) = kx^3 - 12x - k$

   a. When $P(x)$ is divided by $(x - 2)$ the remainder is -3. Find the value of k. **2**

   b. Using your value of k from above, expand the expression $(x + 3)P(x)$. Hence determine the value of the coefficient of the x for $(x + 3)P(x)$. **2**

Section C continues on next page

Section C (20 marks) Start a new page

1. Using a suitable substitution or otherwise determine the value or x for: **4**

$$x^2 + 3x + \frac{2}{x^2+3x} = \frac{9}{2}.$$

2. Given that $x = log_p 5$ and $y = log_p 7$, find $log_p \frac{5p^3}{49}$ in terms of x and y. **3**

3. Solve the following equation for x: $log_{10}(x^2 - 6) + log_{10} 2 = 1 + log_{10} x$. **4**

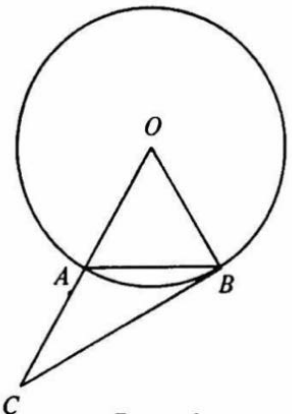
4. For the polynomial $P(x) = x^3 - 8x^2 + 13x - 6$

   a. Show that $(x - 1)$ is a factor of $P(x)$. **1**

   b. Hence write $P(x)$ as a product of its linear factors. **2**

   c. By neatly sketching the graph of $P(x)$, determine the values of x for which $P(x) \geq 0$ **3**

5. In the figure below, O is the centre of the circle. A and B are two points on the circle such that OAB is an equilateral triangle. OA produced to C such that $OA = AC$.



   a. Draw the diagram onto your paper and find $\angle ABC$, giving reasons. **2**

   b. Is CB a tangent to the circle at B? Give a reason for your answer. **1**

Section D continues on next page

Section D (20 marks) Start a new page

1. In a child's game, there should be 11 squares, 5 of which are blue and 6 are red. However, two pieces have been lost. Find the probability that the pieces lost are the same colour given that one of the lost pieces is red. **2**

2. A bag contains 6 red disks, 4 blue disks and 5 green disks. A fair dice has 4 faces painted red and the other 2 painted blue. Kelly takes a disk at random and records its colour. She then throws the dice twice and each time records the colour of the uppermost face.

    a. Draw a probability tree diagram showing all possible outcomes. **2**

    b. Find the probability that Kelly will record exactly two of the same colour. **3**

3. Solve for x for the equation: $4^x = 10 - 4^{x+1}$ **2**

4. For what values of p does the equation $x^2 + 3x = -p(p + x + 3)$ have real roots? **3**

5. For the function $f(x) = 5 - \sqrt{4 - x^2}$

    a. Determine the domain and range of the function. **2**

    b. Does an inverse function exist, justify your answer. **1**

    c. Sketch the graph of $f(x)$ for the domain $x > 0$ showing all essential features. **2**

    d. On the same set of axes as part c, draw the inverse function of $f(x)$. **1**

    e. Hence or otherwise, determine the equation of $f^{-1}(x)$. **2**

Section E continues on next page

Section E (20 marks) Start a new page

1. Prove the identity: $\cos^2 x + \cot^2 x \cos^2 x = \cot^2 x$. **2**

2. A polynomial gives a remainder of -9 when divided by $(x + 5)$ and a remainder of 5 when divided by $(x - 2)$. Find the remainder when the polynomial is divided by $(x + 5)(x - 2)$. **3**

3. A cubic curve has the following equation: $f(x) = x^3 - 6x^2 + 12x + B$, where B is a non-zero constant.

    a. $f(x)$ can be written in the form $(x - A)^3 - 4$, where A is also a non-zero constant, find the values of A and B. **3**

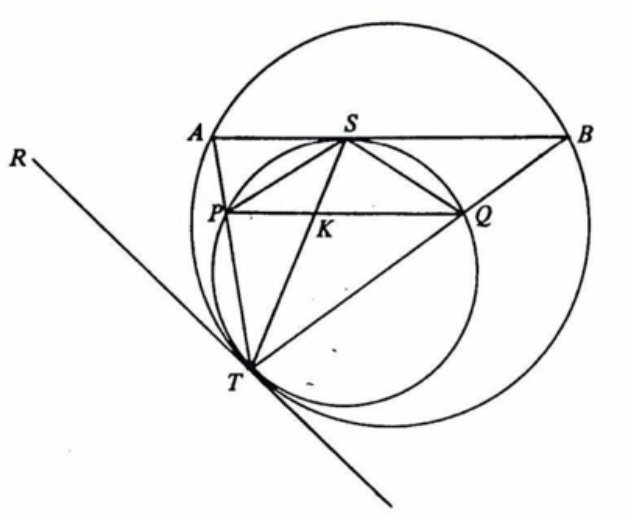
    b. A quadratic curve has equation: $g(x) = x^2 - 4x + 5$. Sketch the graph of $f(x)$ and $g(x)$ on the same set of axes, showing all essential features. **4**

    c. Hence or otherwise, determine with full reasoning the number of real roots for the equation: $x^3 - 7x^2 + 16x + B = 5$. **2**

4. In the diagram below, two circles touch internally at T. TR is their common tangent. AB touches the smaller circle at S. AT and BT cut the smaller circle at P and Q respectively. PQ and ST intersect at K.

    a. Copy the diagram onto your paper and prove that $PQ \parallel AB$. **3**

    b. Prove that ST bisects $\angle ATB$. **3**



End of Examination

Year 10 Section A

1. $\frac{(x^3y)^2}{x^2y^{-4}} = \frac{x^6y^2}{x^2y^{-4}} = x^4y^6$ ✓

✓ answer x^4y^6

2. a) $\log_x 8 = 3$

$x^3 = 8$

$\therefore x = 2$ ✓

✓ answer $x = 2$

b) $4^x = 6$

$\log_4 4^x = \log_4 6$ ✓ or $\log_4 6 = x$

$x \log_4 4 = \log_4 6$

$x = \frac{\log_{10} 6}{\log_{10} 4}$

$x = 1.29$

$\therefore x = 1.29$ ✓

✓ converting to logarithm

✓ correct solution 1.29

3 a) median = 43 mm ✓

Interquartile Range = 48 - 20 = 28mm ✓

b) 75% of 80 = 60 days ✓

all 1 mark each

4 a) mean = 84.33 = 84.3 (1dp) ✓

sd = 1.217 = 1.2 (1dp) ✓

✓ for correct mean

✓ for correct SD

b) The prices in the city are lower than rural areas ✓

but rural prices are more spread out than city prices ✓

✓ talking bout prices

✓ discuss spread of scores

5. $3x^2 - 4x + 2 = 0$

a) $\alpha + \beta = \frac{4}{3}$ ✓

b) $\alpha\beta = \frac{2}{3}$ ✓

c) $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{4/3}{2/3} = 2$ ✓

d) $\alpha^2 + \beta^2 = (\alpha+\beta)^2 - 2\alpha\beta$

$= \left(\frac{4}{3}\right)^2 - 2\left(\frac{2}{3}\right)$

$= \frac{4}{9}$ ✓

all 1 mark each

6. a) $d_{PQ} = \sqrt{(-5+1)^2 + (-2-6)^2}$

$= \sqrt{80}$

$= 4\sqrt{5}$ ✓

accepted $4\sqrt{5}$ and $\sqrt{80}$

b) $M = \left(\frac{(-5-1)}{2}, \frac{(-2+6)}{2}\right)$

$= \left(\frac{-6}{2}, \frac{4}{2}\right)$

$= (-3, 2)$ ✓

c) $m_{MS} = \frac{2+1}{-3-3} = \frac{3}{-6} = -\frac{1}{2}$

$M_{PQ} = \frac{6+2}{-1+5} = \frac{8}{4} = 2$

$m_{MS} \times M_{PQ} = \frac{1}{2} \times 2$

$= -1$

$\therefore MS \perp PQ$ (product of gradients is -1) ✓

– proof ✓

d) $d_{MS} = \sqrt{(-3-3)^2 + (2+1)^2}$

$= \sqrt{45}$

$= 3\sqrt{5}$ ✓

1 mark for d_{MS} accepted $3\sqrt{5}$, $\frac{15}{\sqrt{3}}$

$\therefore$ Area $= 3\sqrt{5} \times 4\sqrt{5}$

$= 60$

Area is $60\ u^2$. ✓

1 mark for product $d_{PQ} \times d_{MS}$

MATHEMATICS Y10 : Yearly Exams: 2018 Section B

Suggested Solutions	Marks Awarded	Marker's Comments
1, a) In ΔABC: $\frac{\sin B}{50} = \frac{\sin C}{70}$ $\therefore \sin B = \frac{50}{70} \times \sin 78$ $= 0.6986...$ $\therefore \angle ABC = 44.3209...^\circ$ $= 44^\circ 19'$ (nearest minute)	1	For correct answer in degrees and minutes
b) $\lvert ABC \rvert = \frac{1}{2} AB.AC \sin \angle BAC$ $= \frac{1}{2}.70.50.\sin(57.679...)$ $= 1478.866...$ $= 1478.87 m^2$ (2dp)	1 1	For correct Area formula Correct answer to 2dp
c) In ΔBMC, $BM^2 = 70^2 + 25^2 - 2.70.25 \cos(57.679...)$ $\therefore BM = 60.4457...$ $= 60.45$ cm	1 ∴ cosine rule 1	For correct subst. into cosine rule For correct answer
d) In ΔTBM: $\tan 63.4 = TB/BM$ $\therefore TB = BM.\tan 63.4$ But $NB = \frac{1}{2} TB$ $= \frac{1}{2} BM.\tan 63.4$ --- ①	1	For correctly calculating or obtaining an expression for NB

MATHEMATICS Y10 : Yearly Exams: 2018 Section B

Suggested Solutions	Marks Awarded	Marker's Comments
Now in Δ NBM: $\tan \angle NMB = \frac{NB}{BM}$ ... (2) Sub (1) into (2): $\therefore \tan \angle NMB = \frac{\frac{1}{2} BM . \tan 63.4}{BM}$ $= \frac{1}{2} \tan 63.4$ $\therefore \angle NMB = 44.9563...$ $= 45^\circ$ (nearest degree)	1	For correctly evaluating $\angle$ of elevation
2. $2\cos\theta = -3\tan\theta$ $= -\frac{3\sin\theta}{\cos\theta}$ $\times \cos\theta$: $2\cos^2\theta + 3\sin\theta = 0$ $2(1-\sin^2\theta) + 3\sin\theta = 0$ $-2\sin^2\theta + 3\sin\theta + 2 = 0$ $2\sin^2\theta - 3\sin\theta - 2 = 0$ $(2\sin\theta + 1)(\sin\theta - 2) = 0$ $\therefore \sin\theta = -\frac{1}{2}$ or $\sin\theta = 2$ (ignore as $-1 \le \sin\theta \le 1$ for $0^\circ \le \theta \le 360^\circ$) $\therefore \theta = 210^\circ$ or 330°	1 1 1 1	For expressing tan into sin and cos and multiplying by $\cos\theta$ For correct quadratic equation rejecting 1 solution For both θ's.

MATHEMATICS Y10 : Yearly Exams: 2018 Section B

Suggested Solutions	Marks Awarded	Marker's Comments
3. $2^x \cdot 3^y \cdot 5^z = \frac{\sqrt[3]{40} \times 12^2}{\sqrt{15}}$		
$= \frac{\sqrt[3]{8\times5} \times (3\times2^2)^2}{\sqrt{5}\times\sqrt{3}}$		
$= \frac{2 \cdot 5^{1/3} \cdot 3^2 \cdot 2^4}{5^{1/2} \cdot 3^{1/2}}$	1	Correct x
$= 2^5 \cdot 3^{1\frac{1}{2}} \cdot 5^{\frac{1}{6}}$	1	Correct y
$\therefore x = 5, y = 1\frac{1}{2}, z = \frac{1}{6}$	1	Correct z
4. The quadratic equation is $(3x+2)(x-1) = 0$	1	For correct working
i.e. $3x^2 - x - 2 = 0$	1	For correct quadratic eq.
5. $P(x) = kx^3 - 12x - k$		
a) $P(2) = -3$	1	Correct application of remainder theorem
$\Rightarrow 8k - 24 - k = -3$		
$7k = 21$		
$\therefore k = 3$	1	For correct k
b) $(x+3)P(x)$		
$= (x+3)(3k^3 - 12x - 3)$		
$= 3x^4 + 9x^3 - 12x^2 - 39x - 9$	1	For correct expansion
$\therefore$ Coefficient of x is -39	1	For correct... coefficient

Q1 4
Q2 3
Q3 4

Section C

Q1 $x^2+3x+\frac{2}{x^2+3x}=\frac{9}{2}$

$x^2+3x=t$

$t+\frac{2}{t}=\frac{9}{2}$ / $\times t$

$t^2+2=\frac{9}{2}t$

$2t^2-9t+4=0$

if try to do polynomial equation then needed to find all linear factors over real number field (some of zeros/roots will be surds than find zeros)

$2\times 4=+8=-8\times -1$ $\quad -8+-1=-9$

$2t^2-8t-t+4=0$

$2t(t-4)-(t-4)=0$

$(2t-1)(t-4)=0$ ✓ * exact values!!!

$2t-1=0$ or $t-4=0$

$t=\frac{1}{2}$ $\quad t=4$

→ be careful when c in quadratic equation is (−)

$x^2+3x=\frac{1}{2}$

$2x^2+6x-1=0$

$x=\frac{-6\pm\sqrt{36-4\times 2(-1)}}{}$

$x^2+3x=4$

$x^2+3x-4=0$

$-1\times 4 \Rightarrow 4+-1=3$

$x = \frac{-6 \pm \sqrt{44}}{4}$ $(x^2 - 1)(x + 4) = 0$

$x = 1$ or $x = -4$ ✓

$x = \frac{-6 \pm 2\sqrt{11}}{4}$

$x = \frac{-3 \pm \sqrt{11}}{2}$ ✓

solutions

$x = 1, -4, \frac{-3+\sqrt{11}}{2}, \frac{-3-\sqrt{11}}{2}$

* Can be done as polynomial equation but you need to finish by factorising.

Q2 $x = \log_p 5$

$y = \log_p 7$

$\log_p \frac{5p^3}{49} = ?$

$\log 5p^3$ → power 3 is over above p^3, be careful

first $\log 5 + \log_p p^3$:

$\log_p 5p^3 - \log_p 49 = \log_p 5 + \log_p p^3 - 2\log_p 7$ ✓

$= x + 3 \times 1 - 2y = x - 2y + 3$

Q3 $\log_{10}(x^2 - 6) + \log_{10} 2 = 1 + \log_{10} x$

$\log_{10} 10 <$

$\log_{10}\left(\frac{x^2-6}{2}\right) 2 = \log_{10} 10x$

$\log_{10} 2(x^2-6) = \log_{10} 10x$ ✓

$2(x^2-6) = 10x$

$x^2-6 = 5x$

$x^2 - 5x - 6 = 0$ ✓

$-6 \times 1 = -6 \quad -6+1 = -5$

$(x-6)(x+1) = 0$ ✓

$x = 6$ or -1 ✓

but $\log_{10} x$, $x > 0$ → only one solution ✓ careful of log definition & domain

so only solution is $x = 6$

$\log_{10}(3 \times 6) + \log_{10} 2 = 1 + \log_{10} 6$

$\log_{10} 60 = \log_{10} 10 \times 6$ ✓

24 $P(x) = x^3 - 8x^2 + 13x - 6$ ✓

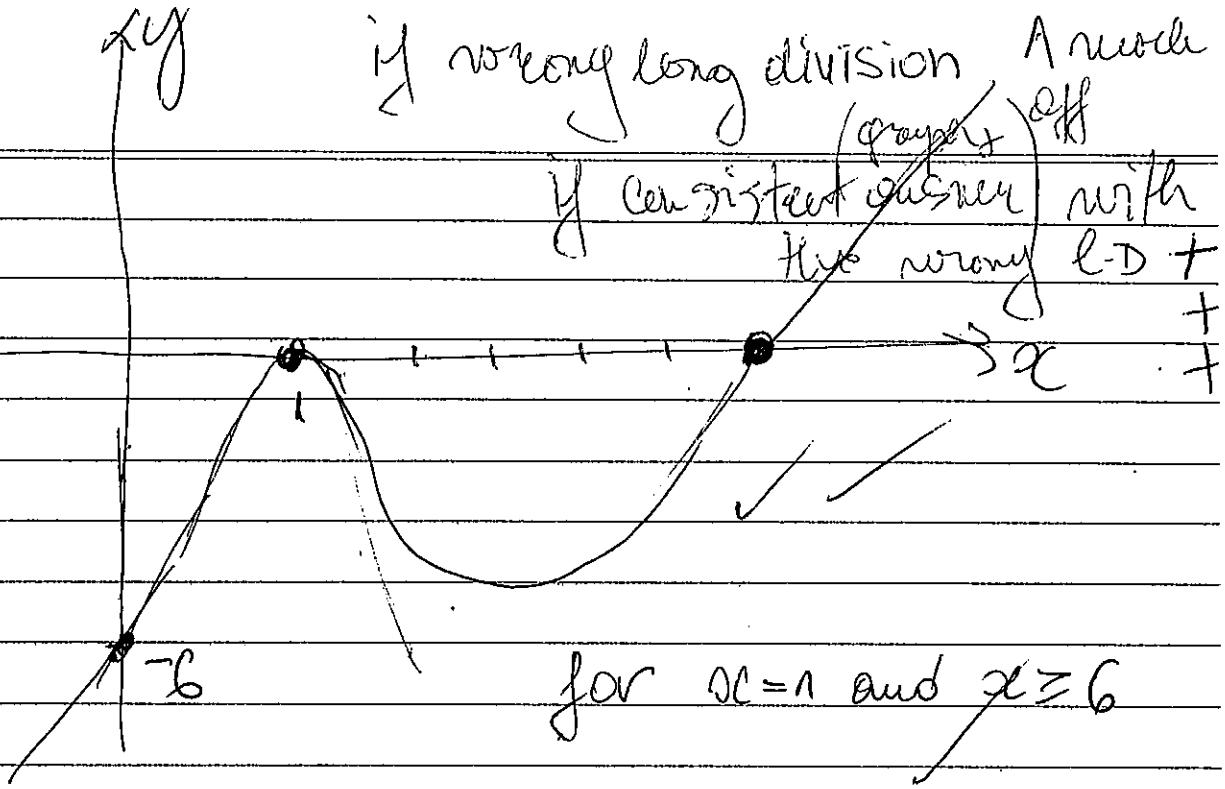
a) $P(1) = 1 - 8 + 13 - 6 = -7 + 6 + 13 = 0$ ✓

b) $P(x) = (x-1)(x^2 - 7x + 6) = (x-1)^2(x-6)$ ✓

	1	−8	13	−6
1		1	−7	6
	1	−7	6	0

	1	−7	6
1		1	−6
	1	−6	0

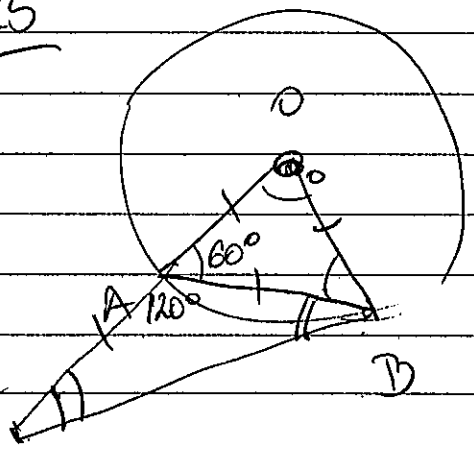
c)



if wrong long division A mark off
if consistent answer (graph) with wrong L-D +
+
+

for $x = 1$ and $x \geq 6$

25



$AC = OA = OB = AB$

$\angle ABC = ?$

$\angle OBA = 60°$ (equilateral triangles)

$\angle ABC = \angle ACB$ (angles opposite equal sides are equal)

$\angle ABC + \angle ACB = 180 - 120° = 60°$

$2\angle ABC = 60°$

$\angle ABC = 30°$

b) $\angle OBC = 60° + 30° = 90°$

$\therefore$ BC tangent at circle at B (radius $\perp$ to tangent)

Section E Yr 10 Yrly 2018

1. $\cos^2 x + \cot^2 x \cos^2 x$

$= \cos^2 x + \dfrac{\cos^2 x \cos^2 x}{\sin^2 x}$

$= \dfrac{\cos^2 x \cdot \sin^2 x + \cos^2 x \cos^2 x}{\sin^2 x}$

$= \dfrac{\cos^2 x (\sin^2 x + \cos^2 x)}{\sin^2 x}$ 1m

$= \underline{\cot^2 x}$ or 1m

$\cos^2 x (1 + \cot^2 x)$

$= \cos^2 x \operatorname{cosec}^2 x$ 1m

$= \dfrac{\cos^2 x}{\sin^2 x}$

$= \underline{\cot^2 x}$ 1m

must show

$\sin^2 x + \cos^2 x = 1$

or $1 + \cot^2 x = \operatorname{cosec}^2 x$

plus $\dfrac{\cos^2 x}{\sin^2 x} = 1$

2. $P(x) = (x+5)(x-2)Q(x) + ax + b$

$P(5) = -5a + b = -9$ ① 1m

$P(2) = 2a + b = 5$ ② 1m

② − ① $7a = 14$

$\therefore a = 2$

Sub a into ② $4 + b = 5$

$b = 1$

Remainder is $\underline{2x+1}$ 1m

3) a) $f(x) = x^3 - 6x^2 + 12x + B$

$= (x-A)^3 - 4$

$= x^3 - 3Ax^2 + 3A^2x - A^3 - 4$ 1m

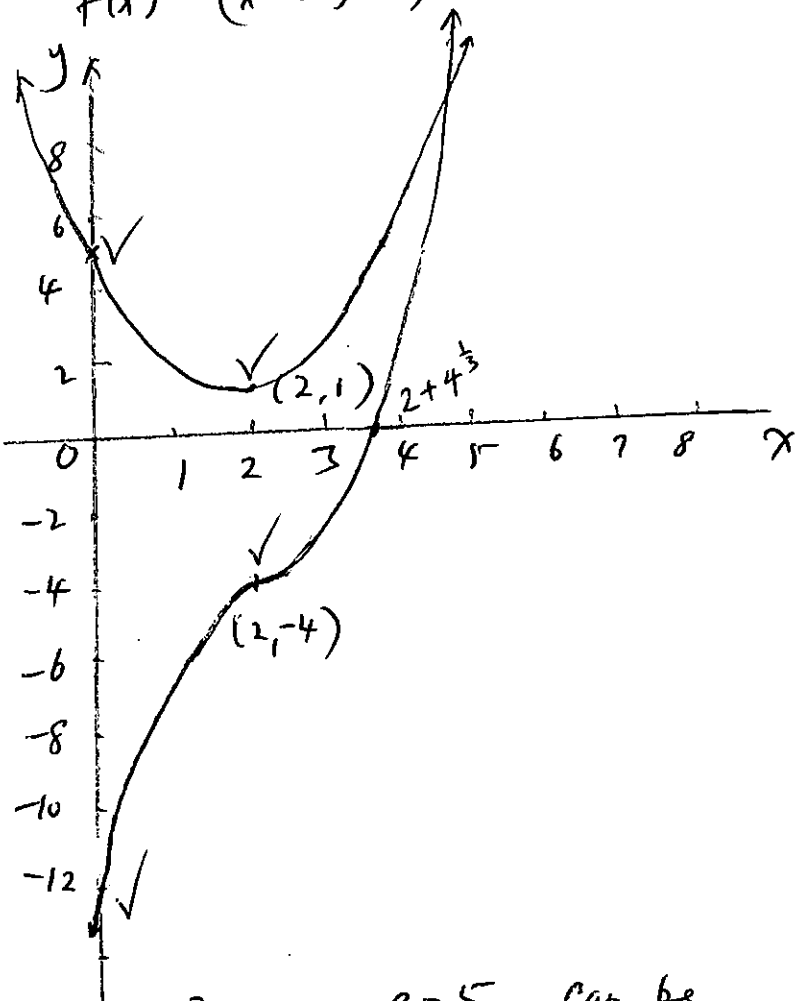
Comparing coeff

x^2 $\quad -6 = -3A \quad (A = 2)$ 1m

Constant $\quad -A^3 - 4 = B \quad (B = -12)$ 1m

b) $g(x) = x^2 - 4 + 5$

$f(x) = (x-2)^3 - 4$



Shape of parabola with vertex (2,1) 1m

y-intercept ($y=5$) 1m

Shape of cubic poly with change of concavity at (2,-4) 1m

and y-intercept $y=-12$ 1m

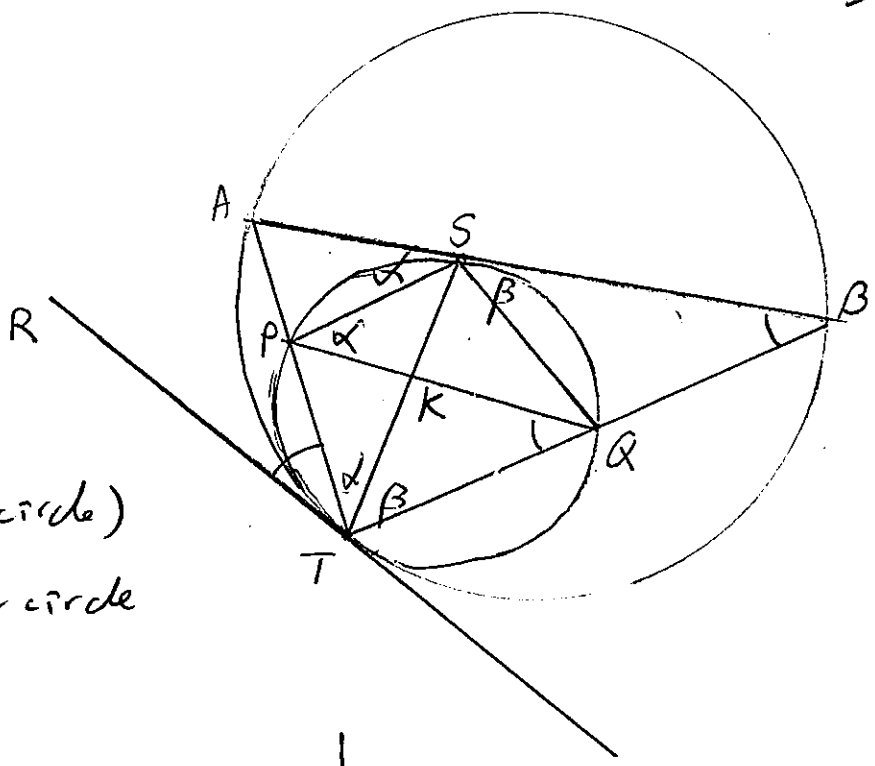
c) $x^3 - 7x^2 + 16x + B = 5$ can be written as

$\underbrace{x^3 - 6x^2 + 12x + B}_{f(x)} = x^2 - 4x + 5$

$= g(x)$

From the graph above, $f(x)$ & $g(x)$ only intersect once $\therefore$ only 1 real root

a) Prove PQ ∥ AB



∠ATR = ∠PQT

(angle between chord and tangent equals angle in alternate segment in the smaller circle)

Similarly in the bigger circle

1m ∠ATR = ∠ABT

∴ ∠PQT = ∠ABT

1m ∴ PQ ∥ AB (corresponding angles equal)

must use the common tangent RT & ∠ART

b) Prove ST bisects ∠ATB

∠ASP = ∠ATS (angle between chord and tangent equals angle in alternate segment)

1m = α

similarly ∠BST = ∠BTS = β

1m ∠ASP = ∠SPQ (alternate angles PQ ∥ AB)

1m ∠SPQ = ∠BTS (angles at circumference standing on the same arc)

∴ α = β

∴ ∠ATS = ∠BTS

1 mark for each different reasons.

Note This circle geometry is extremely hard to mark. Students keep changing the names of the angles and different attempts too. A lot of very bad setting out & hard to follow through.