

Write your name here									
Surname	Other names								
Centre Number	Candidate Number								
Pearson Edexcel Level 1/Level 2 GCSE (9 - 1)	<table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> <td style="width: 12.5%;"></td> </tr> </table>								
<h1 style="margin: 0;">Mathematics</h1> <h2 style="margin: 0;">Paper 1 (Non-Calculator)</h2>									
Higher Tier									
Specimen Papers Set 2	Paper Reference								
Time: 1 hour 30 minutes	1MA1/1H								
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.	Total Marks <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>								

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

S50156A

©2015 Pearson Education Ltd.



Turn over ▶

PEARSON

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Factorise $y^2 + 27y$

$$\frac{y(y + 27)}{(1)}$$

(b) Simplify $(t^3)^2$

$$\frac{t^6}{(1)}$$

(c) Simplify $\frac{w^9}{w^4}$

$$\frac{w^5}{(1)}$$

(Total for Question 1 is 3 marks)

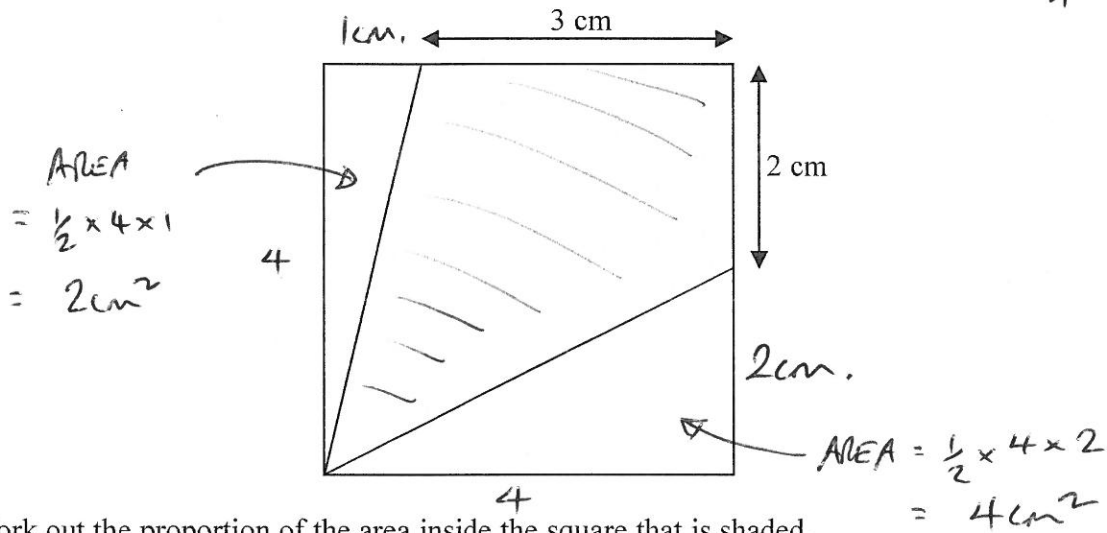
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

2 The diagram shows a square with perimeter 16 cm.

$\therefore \text{SIDE LENGTH} = \frac{16}{4} = 4 \text{ cm}$



Work out the proportion of the area inside the square that is shaded.

AREA OF SQUARE = $4 \times 4 = 16$

$\therefore \text{SHADED AREA} = 16 - 4 - 2 = 10 \text{ cm}^2$

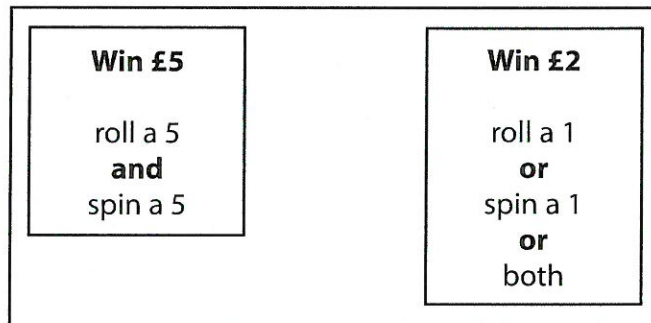
$\therefore \text{PROPORTION SHADED} = \frac{10}{16} = \frac{5}{8}$

$\frac{5}{8}$

(Total for Question 2 is 5 marks)

- 3 David has designed a game.
He uses a fair 6-sided dice and a fair 5-sided spinner.
The dice is numbered 1 to 6
The spinner is numbered 1 to 5

Each player rolls the dice once and spins the spinner once.
A player can win £5 or win £2



David expects 30 people will play his game.
Each person will pay David £1 to play the game.

- (a) Work out how much profit David can expect to make.

$6 \times 5 = 30$ POSSIBLE OUTCOMES \therefore ROLL A 5 + SPIN A 5 IS $\frac{1}{30}$.
 \therefore PROBABILITY OF WINNING £5 IS $\frac{1}{30}$.

ROLL A 1 OR SPIN A 1 = $\frac{10}{30}$ \therefore PROBABILITY OF WINNING £2 = $\frac{10}{30}$

30 PEOPLE SO IN 30 GAMES, PRIZE MONEY = $1 \times £5 + 10 \times £2$
 $= 5 + 20 = £25$

\therefore PROFIT = $30 - 25 = £5$

£5 ~~5~~
(4)

- (b) Give a reason why David's actual profit may be different to the profit he expects to make.

ACTUAL RESULTS MAY BE DIFFERENT TO THEORETICAL RESULTS
BECAUSE PROBABILITY IS HOW LIKELY IT IS, NOT CERTAINTY.

(1)

(Total for Question 3 is 5 marks)

- 4 Triangle ABC has perimeter 20 cm.

$$AB = 7 \text{ cm.}$$

$$BC = 4 \text{ cm.}$$

By calculation, deduce whether triangle ABC is a right-angled triangle.

$$AC = 20 - 7 - 4 = 9$$

$$\text{RIGHT-ANGLED IF } 4^2 + 7^2 = 9^2$$

$$\therefore 16 + 49 = 81$$

$$\text{BUT } 16 + 49 = 65 \neq 81$$

$\therefore ABC$ IS NOT RIGHT-ANGLED.

(Total for Question 4 is 4 marks)

- 5 One sheet of A3 card has area $\frac{1}{8} \text{ m}^2$.

The card has a mass of 160 g per m^2 .

Work out the total mass of 25 sheets of A3 card.

$$160 \text{ g/m}^2 \therefore \frac{1}{8} \times 160 = 20 \text{ g/SHEET}$$

$$\therefore 25 \text{ SHEETS IS } 25 \times 20 = 500 \text{ g.}$$

500g

(Total for Question 5 is 4 marks)

6 (a) Work out $2\frac{1}{4} \times 3\frac{1}{3}$

Give your answer as a mixed number in its simplest form.

$$\overset{3}{\cancel{2}} \frac{1}{\cancel{4}} \times \frac{\overset{5}{\cancel{7}}}{\cancel{3}} = \frac{15}{2} = 7\frac{1}{2}$$

$$7\frac{1}{2}$$

(3)

- (b) Write the numbers 3, 4, 5 and 6 in the boxes to give the greatest possible total.
You may write each number only once.

$$\boxed{5} \frac{1}{\boxed{4}} + \boxed{6} \frac{2}{\boxed{3}}$$

(1)

(Total for Question 6 is 4 marks)

7 A shop has a sale.

Microwave ovens

$\frac{1}{3}$ off normal price

Combination ovens

40% off normal price

A microwave oven has a sale price of £90
A combination oven has a sale price of £84

Which of these ovens has the greater normal price?
You must show all your working.

$$\text{MICROWAVE : SALE PRICE} = \frac{2}{3} \times \text{NORMAL PRICE}$$

$$\therefore \text{NORMAL PRICE} = \frac{3}{2} \times 90 = \pounds 135.$$

$$\text{COMBINATION : SALE PRICE} = 60\% \text{ OF NORMAL PRICE}$$

$$\therefore \text{NORMAL PRICE} = \frac{84}{0.6} = \frac{840}{6} = \pounds 140$$

COMBINATION OVEN HAS GREATER NORMAL PRICE.

(Total for Question 7 is 4 marks)

8 Work out an estimate for $\sqrt{4.98 + 2.16 \times 7.35}$

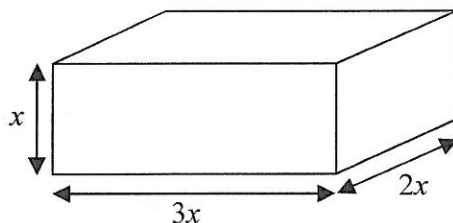
$$\approx \sqrt{5 + 2 \times 7} = \sqrt{19} \approx 4.5$$

4.5

(4 - 4.5)

(Total for Question 8 is 3 marks)

- 9 Here is a cuboid.



All measurements are in centimetres.

x is an integer.

The total volume of the cuboid is less than 900 cm^3

Show that $x \leq 5$

$$x \times 3x \times 2x = 6x^3 < 900$$

$$\therefore x^3 < \frac{900}{6}$$

$$\therefore x^3 < 150.$$

$$5^3 = 125$$

$$6^3 = 216.$$

x IS AN INTEGER

$$\therefore x^3 \leq 125$$

$$\therefore x \leq 5.$$

(Total for Question 9 is 3 marks)

- 10 y is inversely proportional to x
When $x = 1.5$, $y = 36$

Find the value of y when $x = 6$

$$y \propto \frac{1}{x}$$

$$x = 6$$

$$y = \frac{54}{6} = 9$$

$$\therefore y = \frac{k}{x}$$

$$36 = \frac{k}{1.5}$$

$$\therefore k = 1.5 \times 36$$

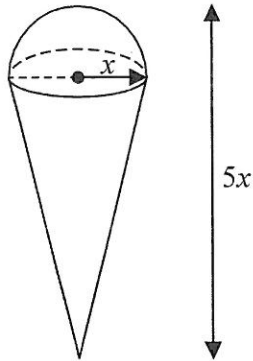
$$\therefore k = 54$$

$$\therefore y = \frac{54}{x}$$

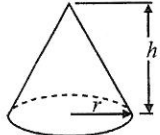
9

(Total for Question 10 is 3 marks)

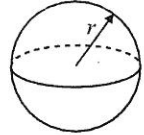
11 A solid is made by putting a hemisphere on top of a cone.



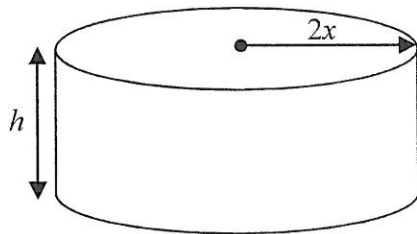
Volume of cone = $\frac{1}{3}\pi r^2 h$



Volume of sphere = $\frac{4}{3}\pi r^3$



The total height of the solid is $5x$
 The radius of the base of the cone is x
 The radius of the hemisphere is x



A cylinder has the same volume as the solid.
 The cylinder has radius $2x$ and height h
 All measurements are in centimetres.

Find a formula for h in terms of x
 Give your answer in its simplest form.

∴ HEIGHT OF CONE = $5x - x = 4x$

∴ VOLUME OF CONE = $\frac{1}{3}\pi x^2 \cdot 4x$
 $= \frac{4}{3}\pi x^3$

VOLUME OF HEMISPHERE = $\frac{1}{2} \times \frac{4}{3}\pi x^3$
 $= \frac{2}{3}\pi x^3$

∴ TOTAL VOLUME = $\frac{4}{3}\pi x^3 + \frac{2}{3}\pi x^3$
 $= 2\pi x^3$

VOLUME OF CYLINDER

= $\pi (2x)^2 h$

= $4\pi x^2 h$

∴ $4\pi x^2 h = 2\pi x^3$

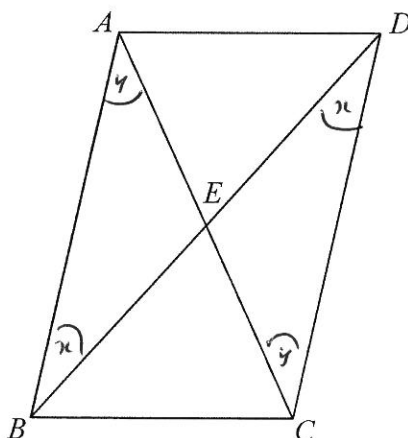
∴ $2h = x$

∴ $h = \frac{x}{2}$

$h = \frac{x}{2}$

(Total for Question 11 is 5 marks)

12 $ABCD$ is a parallelogram.



E is the point where the diagonals AC and BD meet.

Prove that triangle ABE is congruent to triangle CDE .

PARALLELOGRAM $\therefore AB = CD$

$\hat{ABE} = \hat{EDC}$ AND $\hat{BAE} = \hat{ECD}$ BY ALTERNATE ANGLES

\therefore CONGRUENT BY ASA.

(Total for Question 12 is 3 marks)

- 13 Mr Brown gives his class a test.
 The 10 girls in the class get a mean mark of 70%
 The 15 boys in the class get a mean mark of 80%

Nick says that because the mean of 70 and 80 is 75 then the mean mark for the whole class in the test is 75%

Nick is not correct.

Is the correct mean mark less than or greater than 75%?
 You must justify your answer.

(MORE BOYS \therefore AVERAGE OVER BOYS & GIRLS WILL BE NEARER TO 80% THAN 70% i.e. GREATER THAN 75%)

$$\begin{array}{l} \text{TOTAL OF GIRLS MARKS} = 10 \times 70 = 700. \\ \text{TOTAL OF BOYS MARKS} = 15 \times 80 = 1200. \end{array} \quad \left. \vphantom{\begin{array}{l} \text{TOTAL OF GIRLS MARKS} \\ \text{TOTAL OF BOYS MARKS} \end{array}} \right\} \therefore \text{TOTAL MARKS} = 700 + 1200 = 1900.$$

$$\therefore \text{MEAN FOR CLASS} = \frac{1900}{25} = 76\%, \text{ i.e. GREATER THAN } 75\%.$$

(Total for Question 13 is 2 marks)

- 14 Show that $\frac{(4 - \sqrt{3})(4 + \sqrt{3})}{\sqrt{13}}$ simplifies to $\sqrt{13}$

$$(4 - \sqrt{3})(4 + \sqrt{3}) = 16 + 4\sqrt{3} - 4\sqrt{3} - \sqrt{9} = 16 - 3 = 13.$$

$$\frac{13}{\sqrt{13}} \times \frac{\sqrt{13}}{\sqrt{13}} = \frac{13\sqrt{13}}{13} = \sqrt{13}.$$

(Total for Question 14 is 2 marks)

15 (a) Find the value of $\sqrt[3]{8 \times 10^6}$

$$\frac{2 \times 10^2}{(or\ 200)} \quad (1)$$

(b) Find the value of $144^{\frac{1}{2}} \times 64^{\frac{1}{3}}$

$$12 \times \frac{4}{4}$$

$$\frac{3}{(2)}$$

(c) Solve $3^{2x} = \frac{1}{81}$

$$3^4 = 81$$

$$\therefore 3^{-4} = \frac{1}{81}$$

$$\therefore 2x = -4$$

$$\therefore x = -2$$

$$x = \frac{-2}{(2)}$$

(Total for Question 15 is 5 marks)

16 The probability that Sanay is late for school tomorrow is 0.05
The probability that Jaden is late for school tomorrow is 0.15

Alfie says that the probability that Sanay and Jaden will both be late for school tomorrow is 0.0075 because $0.05 \times 0.15 = 0.0075$

What assumption has Alfie made?

ASSUMES THE PROBABILITIES ARE INDEPENDENT

(Total for Question 16 is 1 mark)

$$a = 1 \quad b = -6 \quad c = -8$$

17 Solve $x^2 - 6x - 8 = 0$

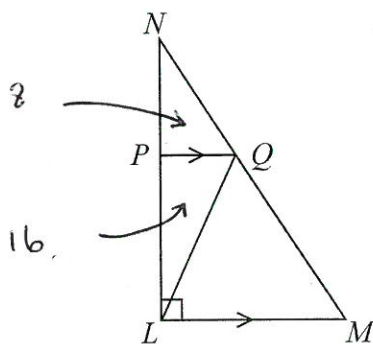
Write your answer in the form $a \pm \sqrt{b}$ where a and b are integers.

$$\begin{aligned}
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{6 \pm \sqrt{(-6)^2 + 4 \times 1 \times 8}}{2} \\
 &= \frac{6 \pm \sqrt{36 + 32}}{2} = \frac{6 \pm \sqrt{68}}{2} & \sqrt{68} &= \sqrt{4 \times 17} = 2\sqrt{17} \\
 &= \frac{6 \pm 2\sqrt{17}}{2} \\
 &= 3 \pm \sqrt{17}
 \end{aligned}$$

3 ± √17

(Total for Question 17 is 3 marks)

18 LMN is a right-angled triangle.



Angle $NLM = 90^\circ$
 PQ is parallel to LM .

The area of triangle PNQ is 8 cm^2
 The area of triangle LPQ is 16 cm^2

Work out the area of triangle LQM .

TRIANGLE PNQ IS SIMILAR
 TO TRIANGLE LNM

$$\text{AREA OF } PNQ = \frac{1}{2} \times PQ \times PN = 8$$

$$\text{AREA OF } PLQ = \frac{1}{2} \times PQ \times PL = 16$$

$$\therefore PL = 2 \times PN$$

$$\therefore LN = PL + PN = 3PN$$

$$\therefore LM = 3PQ$$

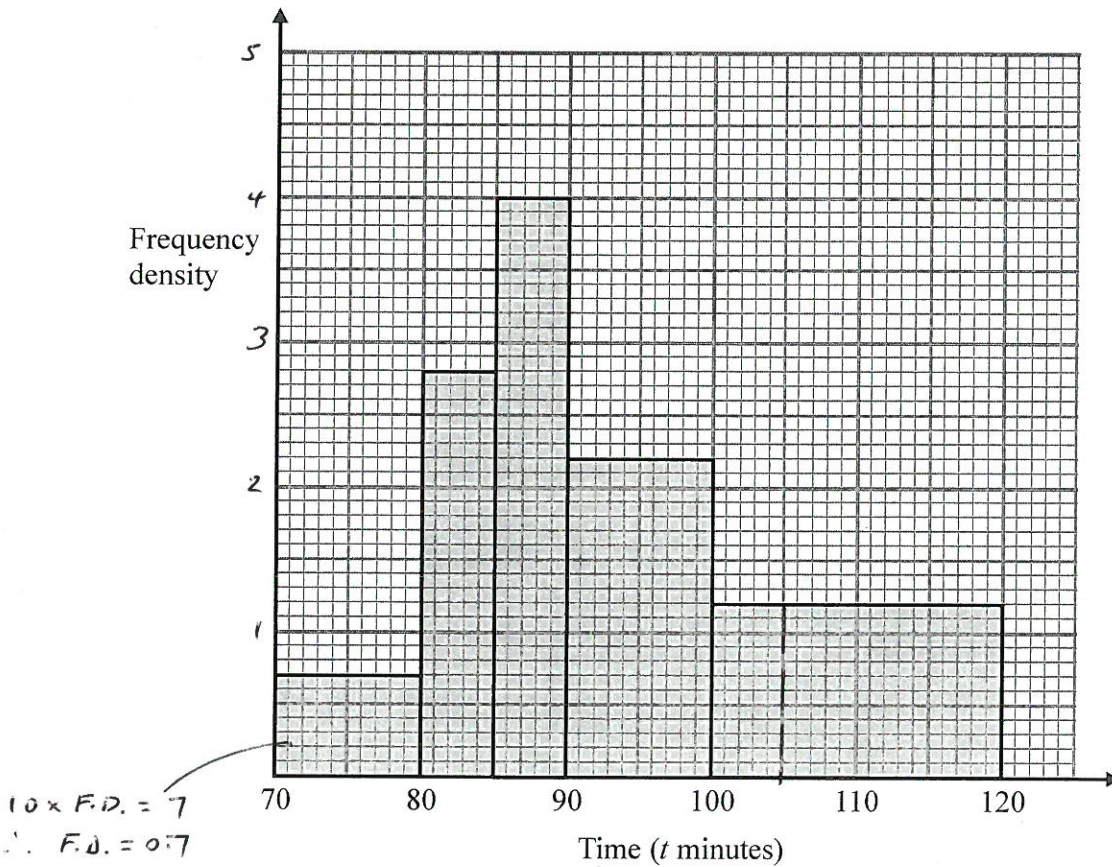
$$\begin{aligned}
 \therefore \text{AREA OF } LNM &= \frac{1}{2} \times LM \times LN \\
 &= \frac{1}{2} \times 3PQ \times 3PN \\
 &= 9 \times 8 = 72
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{AREA OF } LQM &= 72 - 16 - 8 \\
 &= 72 - 24 \\
 &= 48
 \end{aligned}$$

48 cm^2

(Total for Question 18 is 4 marks)

19 The histogram shows information about the time taken by cyclists to finish a cycle race.



7 cyclists took 80 minutes or less to finish the race.

- (i) Work out an estimate for the number of cyclists who took more than 105 minutes to finish the race.

$$1.2 \times 15 = 18$$

18

- (ii) Explain why your answer to part (i) is only an estimate.

TIMES ARE IN INTERVALS SO 100-120 MINUTES IS 24 CYCLISTS AND WE ARE ASSUMING THEY ARE EQUALLY DISTRIBUTED

(Total for Question 19 is 4 marks)

20 Show that $\frac{3x+6}{x^2-3x-10} \div \frac{x+5}{x^3-25x}$ simplifies to ax where a is an integer.

$$\begin{aligned} & \frac{3x+6}{(x-5)(x+2)} \times \frac{x(x^2-25)}{x+5} \\ = & \frac{3x+6}{\cancel{(x-5)}(x+2)} \times \frac{x\cancel{(x+5)}\cancel{(x-5)}}{x+5} \\ = & \frac{x(3x+6)}{x+2} = \frac{3x(x+2)}{\cancel{x+2}} = 3x. \end{aligned}$$

(Total for Question 20 is 4 marks)

21 Solve the inequality $x^2 > 3(x+6)$

$$\begin{aligned} & x^2 > 3x+18 \\ \therefore & x^2 - 3x - 18 > 0 \\ \therefore & (x-6)(x+3) > 0 \\ \therefore & x-6 > 0 \text{ AND } x+3 > 0 \quad \text{OR} \quad x-6 < 0 \text{ AND } x+3 < 0 \\ \therefore & x > 6 \text{ AND } x > -3 \quad \text{OR} \quad x < 6 \text{ AND } x < -3 \\ \therefore & x > 6 \quad \text{OR} \quad x < -3 \end{aligned}$$

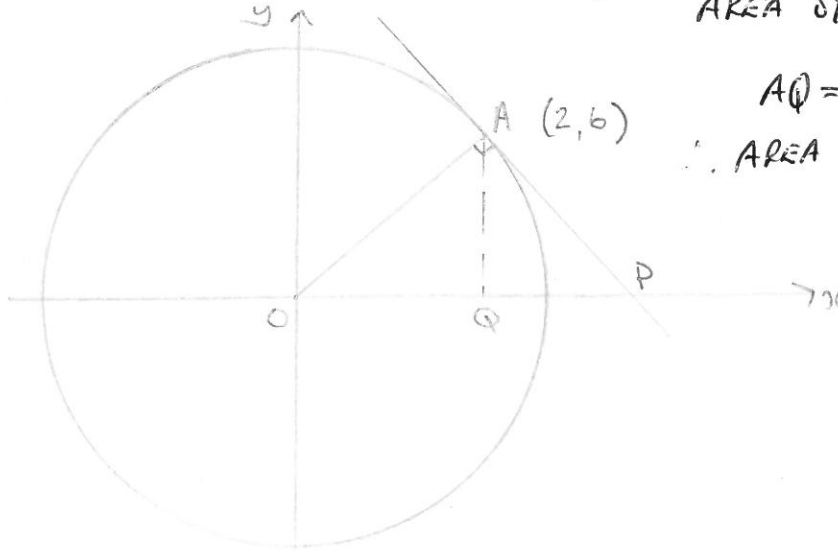
$$x > 6 \quad x < -3$$

(Total for Question 21 is 4 marks)

- 22 The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point A .
 A is the point $(2, 6)$.

The line l crosses the x -axis at the point P .

Work out the area of triangle OAP .



$$\text{AREA OF } OAP = \frac{1}{2} \times OP \times AQ$$

$$AQ = 6$$

$$\therefore \text{AREA OF } OAP = \frac{1}{2} \times OP \times 6 \\ = 3OP$$

$$\text{GRADIENT OF } OA = \frac{6}{2} = 3$$

$$\therefore \text{GRADIENT OF } AP = -\frac{1}{3}$$

$$\therefore \text{EQUATION OF } AP \text{ IS } y = -\frac{1}{3}x + c$$

$$\text{AT } A : 6 = -\frac{1}{3} \times 2 + c$$

$$\therefore c = 6 + \frac{2}{3} = \frac{18}{3} + \frac{2}{3} = \frac{20}{3}$$

$$\therefore y = -\frac{1}{3}x + \frac{20}{3}$$

$$\text{AT } P, y = 0 \therefore 0 = -\frac{1}{3}x + \frac{20}{3}$$

$$\therefore \frac{x}{3} = \frac{20}{3}$$

$$\therefore x = 20$$

$$\therefore OP = 20$$

60

$$\therefore \text{AREA OF } OAP = 3 \times 20 = 60$$

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS