

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education  
Higher Tier

# Mathematics (Linear) B

4365/2H

Paper 2 Calculator

Practice Paper 2012 Specification (Set 3)

H

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>mathematical instruments</li> <li>a calculator.</li> </ul>	
---	--

### Time allowed

- 2 hours

### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 105.
- The quality of your written communication is specifically assessed in Questions 16, 18 and 22. These questions are indicated with an asterisk (\*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer booklet.

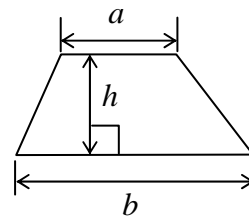
### Advice

- In all calculations, show clearly how you work out your answer.

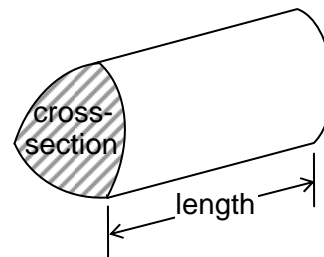
For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
24	
<b>TOTAL</b>	

## Formulae Sheet: Higher Tier

$$\text{Area of trapezium} = \frac{1}{2}(a + b)h$$

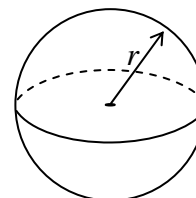


$$\text{Volume of prism} = \text{area of cross-section} \times \text{length}$$



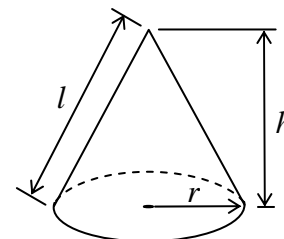
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of sphere} = 4\pi r^2$$



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

$$\text{Curved surface area of cone} = \pi r l$$

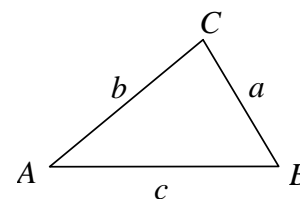


In any triangle  $ABC$

$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

$$\text{Sine rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$



### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$ , where  $a \neq 0$ , are given by

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

Answer **all** questions in the spaces provided.

- 1 Vicki goes on a Spa weekend.

Pamper yourself  
with a Spa weekend  
Normal cost £360  
**Offer** 30% off

She uses a voucher for £200

How much more does she pay?

.....

.....

.....

.....

Answer £ ..... (4 marks)

**Turn over for the next question**

**2** Here are four expressions.

$x - 1$

$4x$

$2x + 4$

$x^2 + 1$

**2 (a)** Show that when  $x = 1$  the median has the same value as the mean.

.....

.....

.....

.....

.....

.....

(5 marks)

**2 (b)** Here are the expressions again.

$x - 1$

$4x$

$2x + 4$

$x^2 + 1$

Work out the value of  $x$  if the mode is 10.

.....

.....

.....

.....

Answer ..... (3 marks)

**3**  $3a + b = 2$

Work out **two** possible pairs of values for  $a$  and  $b$ .

.....

.....

.....

.....

$a = \dots\dots\dots, b = \dots\dots\dots$

$a = \dots\dots\dots, b = \dots\dots\dots$  (3 marks)

**4** The table shows the probabilities of a team winning, losing or drawing a match.

	<b>Win</b>	<b>Lose</b>	<b>Draw</b>
<b>Probability</b>	$p$	$2p$	0.1

Work out  $p$ , the probability of winning the match.

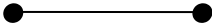
.....

.....

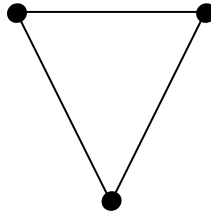
.....

Answer ..... (3 marks)

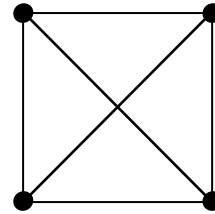
5 Dots are joined by straight lines to make a sequence of patterns.



Pattern 1

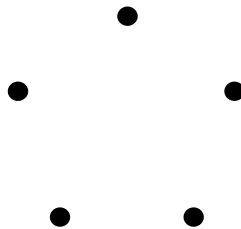


Pattern 2



Pattern 3

5 (a) Complete Pattern 4.



(1 mark)

5 (b) Let  $L$  be the number of lines and  $d$  the number of dots.

One of these formulae works for all patterns in the sequence.

Formula 1  $L = 2d - 3$

Formula 2  $L = \frac{d(d + 1)}{2}$

Formula 3  $L = \frac{d(d - 1)}{2}$

Which one is it?

You **must** show your working.

.....

.....

.....

.....

.....

Answer ..... (3 marks)

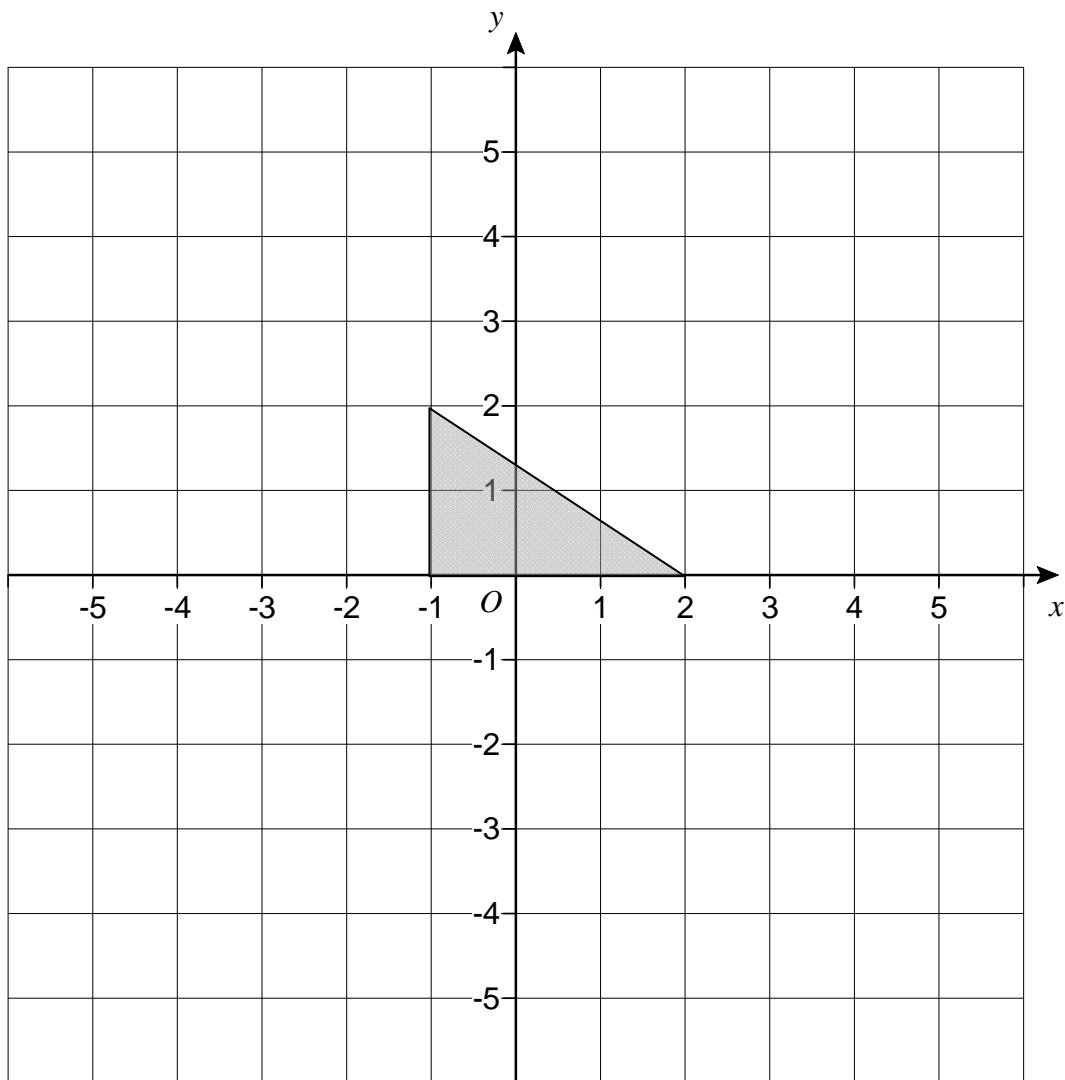
5 (c) Use the correct formula to work out  $L$ , when  $d = 10$

.....

.....

Answer ..... (2 marks)

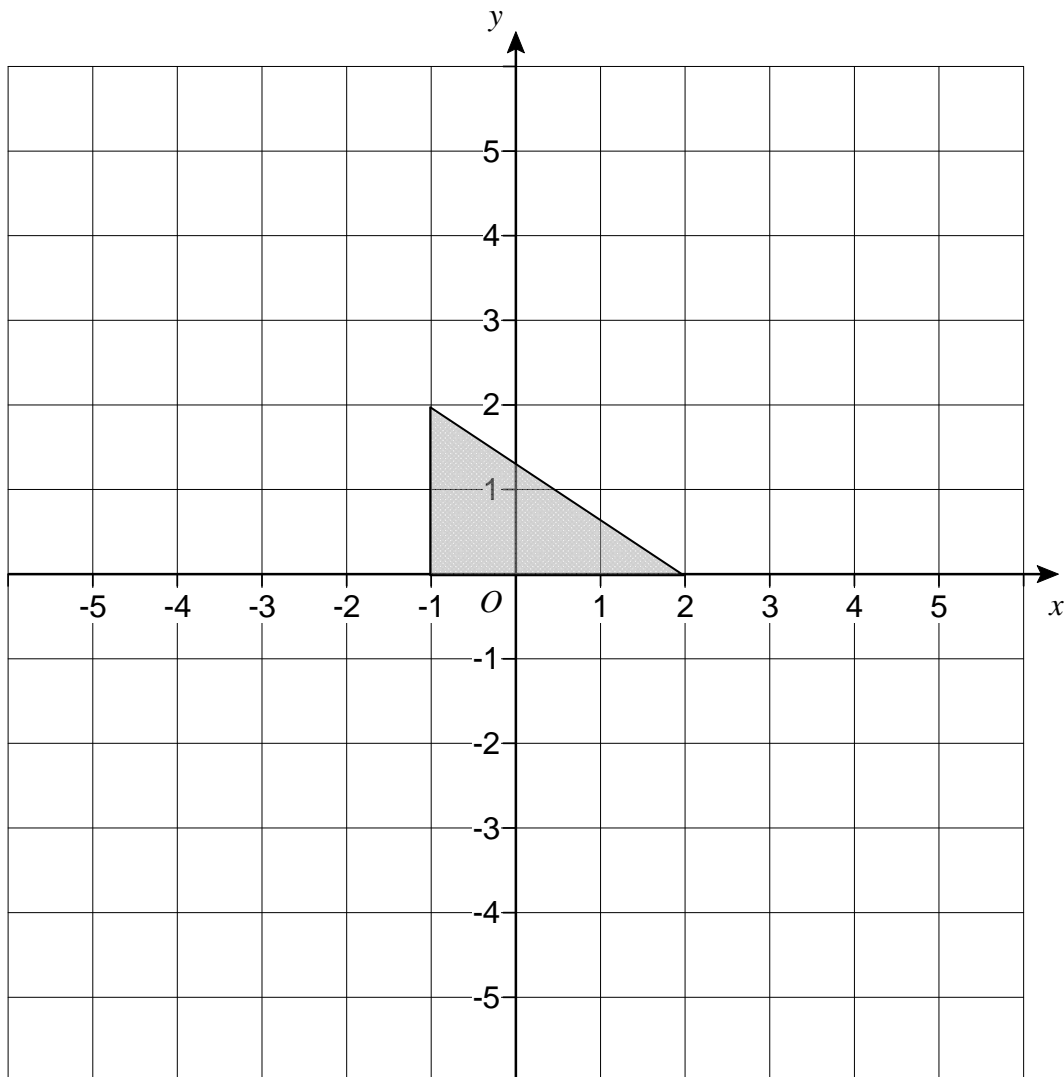
6 (a) Reflect the triangle in the line  $y = 2$



(2 marks)



6 (b) Translate the triangle by the vector  $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$



(2 marks)

Turn over for the next question

- 7 (a)** A plane flies 3800 km from London to Amman.  
The average speed is 800 km/h.  
It leaves London at 0900.  
What time does it arrive in Amman?

.....  
.....  
.....

Answer ..... (4 marks)

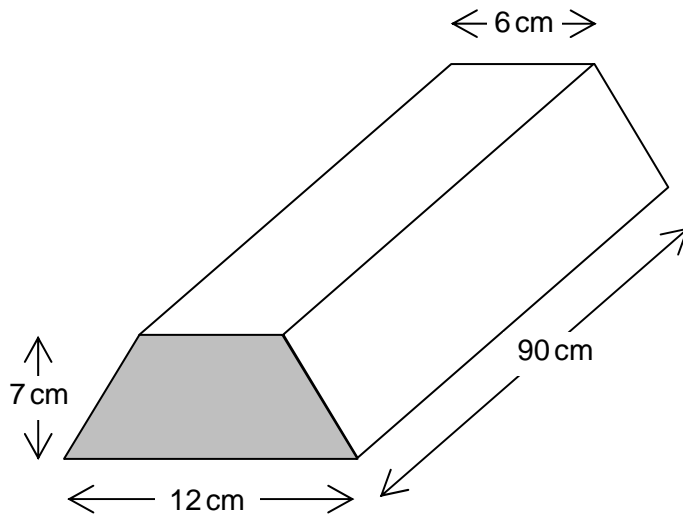
- 7 (b)** Change 800 km/h to metres per second (m/s).

.....  
.....  
.....

Answer .....m/s (3 marks)

8 The cross-section of a building block is a trapezium.

Not drawn  
accurately



8 (a) Calculate the volume of the block.

.....

.....

.....

.....

Answer .....  $\text{cm}^3$  (3 marks)

8 (b) The block is made of concrete.  
One cubic centimetre of concrete weighs 2.3 grams.  
Calculate how much the building block weighs.  
Give your answer to the nearest kilogram.

.....

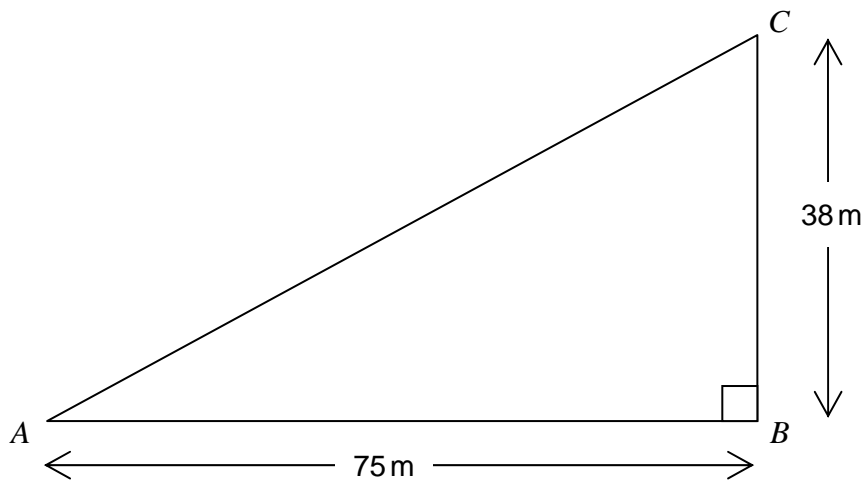
.....

.....

.....

Answer ..... kg (3 marks)

9

 $ABC$  is a triangular field.Not drawn  
accurately

A fence is to be built from  $A$  to  $C$ .  
The fence costs £12.50 per metre.

Work out the cost of the fence.

.....

.....

.....

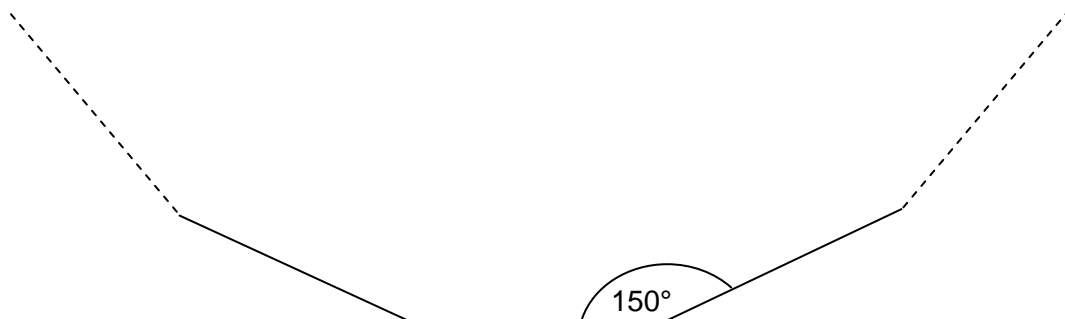
.....

.....

.....

Answer £ ..... (5 marks)

**10** The interior angle of a regular polygon is  $150^\circ$ .



**10 (a)** Write down the size of the exterior angle.

Answer .....degrees (1 mark)

**10 (b)** Work out the number of sides of the polygon.

.....  
.....

Answer ..... (2 marks)

- 11** Two ordinary, fair six-sided dice are rolled together.  
The numbers are added to get the score.

The two dice are rolled 300 times.

How many times would you expect to score 11 or more?

.....

.....

.....

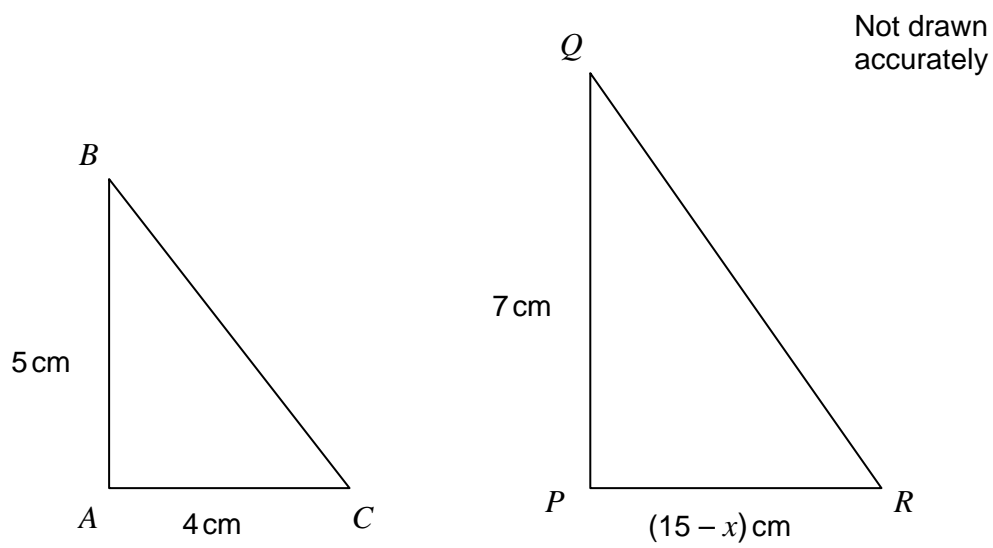
.....

.....

.....

Answer ..... (4 marks)

- 12  $ABC$  and  $PQR$  are similar triangles.



Work out the value of  $x$ .

.....

.....

.....

.....

.....

Answer ..... cm (5 marks)

Turn over for the next question

**13** 30 students take a test.

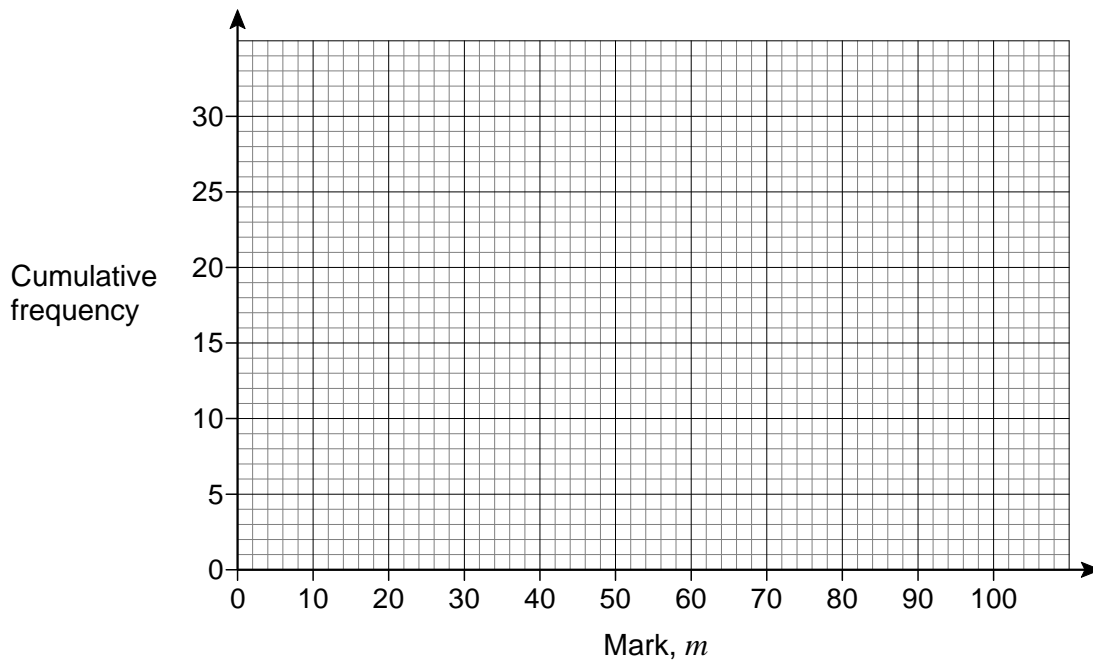
Mark, $m$	Frequency	Cumulative Frequency
$0 < m \leq 20$	1	
$20 < m \leq 40$	3	
$40 < m \leq 60$	6	
$60 < m \leq 80$	11	
$80 < m \leq 100$	9	

**13 (a)** Complete the cumulative frequency column in the table.

(1 mark)

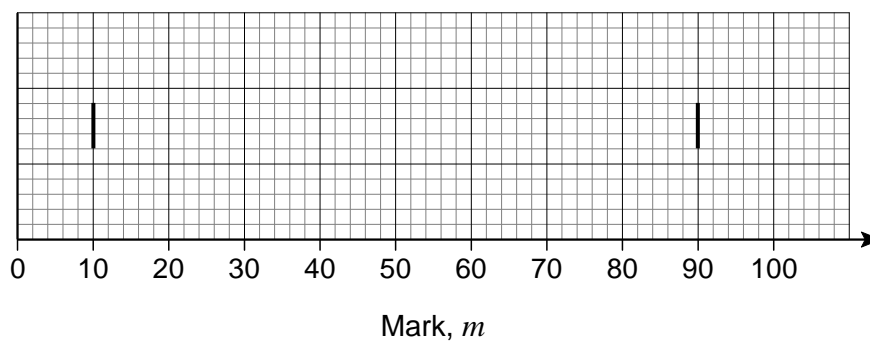


**13 (b)** Draw a cumulative frequency diagram for the marks.



(3 marks)

**13 (c)** Draw a box plot for the marks.  
The lowest and highest marks are plotted for you.



(4 marks)

- 14** Adam has £ 500  
Beth has £ 130

Adam gives some money to Beth.  
He now has twice as much money as Beth.

What percentage of his money did he give away?

.....

.....

.....

.....

.....

Answer ..... % (5 marks)

- 15** Solve the quadratic equation  $x^2 - 25 = 0$

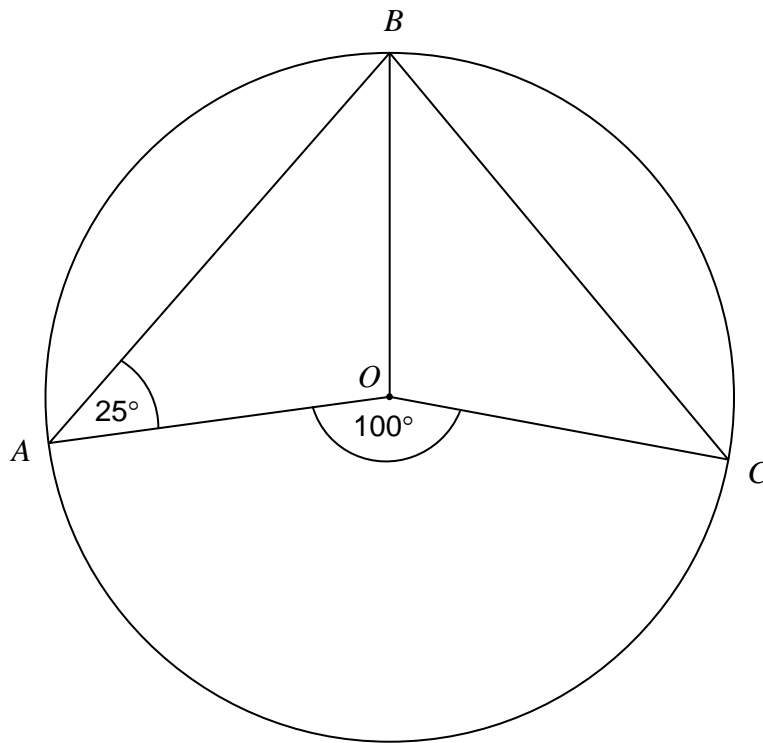
.....

.....

.....

Answer ..... and ..... (2 marks)

\*16  $O$  is the centre of the circle.



Not drawn  
accurately

Prove that triangles  $AOB$  and  $COB$  are congruent.

.....

.....

.....

.....

.....

.....

.....

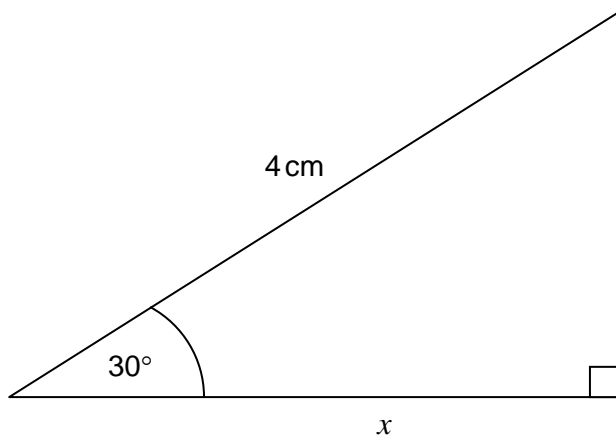
.....

.....

(6 marks)

Turn over ►

17

Not drawn  
accuratelyWork out  $x$ .

.....

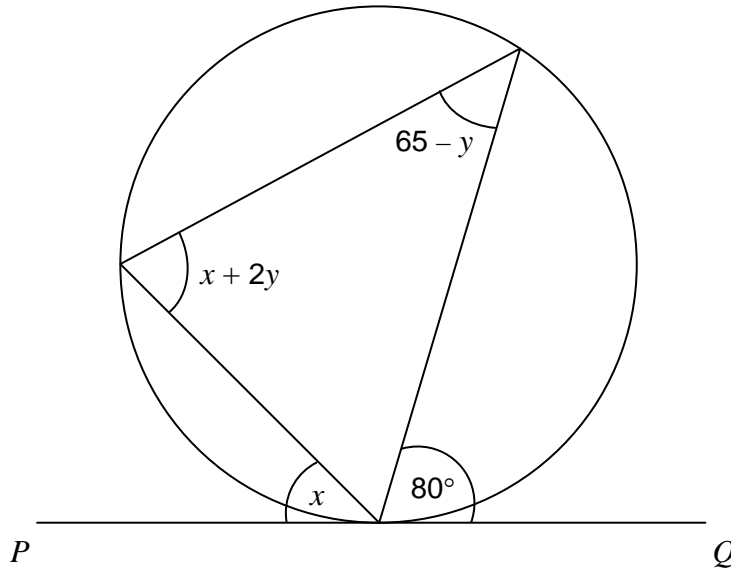
.....

.....

.....

Answer ..... cm (3 marks)

\*18  $PQ$  is a tangent to the circle.



Not drawn accurately

18 (a) Give a reason why  $x + 2y = 80$

..... (1 mark)

18 (b) Write down another equation in  $x$  and  $y$ .

Answer ..... (1 mark)

18 (c) Solve the equations to work out the values of  $x$  and  $y$ .

.....  
 .....  
 .....  
 .....

$x =$  .....  $y =$  .....

(3 marks)

8
---

Turn over ►

- 19** A bag contains 6 counters.  
The number of yellow counters in the bag is  $y$ .

A counter is chosen at random from the bag and **replaced**.

- 19 (a)** Show that the probability that the counter is **not** yellow is  $\frac{6 - y}{6}$

.....

.....

(1 mark)

- 19 (b)** Another counter is chosen at random from the bag and **replaced**.

The probability that both counters are **not** yellow is  $\frac{4}{9}$

Show that  $y^2 - 12y + 20 = 0$

.....

.....

.....

.....

.....

.....

(4 marks)

- 19 (c)** Hence show that the number of yellow counters in the bag is 2.

.....

.....

.....

(2 marks)

20 Simplify fully  $(2ab^3)^4$

.....  
.....

Answer ..... (2 marks)

21 Make  $c$  the subject of the formula  $f = \frac{d - c}{c - e}$

.....  
.....  
.....  
.....  
.....

Answer ..... (4 marks)

**Turn over for the next question**

**\*22**

A crane can lift a maximum load of 1400 kg to 2 significant figures.  
Containers weigh 80 kg to 1 significant figure.

Work out the **maximum** number of containers that the crane can lift **safely**.

.....

.....

.....

.....

.....

.....

.....

.....

Answer ..... (5 marks)

**END OF QUESTIONS**