



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

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**MATHEMATICS (SYLLABUS D)**

**4024/11**

Paper 1

**May/June 2013**

**2 hours**

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen.  
You may use a pencil for any diagrams or graphs.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.  
Omission of essential working will result in loss of marks.

**ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.**

The number of marks is given in brackets [ ] at the end of each question or part question.  
The total of the marks for this paper is 80.

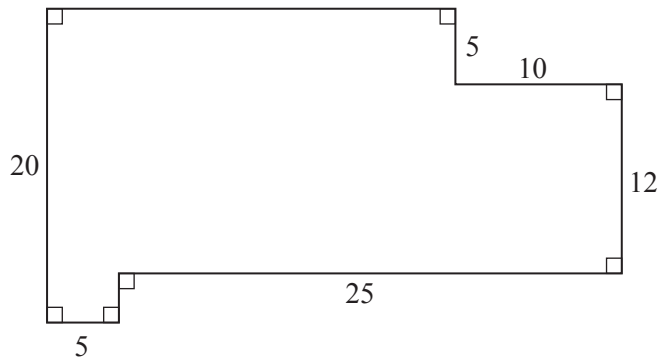
This document consists of **20** printed pages.



## ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

For  
Examiner's  
Use

- 1 In this shape all the lengths are in centimetres.



Work out

- (a) the perimeter,

Answer ..... cm [1]

- (b) the area.

Answer .....cm<sup>2</sup> [1]

- 2 Evaluate

- (a)  $0.3 \times 0.2$ ,

Answer ..... [1]

- (b)  $3.5 \div 0.07$ .

Answer ..... [1]

- 3 (a) A bag containing fruit has mass 3.813 kilograms.  
When the bag is empty its mass is 257 grams.

Find, in kilograms, the mass of the fruit.

Answer ..... kg [1]

- (b) The area of a shape is  $1.2 \text{ m}^2$ .

Convert this area to  $\text{cm}^2$ .

Answer .....  $\text{cm}^2$  [1]

- 4 (a) Complete the statement in the answer space using one of these symbols.

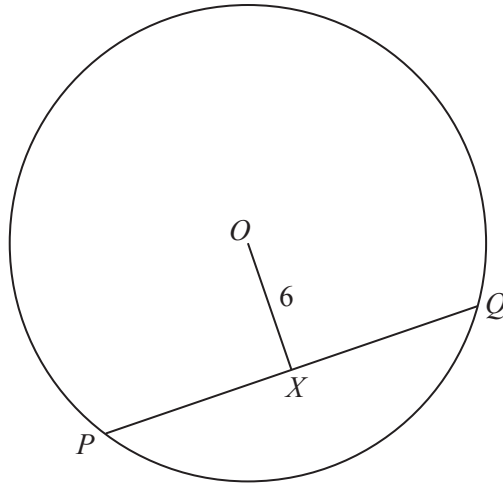
$\leq$	$<$	$=$	$>$	$\geq$
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Answer 0.65 .....  $\frac{27}{40}$  [1]

- (b) Express 7% as a decimal.

Answer ..... [1]

5



$PQ$  is a chord of the circle, centre  $O$ .  
 $X$  is the midpoint of  $PQ$ .  
 $OX = 6$  cm and the radius of the circle is 10 cm.

Calculate  $PQ$ .

Answer ..... cm [2]

---

- 6 A bag contains red, yellow and green sweets.  
 $\frac{2}{5}$  of the sweets are red and  $\frac{1}{4}$  of the sweets are yellow.

What fraction of the sweets are green?

For  
Examiner's  
Use

*Answer* ..... [2]

---

- 7 On a map the length of a lake is 4.5 centimetres.  
The actual length of the lake is 2.7 kilometres.

Write the scale of the map as a ratio in the form 1 :  $n$ .

*Answer* 1 : ..... [2]

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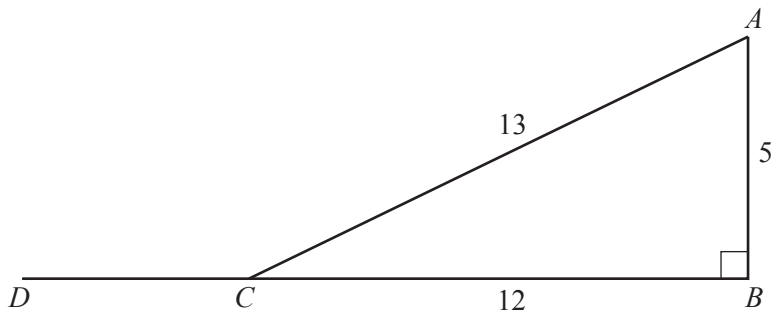
- 8 (a) One approximate solution of the equation  $\sin x^\circ = 0.53$  is  $x = 32$ .

Use this value of  $x$  to find the solution of the equation that lies between  $90^\circ$  and  $180^\circ$ .

For  
Examiner's  
Use

Answer ..... [1]

(b)



Triangle  $ABC$  is right-angled at  $B$  and  $BC$  is produced to  $D$ .  
 $AB = 5$  cm,  $BC = 12$  cm and  $AC = 13$  cm.

Write down the value of  $\cos \hat{ACD}$ .

Answer  $\cos \hat{ACD} = \dots\dots\dots$  [1]

---

9 Ahmed pays a total of \$81 for wood, paint and a hammer.

- (a) The amounts he pays for the wood, paint and hammer are in the ratio 4 : 3 : 2.

Calculate how much Ahmed pays for the hammer.

*Answer* \$ ..... [1]

- (b) When Ahmed paid \$81 he had received a 10% discount on the normal price.

Calculate the normal price.

*Answer* \$ ..... [2]

10  $b = m(a - c)$

- (a) Evaluate  $b$  when  $m = 5$ ,  $a = 8$  and  $c = -3$ .

*Answer*  $b =$  ..... [1]

- (b) Rearrange the formula to make  $c$  the subject.

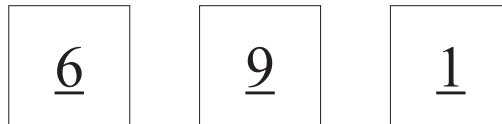
*Answer*  $c =$  ..... [2]

11 Choose a quadrilateral from the list to complete each statement.

**Kite    Parallelogram    Rectangle    Rhombus    Square    Trapezium**

- (a) A ..... has four equal sides and four angles of  $90^\circ$ . [1]
- (b) A ..... has just one pair of parallel sides. [1]
- (c) A ..... has just one pair of opposite angles equal and its diagonals bisect at  $90^\circ$ . [1]

12



The three cards above can be rearranged to make three-digit numbers, for example 916.

Arrange the three cards to make

- (a) the three-digit number that is closest to 650,

*Answer* ..... [1]

- (b) the three-digit number that is a multiple of 7,

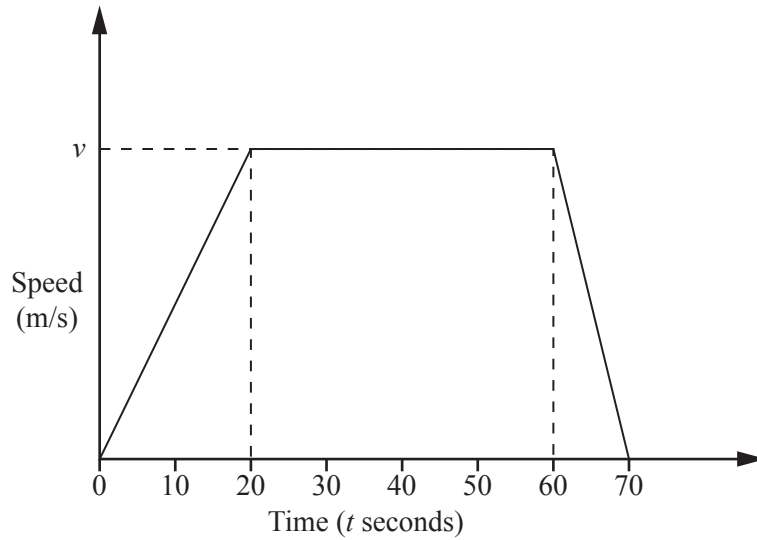
*Answer* ..... [1]

- (c) a three-digit number that is a square number.

*Answer* ..... [1]



13



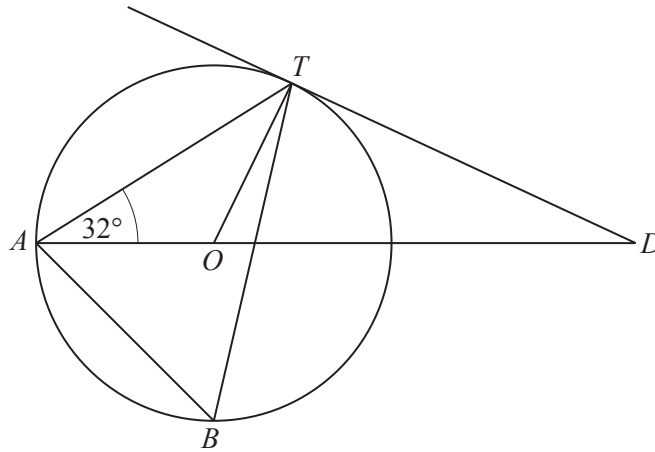
The diagram shows the speed-time graph for 70 seconds of a car's journey. After 20 seconds the car reaches a speed of  $v$  m/s. During the 70 seconds the car travels 1375 m.

(a) Calculate  $v$ .

Answer  $v = \dots\dots\dots$  [2]

(b) Calculate the acceleration of the car during the first 20 seconds.

Answer  $\dots\dots\dots$  m/s<sup>2</sup> [1]



$A$ ,  $B$  and  $T$  are points on a circle, centre  $O$ .  
 $AOD$  is a straight line and  $DT$  is a tangent to the circle at  $T$ .  
 $\hat{TAO} = 32^\circ$

Find

(a)  $\hat{ATO}$ ,

Answer  $\hat{ATO} = \dots\dots\dots [1]$

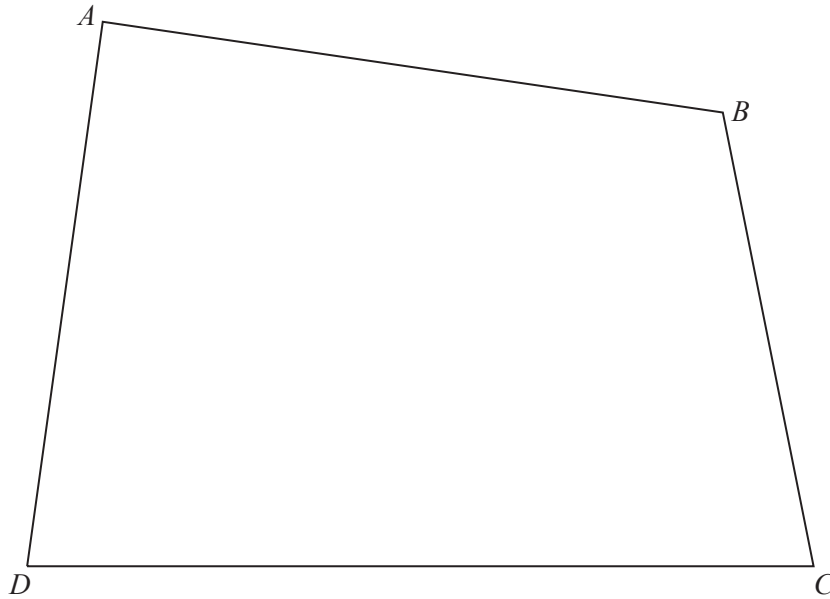
(b)  $\hat{TDO}$ ,

Answer  $\hat{TDO} = \dots\dots\dots [1]$

(c)  $\hat{ABT}$ .

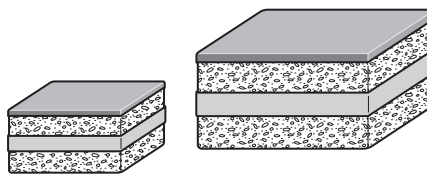
Answer  $\hat{ABT} = \dots\dots\dots [1]$

15

For  
Examiner's  
Use

- (a) Construct the locus of all points, **inside** the quadrilateral  $ABCD$ , which are
- (i) equidistant from  $DA$  and  $DC$ , [1]
  - (ii) 5 cm from  $B$ . [1]
- (b) On the diagram, shade the region **inside** the quadrilateral containing the points that are nearer to  $DA$  than  $DC$  **and** more than 5 cm from  $B$ . [1]
-

- 16 Maryam makes two geometrically similar cakes. The heights of the cakes are 6 cm and 9 cm.



For  
Examiner's  
Use

- (a) Maryam decorates each cake with a ribbon around the outside. The length of the ribbon for the larger cake is 66 cm.

Find the length of the ribbon for the smaller cake.

Answer ..... cm [1]

- (b) Maryam uses  $1600 \text{ m}^3$  of cake mixture to make the smaller cake.

Find the volume of cake mixture she uses to make the larger cake.

Answer .....  $\text{cm}^3$  [2]

17  $p = 2.4 \times 10^2$       $q = 6 \times 10^3$

Giving your answers in standard form, find

(a)  $p + q$ ,

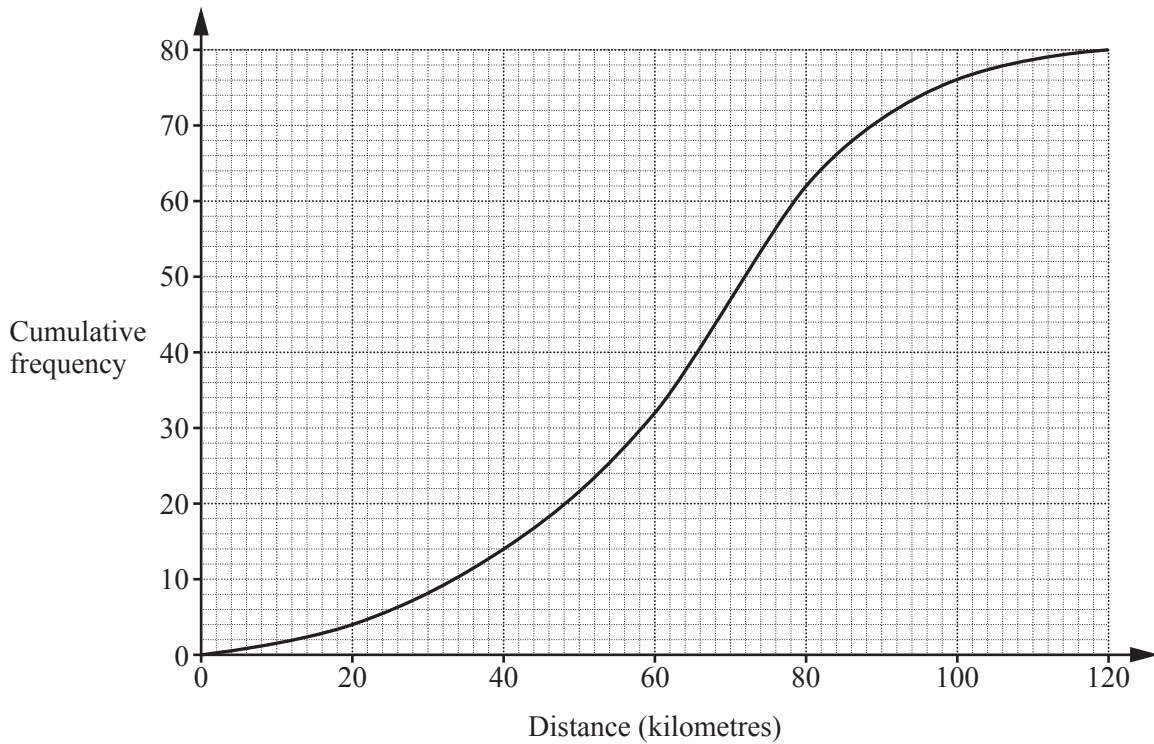
Answer ..... [1]

(b)  $2p \div q$ .

Answer ..... [2]

18 Eighty cyclists were each asked the distance (in kilometres) they cycled last week.

For  
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Use



The cumulative frequency diagram represents the results.

Use the graph to estimate

(a) the number of cyclists who cycled between 60 and 80 kilometres,

Answer ..... [1]

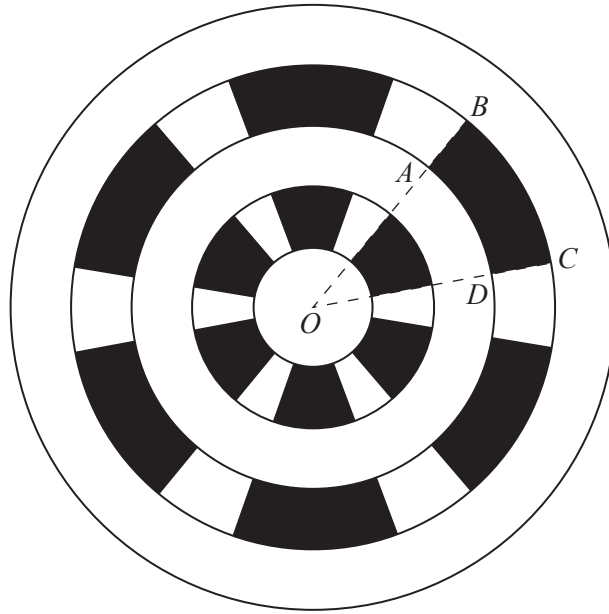
(b) the median distance cycled,

Answer ..... km [1]

(c) the interquartile range for the distance cycled.

Answer ..... km [2]

- 19 The diagram shows the metal cover for a circular drain.  
Water drains out through the shaded sections.



$O$  is the centre of circles with radii 1 cm, 2 cm, 3 cm, 4 cm and 5 cm.  
The cover has rotational symmetry of order 6 and  $\widehat{BOC} = 40^\circ$ .

- (a) Calculate the area of the shaded section  $ABCD$ , giving your answer in terms of  $\pi$ .

Answer .....cm<sup>2</sup> [2]

(b) The total area of the metal (unshaded) sections of the cover is  $\frac{55}{3}\pi \text{ cm}^2$ .

(i) Calculate the total area of the shaded sections, giving your answer in terms of  $\pi$ .

*Answer* .....  $\text{cm}^2$  [1]

(ii) Calculate the fraction of the total area of the cover that is metal (unshaded).  
Give your answer in its simplest form.

*Answer* ..... [1]

20 (a) Evaluate

(i)  $5^0 + 5^2$ ,

*Answer* ..... [1]

(ii)  $36^{\frac{1}{2}}$ ,

*Answer* ..... [1]

(iii)  $(2^{\frac{2}{3}})^6$ .

*Answer* ..... [1]

(b)  $\left(\frac{1}{3}\right)^k = 9$

Find the value of  $k$ .

*Answer*  $k =$  ..... [1]

21  $R$  is directly proportional to the **cube** of  $p$ .  
When  $p = 2$ ,  $R = 24$ .

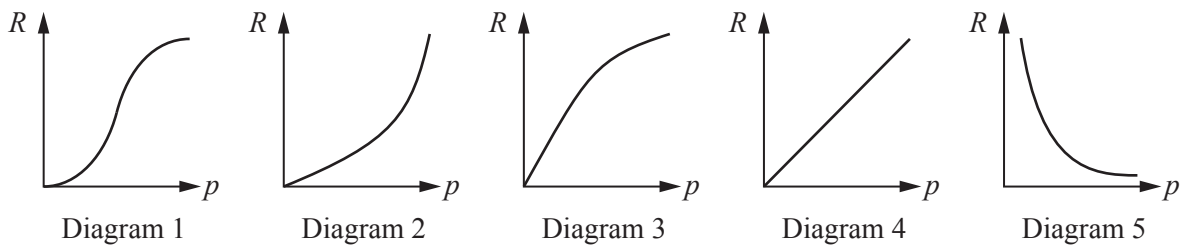
(a) Find the formula for  $R$  in terms of  $p$ .

Answer  $R = \dots\dots\dots$  [1]

(b) Find the value of  $p$  when  $R = 192$ .

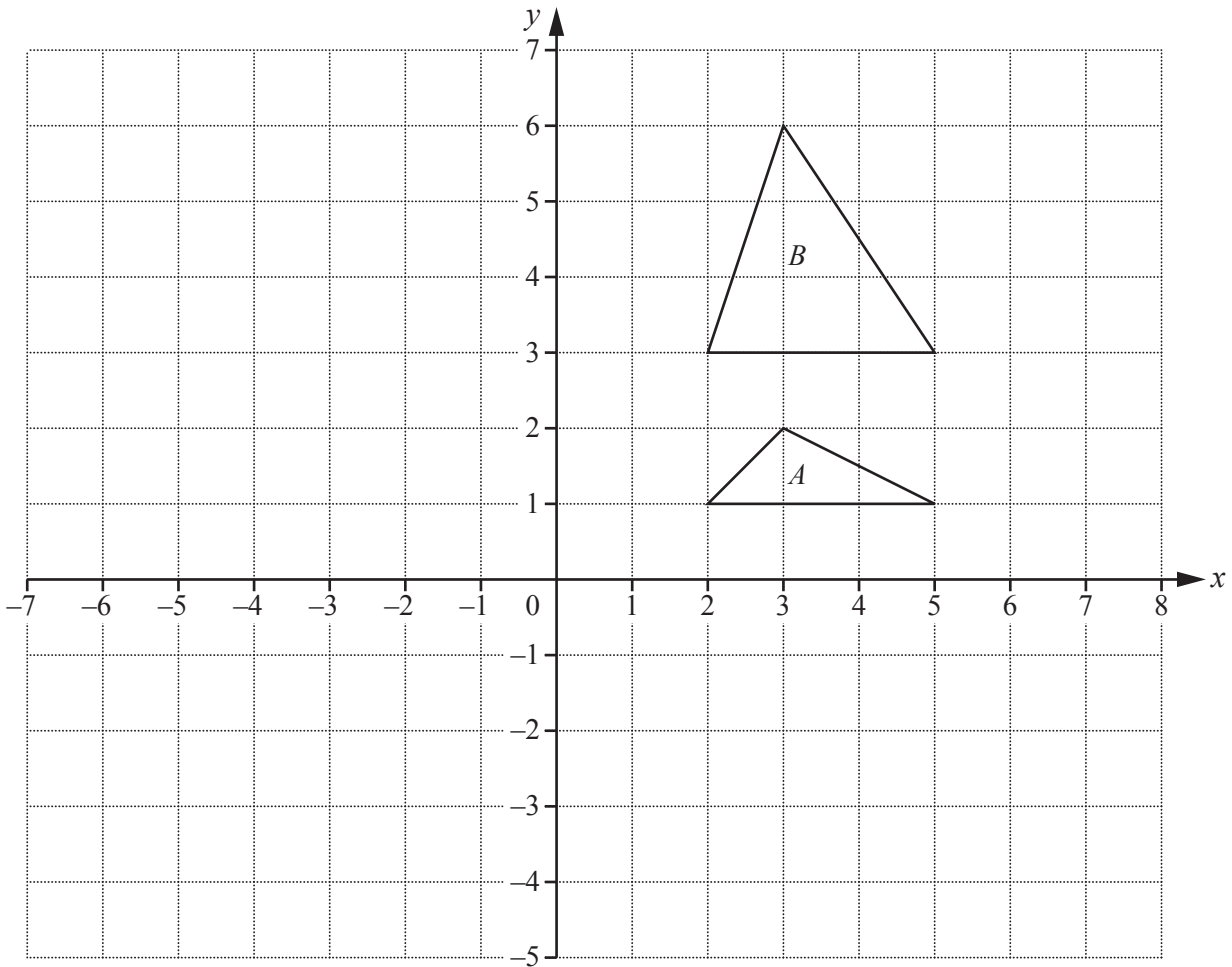
Answer  $p = \dots\dots\dots$  [2]

(c) Which of the diagrams below represents the graph of  $R$  against  $p$ ?



Answer Diagram  $\dots\dots\dots$  [1]





The diagram shows triangles  $A$  and  $B$ .

- (a) The translation  $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$  maps triangle  $A$  onto triangle  $C$ .

On the diagram, draw and label triangle  $C$ .

[1]

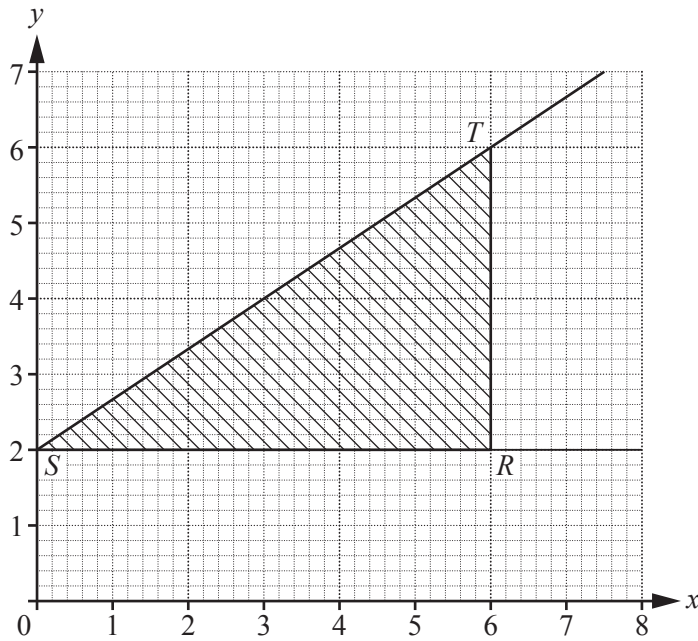
- (b) The rotation  $90^\circ$  clockwise, centre  $(1, 1)$ , maps triangle  $A$  onto triangle  $D$ .

On the diagram, draw and label triangle  $D$ .

[2]

- (c) Find the matrix of the transformation that maps triangle  $A$  onto triangle  $B$ .

Answer  $\left( \begin{array}{cc} & \\ & \end{array} \right)$  [1]



The diagram shows a triangle  $RST$ .

(a) Write down

(i) the gradient of the line  $ST$ ,

Answer ..... [1]

(ii) the equation of a line that is parallel to  $ST$ ,

Answer ..... [1]

(iii) the equation of the line with gradient 3 that passes through  $S$ .

Answer ..... [1]

(b) One of the inequalities that defines the shaded region  $RST$  is  $x \leq 6$ .

Write down the other two inequalities that define this region.

Answer .....

..... [2]

24 (a)  $A = \begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$      $B = \begin{pmatrix} 2 & -3 \\ 1 & 1 \end{pmatrix}$

(i) Find  $2A - B$ .

Answer  $\begin{pmatrix} & \\ & \end{pmatrix}$  [1]

(ii) Find  $B^{-1}$ .

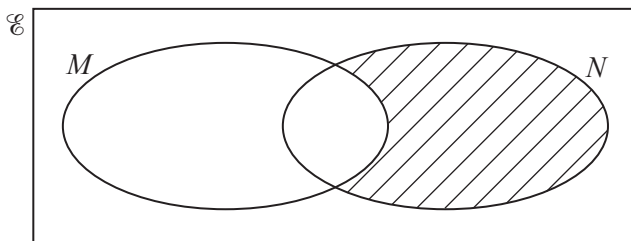
Answer  $\begin{pmatrix} & \\ & \end{pmatrix}$  [2]

- (b)  $\mathcal{E} = \{\text{natural numbers}\}$   
 $P = \{\text{factors of } 8\}$   
 $Q = \{\text{factors of } 12\}$

List the elements of the set  $P \cup Q$ .

Answer ..... [2]

(c)



Use set notation to describe the shaded subset in the Venn diagram.

Answer ..... [1]

25 (a) Factorise fully  $10x^2y + 15xy^2$ .

For  
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Use

Answer ..... [1]

(b) Factorise  $25a^2 - b^2$ .

Answer ..... [1]

(c) Simplify  $\frac{3}{(x+1)^2} - \frac{2}{x+1}$ .

Answer ..... [2]

(d) Simplify  $\frac{3a^2}{10bc} \div \frac{9a}{5b^2c}$ .

Answer ..... [2]

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