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0580/41

October/November 2018

2 hours 30 minutes

Additional Materials: Electronic calculator Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

The total of the marks for this paper is 130.

This document consists of **16** printed pages.

1 Marianne sells photos.

(a) The selling price of each photo is \$6.

(i) The selling price for each photo is made up of two parts, printing cost and profit.
For each photo, the ratio printing cost : profit = 5 : 3.

Calculate the profit she makes on each photo.

\$ [2]

(ii) Calculate her profit as a percentage of the selling price.

.....% [1]

(iii) Calculate the selling price of a photo in euros (€) when the exchange rate is €1 = \$1.091 .

€ [2]

(b) Marianne sells two sizes of photo.
These photos are mathematically similar rectangles.
The smaller photo has length 15 cm and width 12 cm.
The larger photo has area 352.8 cm².

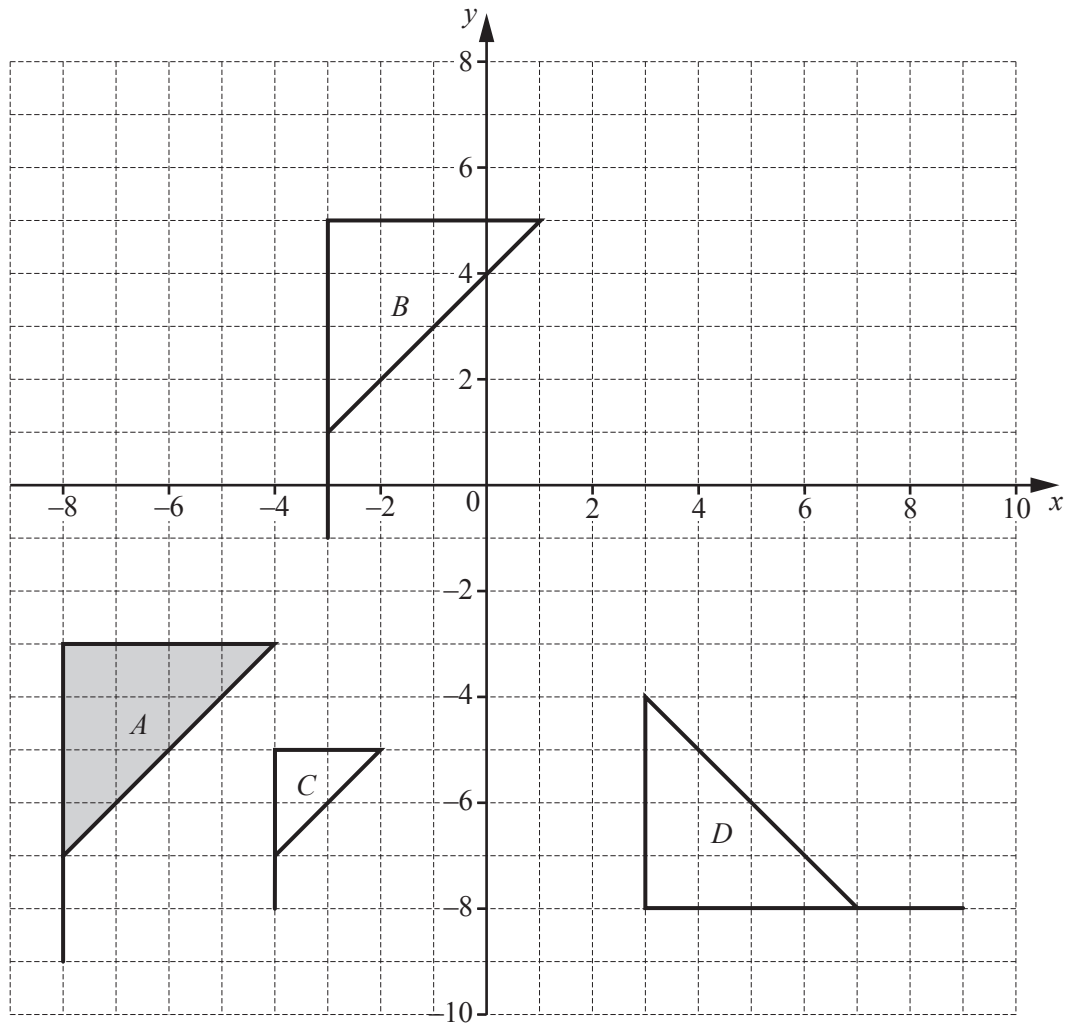
Calculate the length of the larger photo.

..... cm [3]

(c) In a sale, Marianne buys a new camera for \$483.
This is a reduction of 8% on the original price.

Calculate the original price of the camera.

\$ [3]



(a) Describe fully the **single** transformation that maps

(i) flag *A* onto flag *B*,

..... [2]

(ii) flag *A* onto flag *C*,

..... [3]

(iii) flag *A* onto flag *D*.

..... [3]

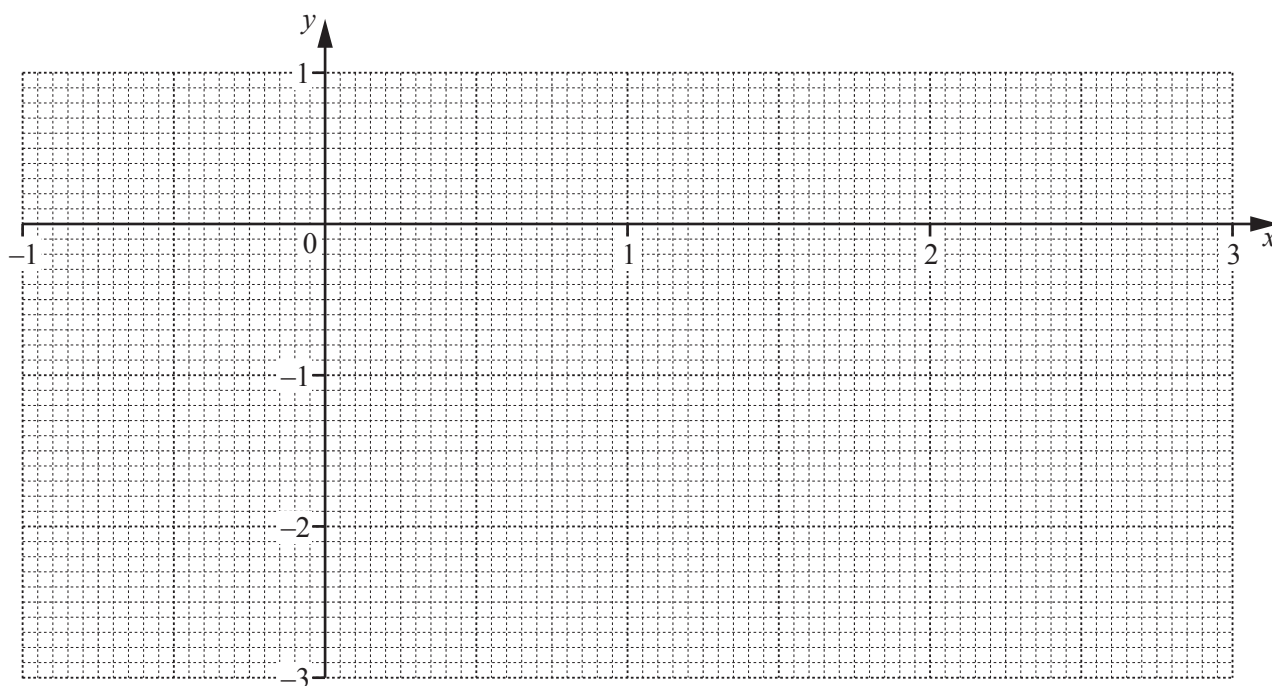
(b) Draw the reflection of flag *A* in the line $y = -1$. [2]

- 3 The table shows some values of $y = x^3 - 3x^2 + x$.

x	-0.75	-0.5	-0.25	0	0.5	1	1.5	2	2.5	2.75
y	-2.9	-1.4	-0.5		-0.1	-1	-1.9		-0.6	

- (a) Complete the table. [3]

- (b) On the grid, draw the graph of $y = x^3 - 3x^2 + x$ for $-0.75 \leq x \leq 2.75$. [4]



- (c) Use your graph to complete the inequalities in x for which $y > -1$.

..... $< x <$ and $x >$

[3]

(d) The equation $x^3 - 3x^2 + 2x - 1 = 0$ can be solved by drawing a straight line on the grid.

(i) Write down the equation of this line.

..... [2]

(ii) On the grid, draw this line and use it to solve the equation $x^3 - 3x^2 + 2x - 1 = 0$.

$x =$ [3]

(e) By drawing a suitable tangent, find an estimate for the gradient of the graph of $y = x^3 - 3x^2 + x$ at $x = -0.25$.

..... [3]

- 4 A school nurse records the height, h cm, of each of 180 children.
The table shows the information.

Height (h cm)	$60 < h \leq 70$	$70 < h \leq 90$	$90 < h \leq 100$	$100 < h \leq 110$	$110 < h \leq 115$	$115 < h \leq 125$
Frequency	8	26	35	67	28	16

- (a) Calculate an estimate of the mean.
Give your answer correct to 1 decimal place.

..... cm [4]

- (b) In a histogram showing the information, the height of the bar for the interval $60 < h \leq 70$ is 0.4 cm.

Calculate the height of the bar for each of the following intervals.

$115 < h \leq 125$ cm

$110 < h \leq 115$ cm

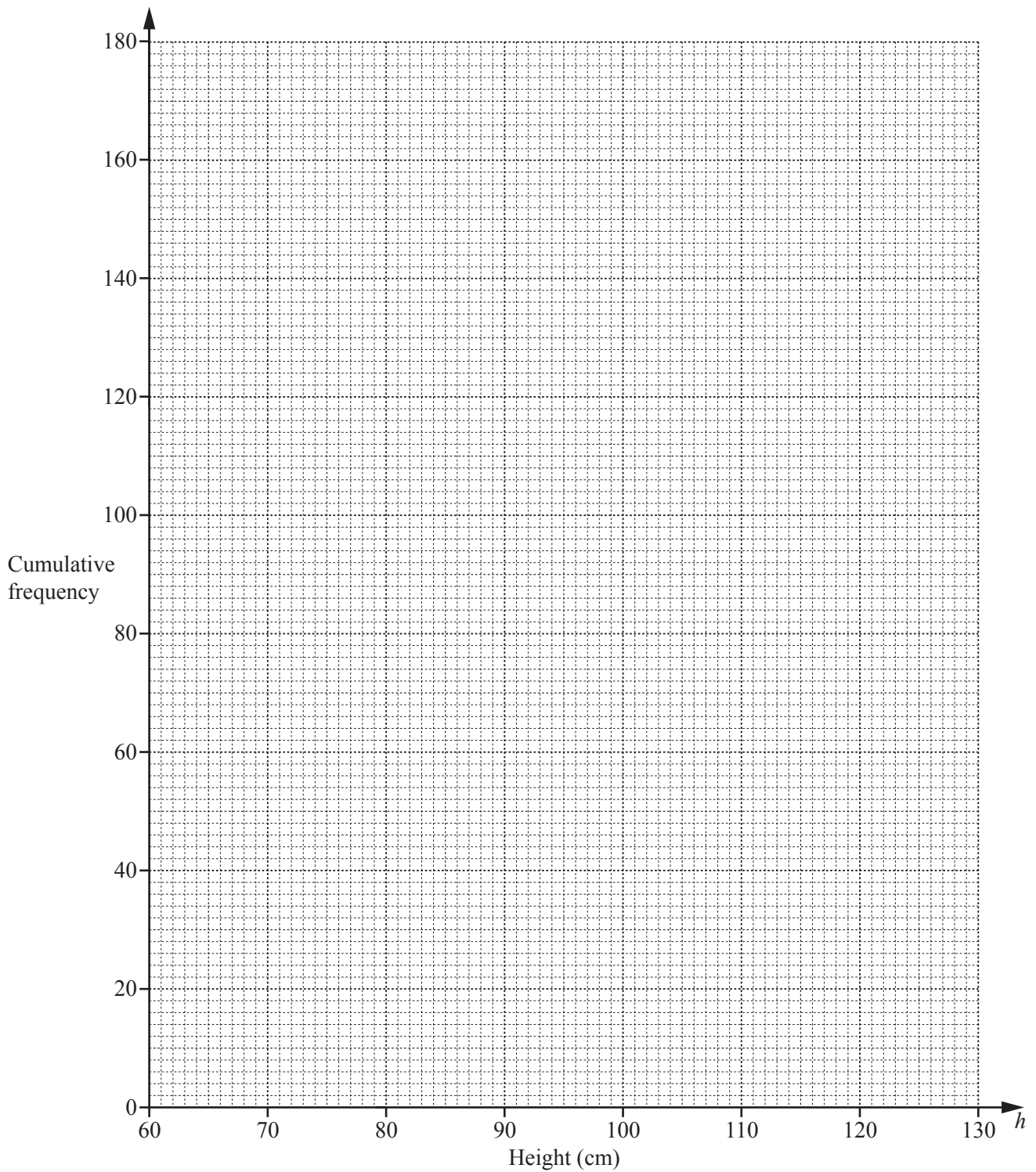
$70 < h \leq 90$ cm [3]

- (c) Complete the cumulative frequency table below.

Height (h cm)	$h \leq 70$	$h \leq 90$	$h \leq 100$	$h \leq 110$	$h \leq 115$	$h \leq 125$
Cumulative frequency						180

[2]

- (d) On the grid opposite, draw a cumulative frequency diagram.



[3]

(e) Use your cumulative frequency diagram to find an estimate of

(i) the interquartile range,

..... cm [2]

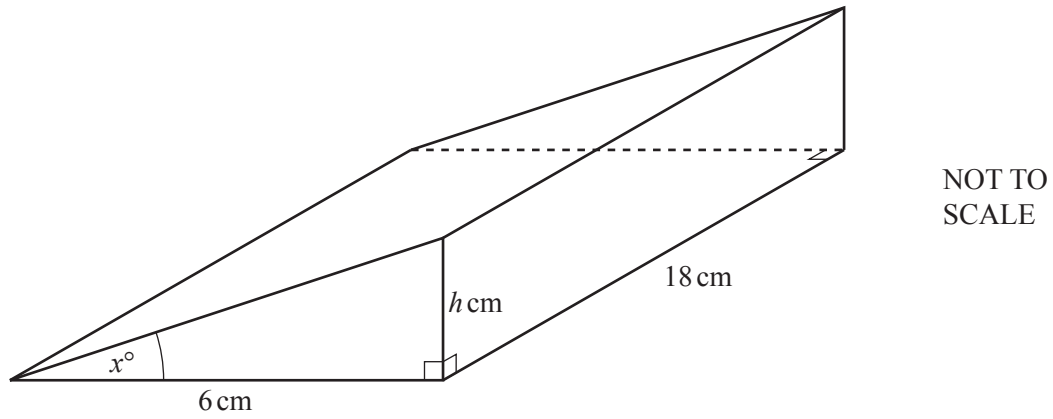
(ii) the 70th percentile,

..... cm [2]

(iii) the number of children with height greater than 106 cm.

..... [2]

5



The diagram shows a prism with length 18 cm and volume 253.8 cm^3 .
The cross-section of the prism is a right-angled triangle with base 6 cm and height h cm.

- (a) (i) Show that the value of h is 4.7 .

[3]

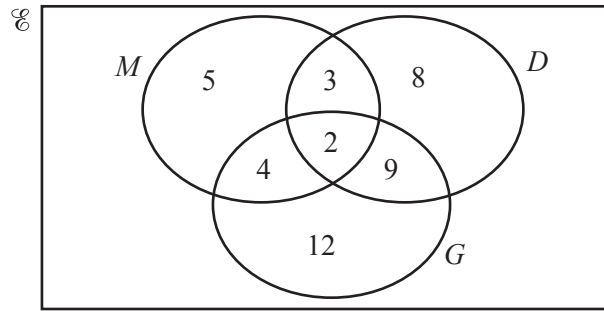
- (ii) Calculate the value of x .

$x = \dots\dots\dots$ [2]

- (b) Calculate the total surface area of the prism.

$\dots\dots\dots \text{ cm}^2$ [6]

6 (a)



The Venn diagram above shows information about the number of students who study Music (M), Drama (D) and Geography (G).

(i) How many students study Music? [1]

(ii) How many students study exactly two subjects? [1]

(iii) Two students are chosen at random from those who study Drama.

Calculate the probability that they both also study Music.

..... [3]

(iv) In the Venn diagram above, shade $M \cap D'$. [1]

(b) (i) $\mathcal{E} = \{x : x \text{ is an integer and } 1 \leq x \leq 10\}$

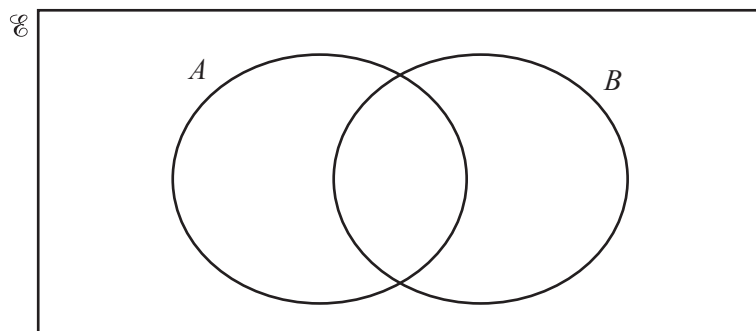
$A = \{x : x \text{ is even}\}$

$4 \in A \cap B$

$n(A \cap B) = 1$

$(A \cup B)' = \{1, 7, 9\}$

Complete the Venn diagram below using this information.



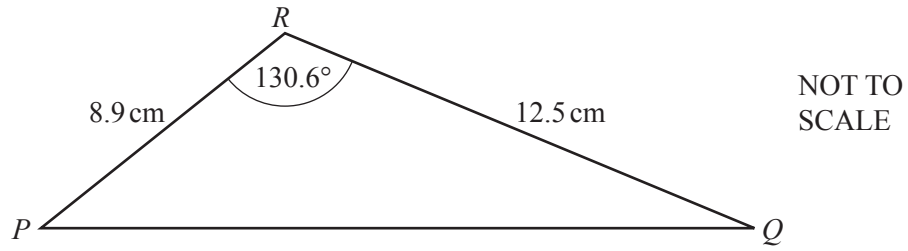
[4]

(ii) Use your Venn diagram to complete the statement.

$B = \{\text{.....}\}$

[1]

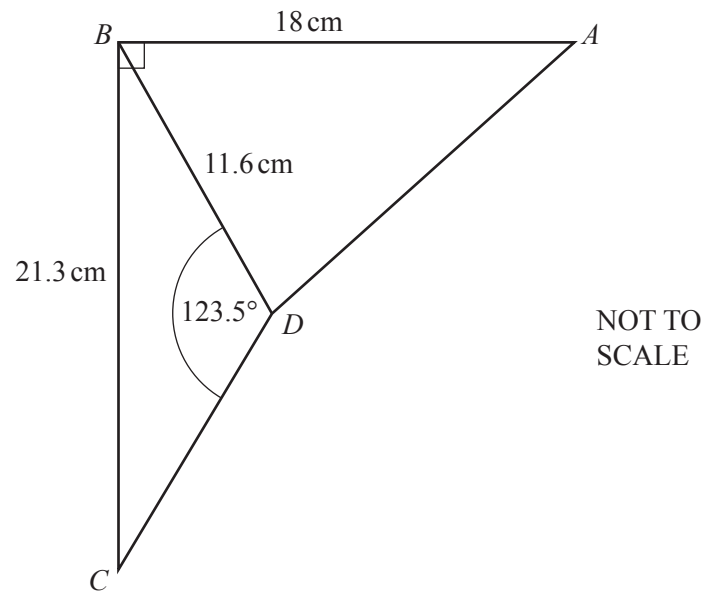
7 (a)



Calculate the area of triangle PQR .

..... cm^2 [2]

(b)



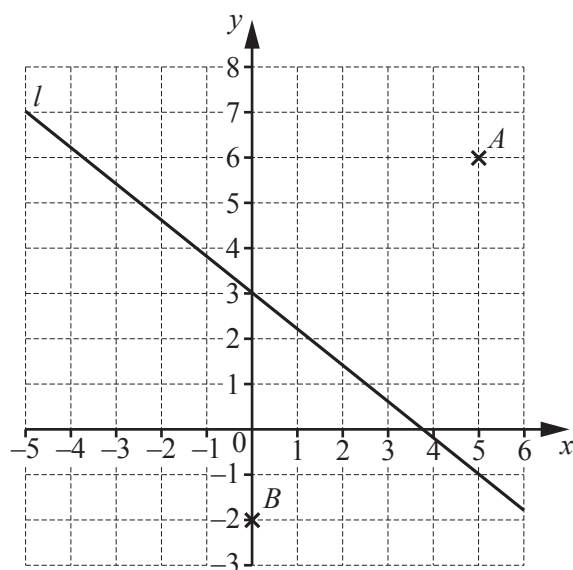
In the diagram, $AB = 18 \text{ cm}$, $BC = 21.3 \text{ cm}$ and $BD = 11.6 \text{ cm}$.
Angle $BDC = 123.5^\circ$ and angle ABC is a right angle.

(i) Calculate angle BCD .

Angle $BCD = \dots\dots\dots$ [3]

(ii) Calculate AD .

$AD = \dots\dots\dots$ cm [5]



- (a) Write down the co-ordinates of A .

(..... ,) [1]

- (b) Find the equation of line l in the form $y = mx + c$.

$y = \dots\dots\dots$ [3]

- (c) Write down the equation of the line parallel to line l that passes through the point B .

..... [2]

- (d) C is the point $(8, 14)$.

- (i) Write down the equation of the line perpendicular to line l that passes through the point C .

..... [3]

- (ii) Calculate the length of AC .

..... [3]

- (iii) Find the co-ordinates of the mid-point of BC .

(..... ,) [2]

- 9 Paulo and Jim each buy sacks of rice but from different shops.
 Paulo pays \$72 for sacks costing \$ m each.
 Jim pays \$72 for sacks costing \$ $(m + 0.9)$ each.

(a) (i) Find an expression, in terms of m , for the number of sacks Paulo buys.

..... [1]

(ii) Find an expression, in terms of m , for the number of sacks Jim buys.

..... [1]

(b) Paulo buys 4 more sacks than Jim.

Write down an equation, in terms of m , and show that it simplifies to $10m^2 + 9m - 162 = 0$.

[4]

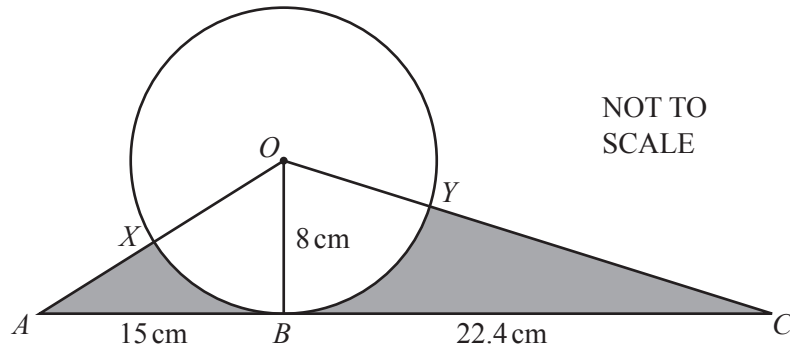
(c) (i) Solve $10m^2 + 9m - 162 = 0$.

$m = \dots\dots\dots$ or $m = \dots\dots\dots$ [3]

(ii) Find the number of sacks of rice that Paulo buys.

..... [1]

10



The diagram shows a circle, centre O .
 The straight line ABC is a tangent to the circle at B .
 $OB = 8\text{ cm}$, $AB = 15\text{ cm}$ and $BC = 22.4\text{ cm}$.
 AO crosses the circle at X and OC crosses the circle at Y .

- (a) Calculate angle XOY .

Angle $XOY = \dots\dots\dots$ [5]

- (b) Calculate the length of the arc XY .

$\dots\dots\dots\text{ cm}$ [2]

- (c) Calculate the total area of the two shaded regions.

..... cm² [4]

Question 11 is printed on the next page.

11 (a) Factorise $5m^2 - 20p^4$.

..... [3]

(b) Make P the subject of the formula $A = P + \frac{PRT}{100}$.

$P =$ [3]

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