



CANDIDATE  
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**0580/43**

October/November 2024

**2 hours 30 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

1 Dinari sells fruit and vegetables.

- (a) One day the mass of fruit and vegetables he sells is in the ratio fruit : vegetables = 9 : 8.  
He sells 48 kg of vegetables.

Find the mass of the fruit he sells.

..... kg [2]

- (b) Due to an issue with question 1(b), the question has been removed from the question paper.

- (c) In one week Dinari buys fruit and vegetables for \$1620.  
He sells the fruit and vegetables for \$1750.

Calculate his percentage profit.

..... % [2]

- (d) In another week Dinari sells fruit and vegetables for \$1738.  
He makes a profit of 10%.

Calculate the amount he paid for the fruit and vegetables in that week.

\$ ..... [2]

- 2 (a)  $A$  is the point  $(3, 7)$  and  $B$  is the point  $(-1, 5)$ .

(i) Find the coordinates of the midpoint of the line  $AB$ .

( ..... , ..... ) [2]

(ii) Write  $\overrightarrow{AB}$  as a column vector.

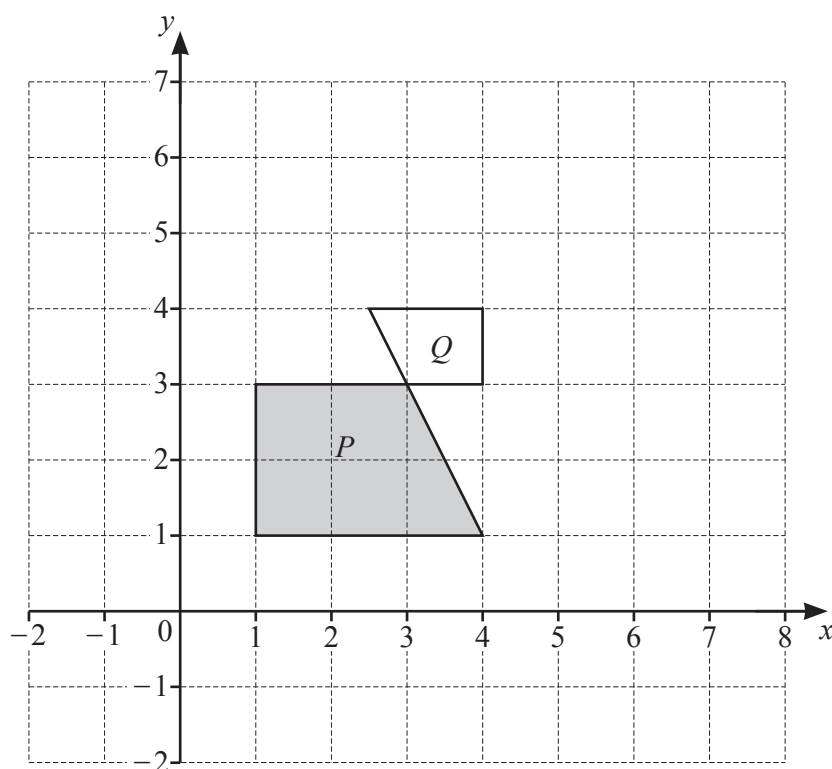
$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]

(iii)  $\overrightarrow{AC} = 3\overrightarrow{BA}$

Find the coordinates of  $C$ .

( ..... , ..... ) [2]

(b)



(i) Rotate shape  $P$  through  $180^\circ$  about the point  $(4, 1)$ . [2]

(ii) Reflect shape  $P$  in the line  $y = x + 2$ . [2]

(iii) Describe fully the **single** transformation that maps shape  $P$  onto shape  $Q$ .

.....

..... [3]

- 3 (a) Ed invests \$500 in an account paying  $r\%$  per year simple interest.  
At the end of 14 years the total amount in Ed's account is \$675.

Find the value of  $r$ .

$r = \dots\dots\dots$  [3]

- (b) Eva invests \$400 at a rate of 2.2% per year compound interest.

Calculate the total interest earned at the end of 11 years.

\$  $\dots\dots\dots$  [3]

- (c) Erin invests \$700 at a rate of  $p\%$  per **month** compound interest.  
At the end of 21 years the value of Erin's investment is \$1074, correct to the nearest dollar.

Calculate the value of  $p$ .

$p =$  ..... [3]

- 4 (a) A box contains 50 cuboids.  
Each cuboid has a mass of 135 g.  
The total mass of the cuboids and the box is 7 kg.

Calculate the mass of the box.  
Give your answer in grams.

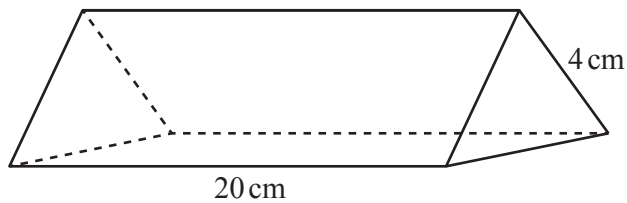
..... g [2]

- (b) A solid cube of side 4 cm is fixed to the base inside an empty cube of side 6 cm.  
Water is poured into the larger cube until it reaches the top of the smaller cube.

Calculate the amount of water poured into the larger cube.

..... cm<sup>3</sup> [2]

(c)



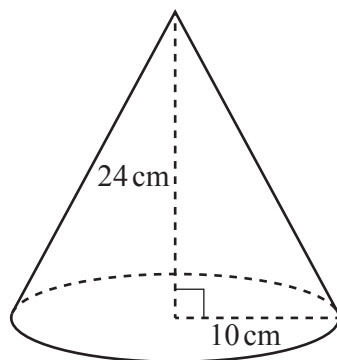
NOT TO  
SCALE

The diagram shows a solid triangular prism of length 20 cm.  
The cross-section is an equilateral triangle with side length 4 cm.  
The prism is made of wood with a density of 0.85 g/cm<sup>3</sup>.

Calculate the mass of the prism.  
[Density = mass ÷ volume]

..... g [4]

(d)

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The diagram shows a solid cone with base radius 10 cm and height 24 cm.

- (i) Show that the **total** surface area of the cone is  $1131 \text{ cm}^2$ , correct to the nearest  $\text{cm}^2$ .  
[The curved surface area of a cone with base radius  $r$  and slant height  $l$  is  $A = \pi r l$  .]

[4]

- (ii) The total surface area of the cone is painted.

- (a) The cost to paint the cone is \$1.71 .

Calculate the cost to paint  $1 \text{ cm}^2$  of the cone.  
Give your answer in cents.

..... cents [1]

- (b) One tin of paint has enough paint to cover  $2.5 \text{ m}^2$ .

Calculate the number of these cones that can be painted completely using one tin of paint.

..... [2]

- 5 (a) Naomi runs 100 m in 15 seconds.

Calculate Naomi's average speed in kilometres per hour.

..... km/h [2]

- (b) Olav runs for 45 minutes at a speed of 9.5 km/h.  
He then runs 8.1 km at a speed of 7.5 km/h.

Calculate Olav's average speed for the whole run.

..... km/h [3]

- (c) A train has length  $p$  metres.  
The train passes through a station of length  $q$  metres.  
The speed of the train is  $v$  kilometres per hour.

Find an expression for the time the train takes to completely pass through the station.  
Give your answer in seconds, in terms of  $p$ ,  $q$  and  $v$ .

..... s [3]

6 (a) Simplify  $\frac{24u}{5y} \times \frac{10}{3u}$ .

..... [2]

(b) Expand and simplify  $(x-1)(x+2)(x+3)$ .

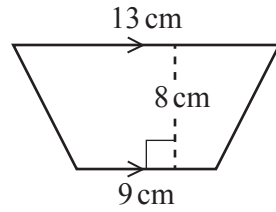
..... [3]

(c) Solve the equation  $2x^2 + x - 5 = 0$ .

You must show all your working and give your answers correct to 2 decimal places.

$x =$  ..... or  $x =$  ..... [4]

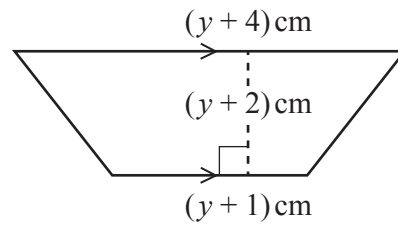
7 (a) (i)

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Calculate the area of the trapezium.

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

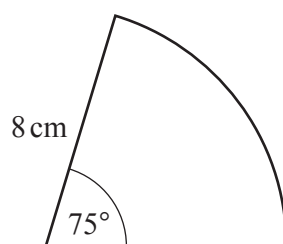
(ii)

NOT TO  
SCALEThe area of this trapezium is  $264 \text{ cm}^2$ .(a) Show that  $2y^2 + 9y - 518 = 0$ .

[3]

(b) Solve  $2y^2 + 9y - 518 = 0$  by factorisation to find the value of  $y$ . $y =$  ..... [3]

(b)

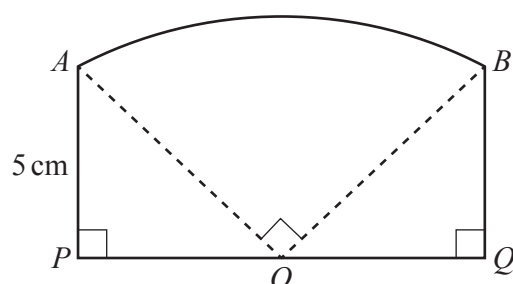
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SCALE

The diagram shows a sector of a circle with radius 8 cm and angle  $75^\circ$ .

Find the perimeter of the sector.

..... cm [3]

(c)

NOT TO  
SCALE

The diagram shows a shape  $ABQP$  made from three straight lines and an arc of a sector of a circle. The sector has centre  $O$  and angle  $90^\circ$ .  $PQ$  is a straight line and  $AP = PO = OQ = QB = 5$  cm.

Find the area of  $ABQP$ .

Give your answer in the form  $a + k\pi$ .

.....  $\text{cm}^2$  [4]

- 8 Guillaume measures the speed of each of 100 cars.  
The results are shown in the table.

|                   |                  |                  |                  |                  |
|-------------------|------------------|------------------|------------------|------------------|
| Speed ( $v$ km/h) | $30 < v \leq 40$ | $40 < v \leq 45$ | $45 < v \leq 50$ | $50 < v \leq 70$ |
| Frequency         | 15               | 20               | 35               | 30               |

- (a) Guillaume draws a pie chart for this data.

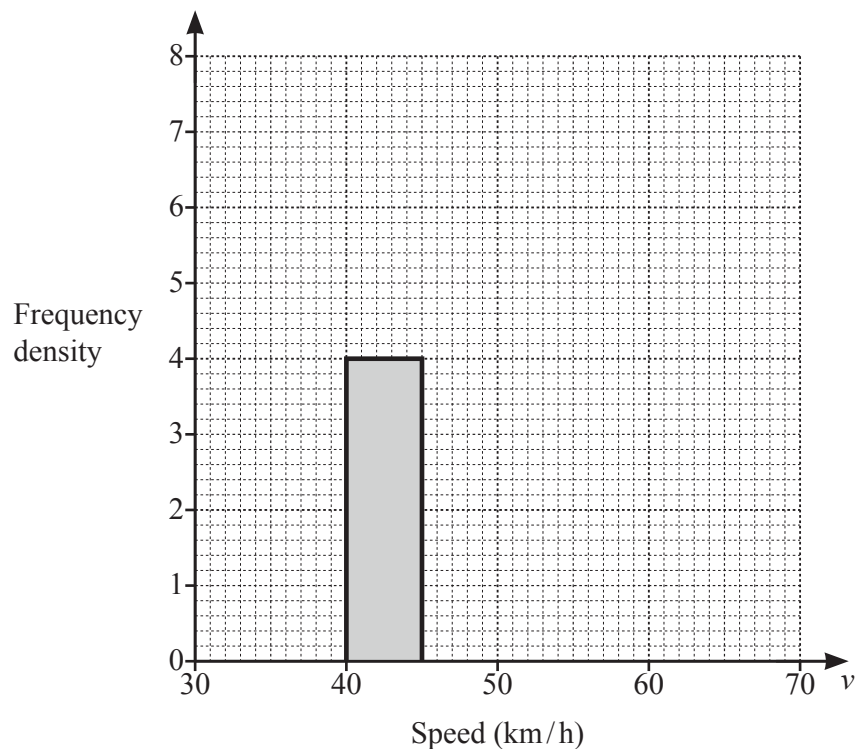
Calculate the angle for the interval  $45 < v \leq 50$ .

..... [2]

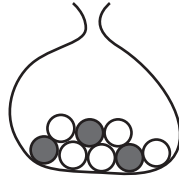
- (b) Calculate an estimate of the mean speed.

..... km/h [4]

- (c) Complete the histogram to show the data in the table.



[3]



A bag contains 5 white balls and 3 black balls.

- (a) (i) Marwan picks a ball from the bag at random and then replaces it.

Find the probability that the ball is white.

..... [1]

- (ii) Naomi picks a ball from the bag at random and then replaces it.  
She repeats this 120 times.

Find the number of times the ball is expected to be white.

..... [1]

- (b) Oscar picks a ball from the bag at random.  
He replaces it and then picks a second ball from the bag at random.

- (i) Find the probability that the balls are the same colour.

..... [3]

- (ii) Find the probability that the balls are not the same colour.

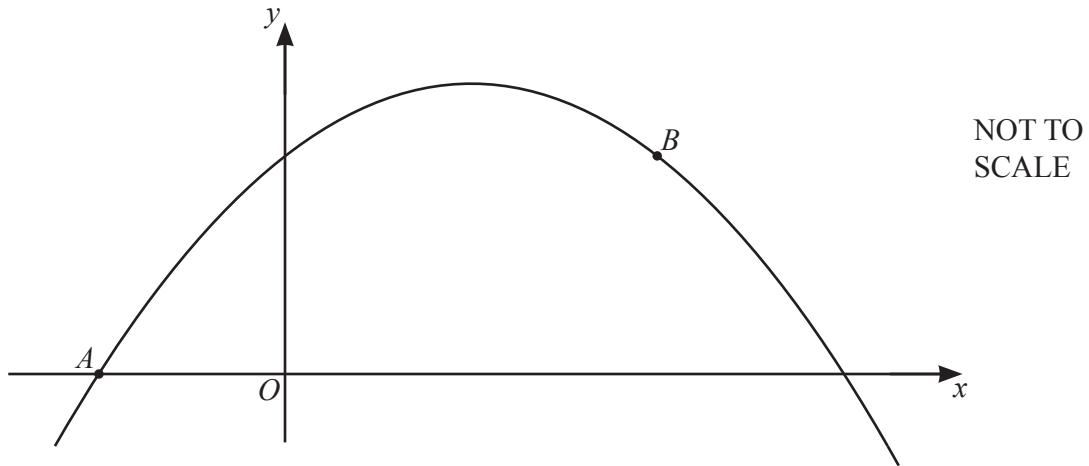
..... [1]

- (c) Priya picks 3 of the 8 balls from the bag at random without replacement.

Find the probability that she picks two white balls and one black ball.

..... [3]

10



The diagram shows a sketch of the graph of  $y = 3 + 2x - x^2$ .  
 $A$  is the point  $(-1, 0)$  and  $B$  is the point  $(2, 3)$ .

- (a) Find the derivative of  $3 + 2x - x^2$ .

..... [2]

- (b) (i) Show that the equation of the tangent at  $A$  is  $y = 4x + 4$ .

[3]

- (ii) The line  $L$  is perpendicular to the line  $y = 4x + 4$ .  
 The line  $L$  passes through the point  $B$ .

Find the equation of the line  $L$ .

Give your answer in the form  $y = mx + c$ .

$y =$  ..... [3]

(c) Find the coordinates of the maximum point on the graph of  $y = 3 + 2x - x^2$ .

( ..... , ..... ) [3]

11       $f(x) = 2x + 5$        $g(x) = 1 - 2x$        $h(x) = \frac{1}{x+1}, x \neq -1$        $j(x) = 2^x$

(a) Find  $g(-3)$ .

..... [1]

(b) Find  $f(x)g(x) + fg(x) + 1$ .  
Give your answer in its simplest form.

..... [4]

(c) Find  $g^{-1}(x)$ .

$g^{-1}(x) =$  ..... [2]

(d) Find  $hh(1)$ .

..... [2]

- (e) Simplify  $\frac{1}{f(x)} - h(x)$ .

Give your answer as a single fraction in its simplest form.

..... [3]

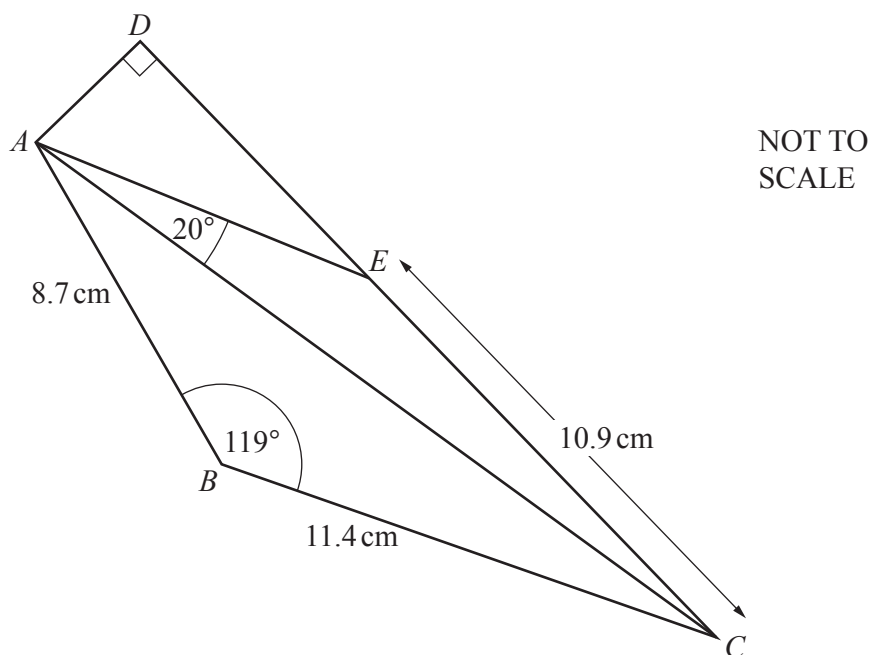
- (f) Find  $x$  when  $j(x) = \frac{1}{32}$ .

$x =$  ..... [1]

- (g) Find  $x$  when  $j^{-1}(x) = 0$ .

$x =$  ..... [1]

12



$ABCD$  is a quadrilateral and  $E$  is a point on  $CD$ .  
 $AB = 8.7 \text{ cm}$ ,  $BC = 11.4 \text{ cm}$  and  $CE = 10.9 \text{ cm}$ .  
 Angle  $ADE = 90^\circ$ , angle  $ABC = 119^\circ$  and angle  $CAE = 20^\circ$ .

(a) Show that  $AC = 17.37 \text{ cm}$ , correct to 2 decimal places.

[3]

(b) Angle  $AEC$  is obtuse.

Calculate angle  $ACE$ .

Angle  $ACE = \dots\dots\dots$  [4]

(c) Calculate the perimeter of quadrilateral  $ABCD$ .

$\dots\dots\dots$  cm [3]

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