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**MATHEMATICS****0580/42**

Paper 4 Calculator (Extended)

**October/November 2025****2 hours**

You must answer on the question paper.

You will need: Geometrical instruments

**INSTRUCTIONS**

- 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 scientific 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.

**INFORMATION**

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Any blank pages are indicated.

## List of formulas

Area,  $A$ , of triangle, base  $b$ , height  $h$ .

$$A = \frac{1}{2}bh$$

Area,  $A$ , of circle of radius  $r$ .

$$A = \pi r^2$$

Circumference,  $C$ , of circle of radius  $r$ .

$$C = 2\pi r$$

Curved surface area,  $A$ , of cylinder of radius  $r$ , height  $h$ .

$$A = 2\pi rh$$

Curved surface area,  $A$ , of cone of radius  $r$ , sloping edge  $l$ .

$$A = \pi rl$$

Surface area,  $A$ , of sphere of radius  $r$ .

$$A = 4\pi r^2$$

Volume,  $V$ , of prism, cross-sectional area  $A$ , length  $l$ .

$$V = Al$$

Volume,  $V$ , of pyramid, base area  $A$ , height  $h$ .

$$V = \frac{1}{3}Ah$$

Volume,  $V$ , of cylinder of radius  $r$ , height  $h$ .

$$V = \pi r^2 h$$

Volume,  $V$ , of cone of radius  $r$ , height  $h$ .

$$V = \frac{1}{3}\pi r^2 h$$

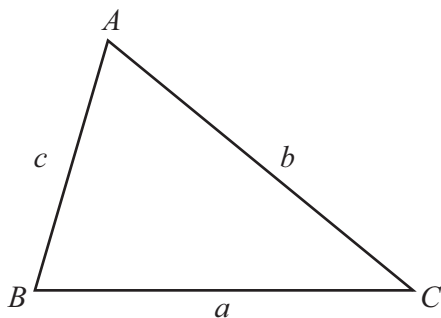
Volume,  $V$ , of sphere of radius  $r$ .

$$V = \frac{4}{3}\pi r^3$$

For the equation  $ax^2 + bx + c = 0$ , where  $a \neq 0$ ,

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

For the triangle shown,



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

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



- 1 Write the ratio 60 grams : 3 kilograms in the form  $1 : n$ .

1 : ..... [2]

- 2 Solve.

$$8x - 17 = 27$$

$x =$  ..... [2]

- 3 Write down the order of rotational symmetry of a regular decagon.

..... [1]

- 4 Pedro makes cards.

- (a) He makes cards at a rate of 9 cards every 20 minutes.

Work out the number of cards he makes in 8 hours.

..... [2]

- (b) Each card costs 12 cents to make.  
Pedro sells each card for 50 cents.

Work out his percentage profit on each card.

..... % [2]



- 5 Nuwa is buying a phone.  
One website sells the phone for 953 Yuan.  
A different website sells the same phone for \$141.  
The exchange rate is 1 Yuan = \$0.152 .

Calculate the difference between these phone prices.  
Give your answer in dollars, correct to the nearest cent.

\$ ..... [2]

- 6 One morning, a dentist has appointments for 10 patients.  
The stem-and-leaf diagram shows the waiting time for 8 of these patients.

|   |   |     |
|---|---|-----|
| 0 | 1 | 4   |
| 1 | 0 | 2 9 |
| 2 | 1 | 5 5 |

Key: 1 | 0 represents 10 minutes

The times for the two other patients,  $P$  and  $Q$ , are not shown in the stem-and-leaf diagram.

The mean waiting time of all 10 patients that morning is 16 minutes.

The range of waiting times is 26 minutes.

Patient  $P$  waits longer than patient  $Q$ .

Find the waiting time for each of patient  $P$  and patient  $Q$ .

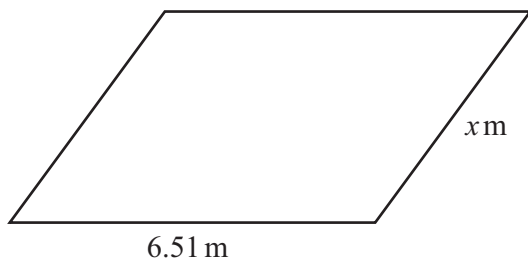
Patient  $P$  ..... min

Patient  $Q$  ..... min

[4]



7 The diagram shows a parallelogram.



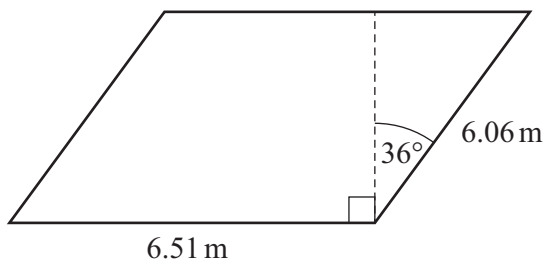
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The parallelogram has the same perimeter as a circle with radius 4 m.

(a) Show that  $x = 6.06$  m, correct to 2 decimal places.

[4]

(b)



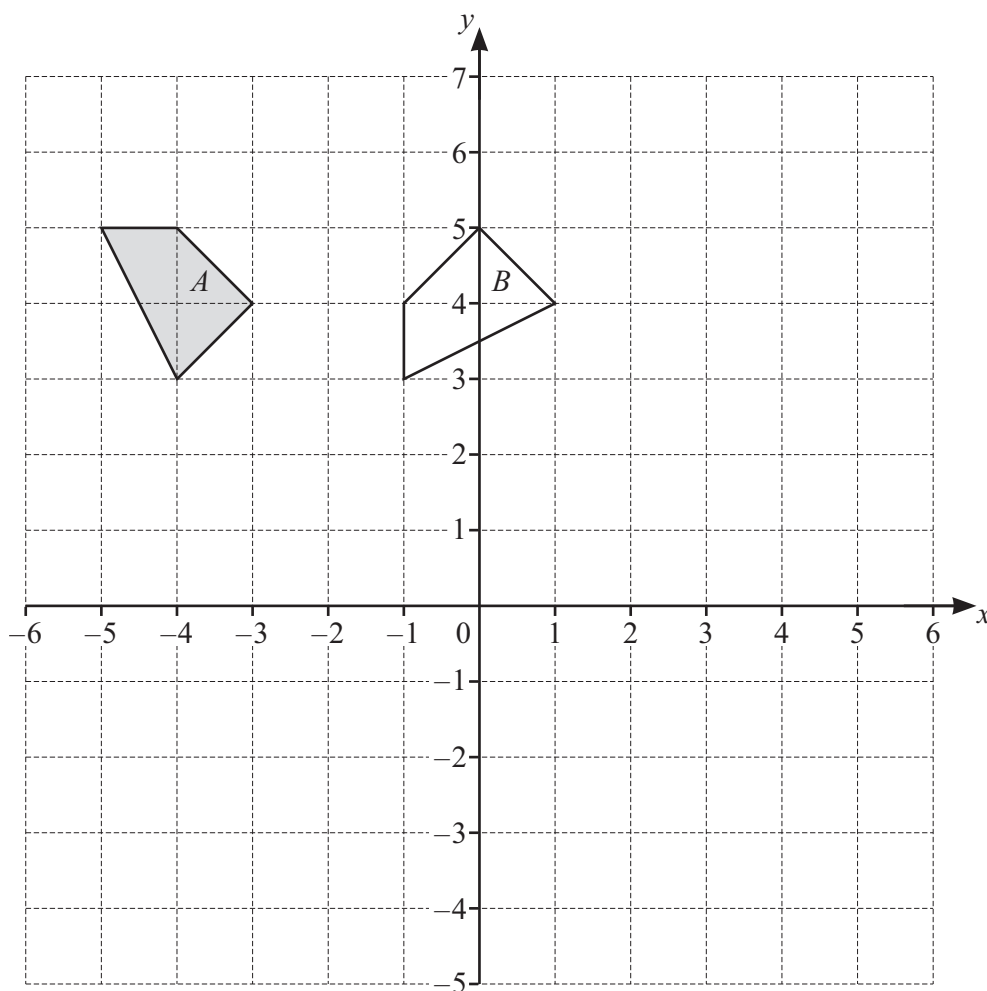
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The floor of a room is in the shape of this parallelogram.  
It costs \$18 per square metre to tile the floor.

Calculate the total cost of tiling the floor.

\$ ..... [4]





(a) On the diagram, draw the image of

(i) shape  $A$  after a translation by the vector  $\begin{pmatrix} 1 \\ -7 \end{pmatrix}$  [2]

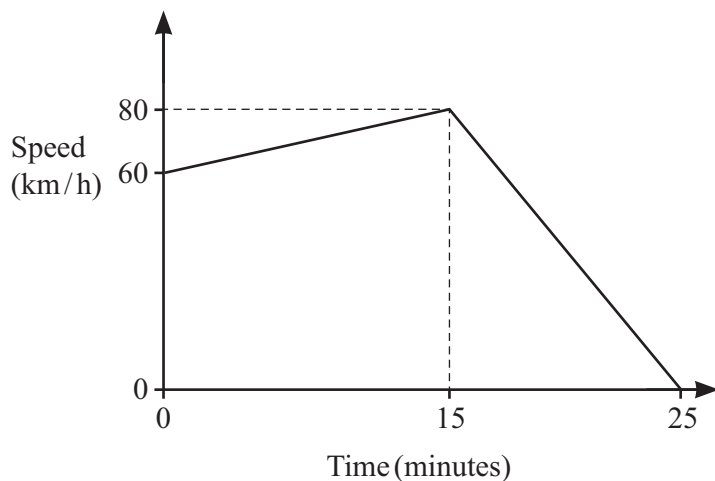
(ii) shape  $A$  after a reflection in the line  $y = x + 1$ . [3]

(b) Describe fully the **single** transformation that maps shape  $A$  onto shape  $B$ .

..... [3]  
 .....



- 9 The diagram shows the speed–time graph for part of a car journey.



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Find the total distance travelled in the 25 minutes.

..... km [3]

- 10 Find the  $n$ th term of each sequence.

(a) 17, 9, 1,  $-7$ ,  $-15$ , ...

..... [2]

(b) 3, 12, 27, 48, 75, ...

..... [2]



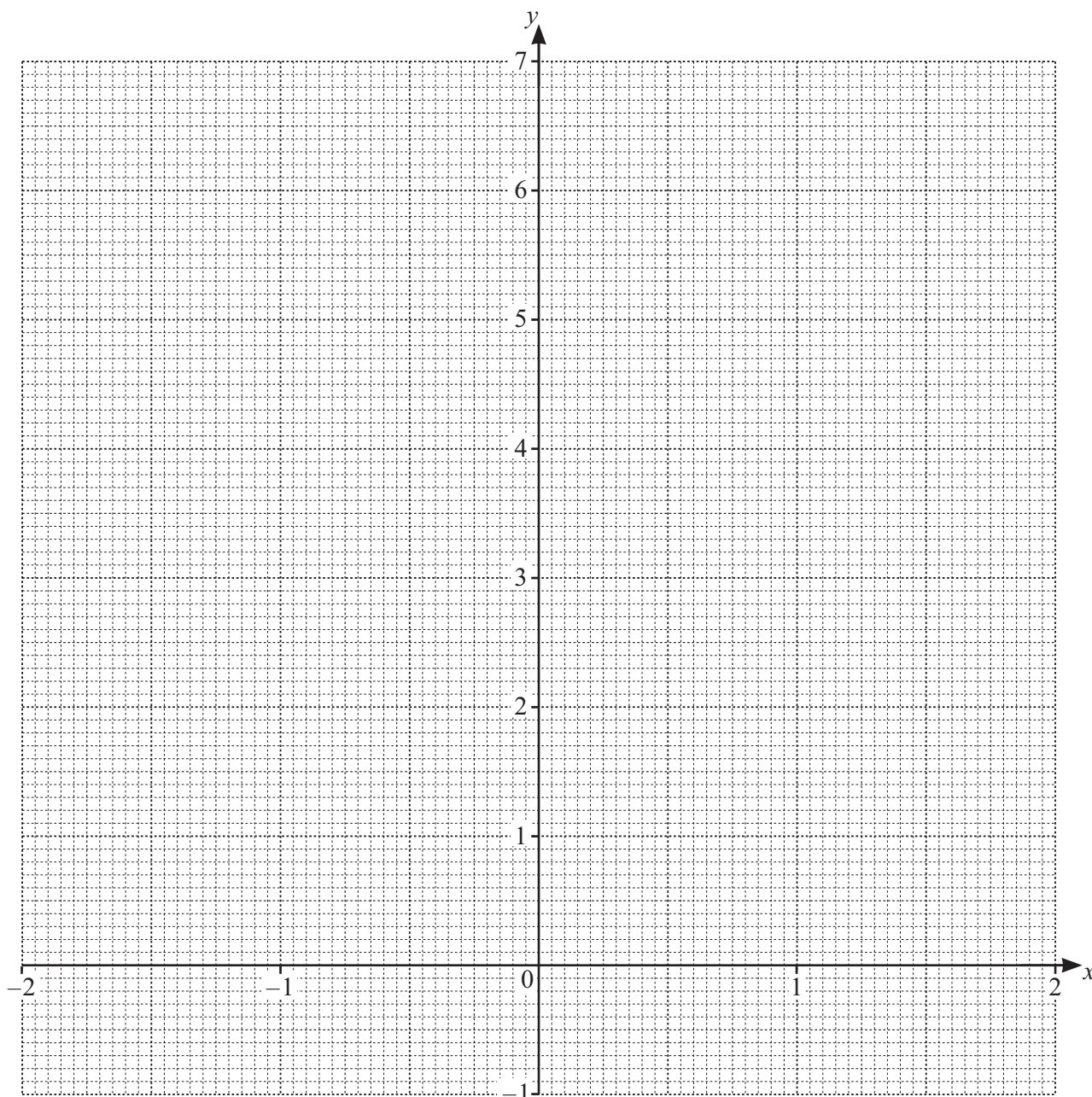
- 11 The table shows some values for  $y = x^3 - 2x + 3$ .  
Where appropriate, values of  $y$  are given correct to 2 decimal places.

|     |    |      |    |      |   |      |   |     |   |
|-----|----|------|----|------|---|------|---|-----|---|
| $x$ | -2 | -1.5 | -1 | -0.5 | 0 | 0.5  | 1 | 1.5 | 2 |
| $y$ | -1 |      | 4  | 3.88 | 3 | 2.13 | 2 |     | 7 |

(a) Complete the table.

[2]

(b) Draw the graph of  $y = x^3 - 2x + 3$  for  $-2 \leq x \leq 2$ .



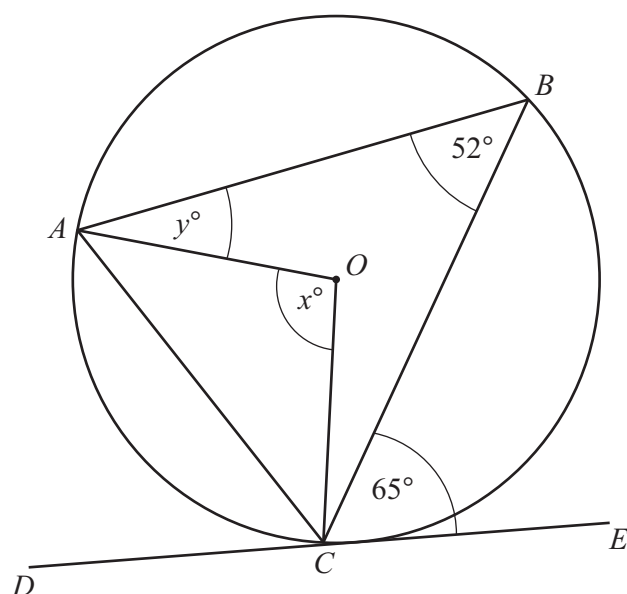
[4]



(c) By drawing a suitable straight line on the grid, solve the equation  $x^3 - 2.5x + 1 = 0$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [4]

12



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$A$ ,  $B$  and  $C$  lie on a circle centre  $O$ .  
 $DE$  is a tangent to the circle at  $C$ .  
 Angle  $ABC = 52^\circ$  and angle  $BCE = 65^\circ$ .

- (a) Find the value of  $x$ .  
 Give a geometrical reason for your answer.

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

- (b) Find the value of  $y$ .

$y = \dots\dots\dots$  [2]



13 Simplify.

$$\frac{7}{2m} + \frac{3}{8m}$$

..... [2]

14 (a) Carlos invests \$24 000 at a rate of 3.2% per year compound interest.

Calculate the value of his investment at the end of 4 years.

\$ ..... [2]

(b) Carlos buys a painting for \$ $x$ .  
He sells the painting for \$40 870.  
He makes a profit of 34%.

Calculate the value of his profit.

\$ ..... [3]

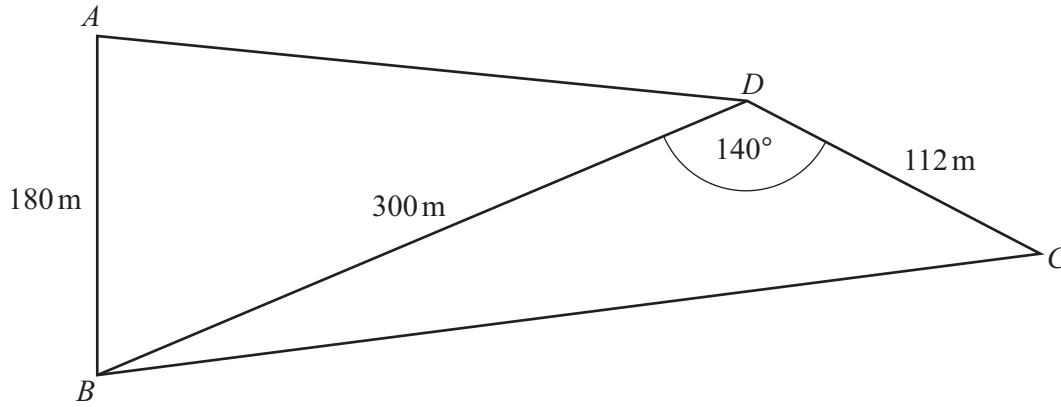
(c) Carlos also buys a car with a value of \$32 500.  
The value of the car decreases exponentially by 23% each year.

Find a formula for the value, \$ $V$ , of the car at the end of  $n$  years.

..... [3]



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The diagram shows a field,  $ABCD$ , in the shape of a quadrilateral.  
 $BD$  is a straight path across the field.

(a) Calculate  $BC$ .

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

(b) Calculate angle  $DBC$ .

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

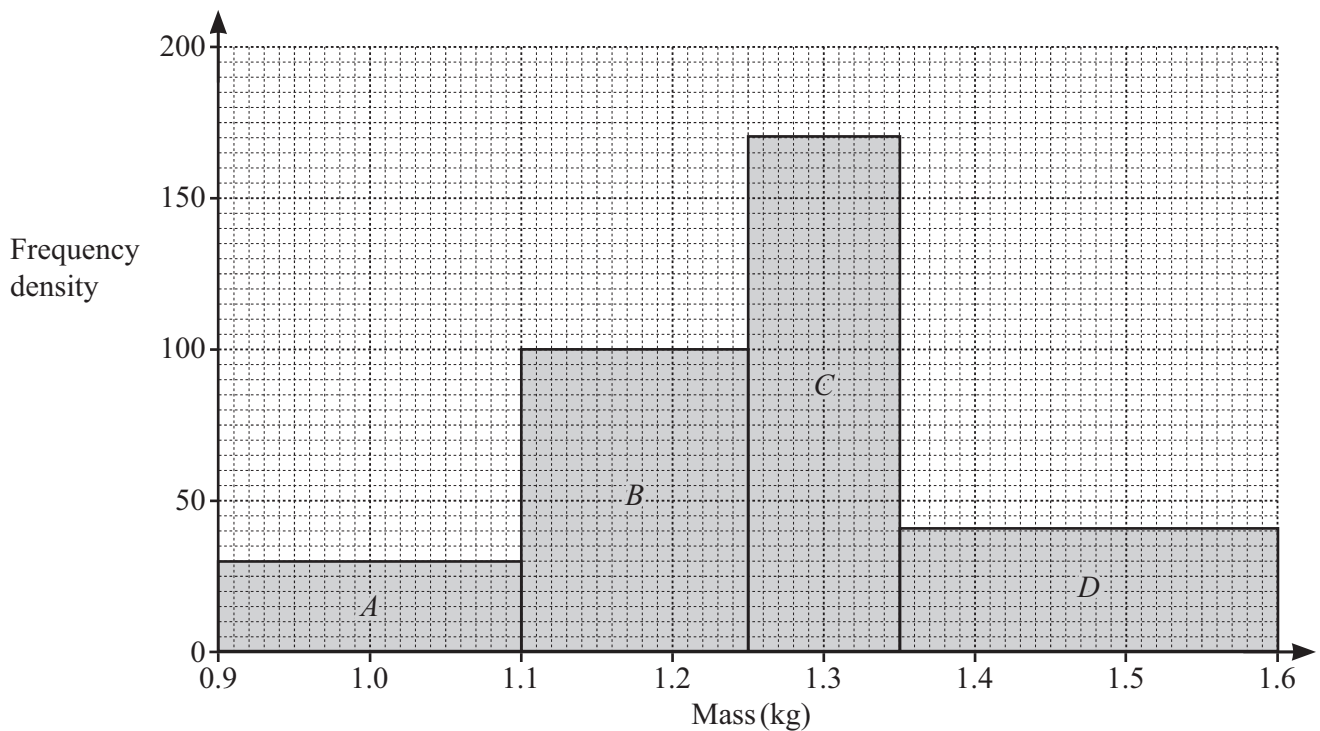
(c) The total area of the field,  $ABCD$ , is  $35\,900\text{ m}^2$ .

Work out the length of the shortest distance from  $D$  to  $AB$ .

$\dots\dots\dots$  m [4]



- 16 The histogram shows information about the masses of some coconuts. The masses are classified into four categories  $A$ ,  $B$ ,  $C$  and  $D$ .



- (a) Show that there are 10 coconuts in category  $D$ .

[1]

- (b) Two of the coconuts from those in category  $C$  and category  $D$  are chosen at random.

Find the probability that both are from category  $D$ .

..... [3]

- (c) Calculate an estimate of the mean mass of the coconuts.

..... kg [4]

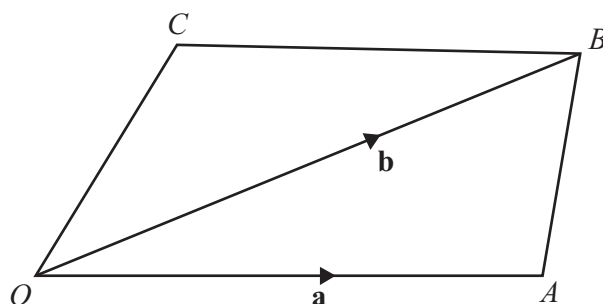


17 Expand and simplify.

$$(x-2)(2x+3)(x+4)$$

..... [3]

18



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In the diagram,  $OA$  is parallel to  $CB$ .

$$OA : CB = 4 : 3$$

$$\overrightarrow{OA} = \mathbf{a} \text{ and } \overrightarrow{OB} = \mathbf{b}.$$

(a) Find  $\overrightarrow{AB}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

$$\overrightarrow{AB} = \dots\dots\dots [1]$$

(b)  $M$  is the midpoint of  $OC$ .

Find  $\overrightarrow{AM}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

Give your answer in its simplest form.

$$\overrightarrow{AM} = \dots\dots\dots [3]$$





- 19 Solve the simultaneous equations.  
You must show all your working and give your answers correct to 2 decimal places.

$$y = 5 - 2x$$

$$y = 3x^2 - 7x - 6$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

[6]



- 20 A solid metal prism has a mass of 4810 g, correct to the nearest 10 g.  
The density of the metal is  $7.7 \text{ g/cm}^3$ , correct to 1 decimal place.

Calculate the lower bound for the volume of the prism.  
[Density = mass  $\div$  volume]

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

- 21  $y$  is inversely proportional to  $(x + 2)^2$ .  
 $w$  is proportional to  $x$ .

When  $y = 8$ ,  $x = 3.5$ .

When  $w = 15$ ,  $x = 90$ .

Find  $y$  in terms of  $w$ .

$y =$  ..... [4]





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