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MATHEMATICS**0580/42**

Paper 4 Calculator (Extended)

February/March 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 π , 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.



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 .

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

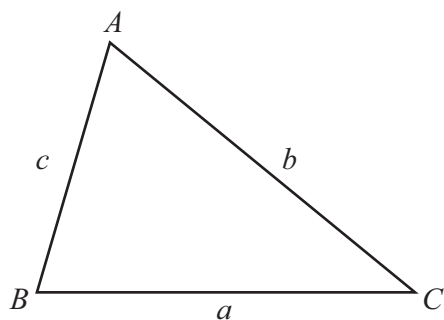
Volume, V , of sphere of radius r .

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

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 down a factor of 28 that is a prime number.

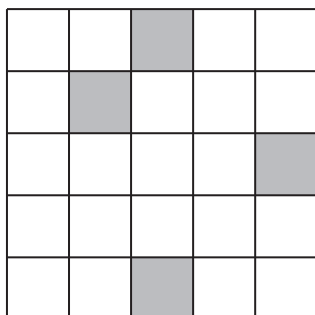
..... [1]

- 2 Simplify.

$$4y^2 + 3y - y^2 + 2y$$

..... [2]

- 3



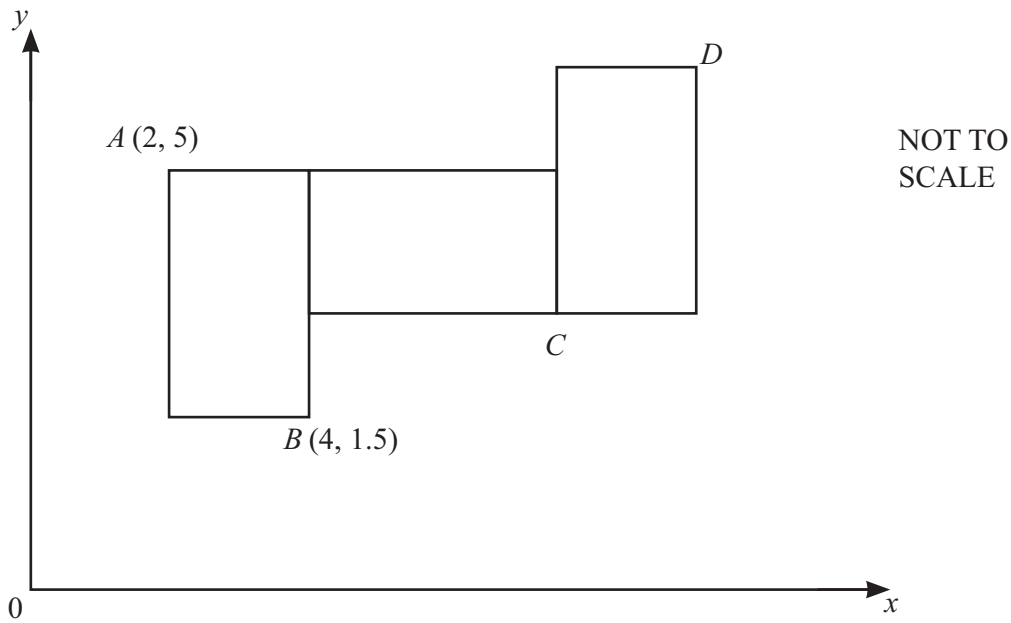
Shade **two** more small squares to make a pattern with two lines of symmetry. [1]

- 4 Calculate $\frac{20.24 - \sqrt[3]{30}}{6.5}$.

Give your answer correct to 1 decimal place.

..... [2]





A pattern is formed by 3 congruent rectangles.
 Each rectangle is a rotation of 90° around one vertex of the rectangle next to it.
 The point A has coordinates $(2, 5)$.
 The point B has coordinates $(4, 1.5)$.

Work out the coordinates of point C and point D .

C (..... ,)

D (..... ,)

[3]

- 6 Each week Nisha is paid \$12 per hour for the first 40 hours that she works.
 She is paid 30% more per hour for any extra hours that she works.
 One week Nisha works for 45.5 hours.

Calculate how much she is paid that week.

\$ [3]

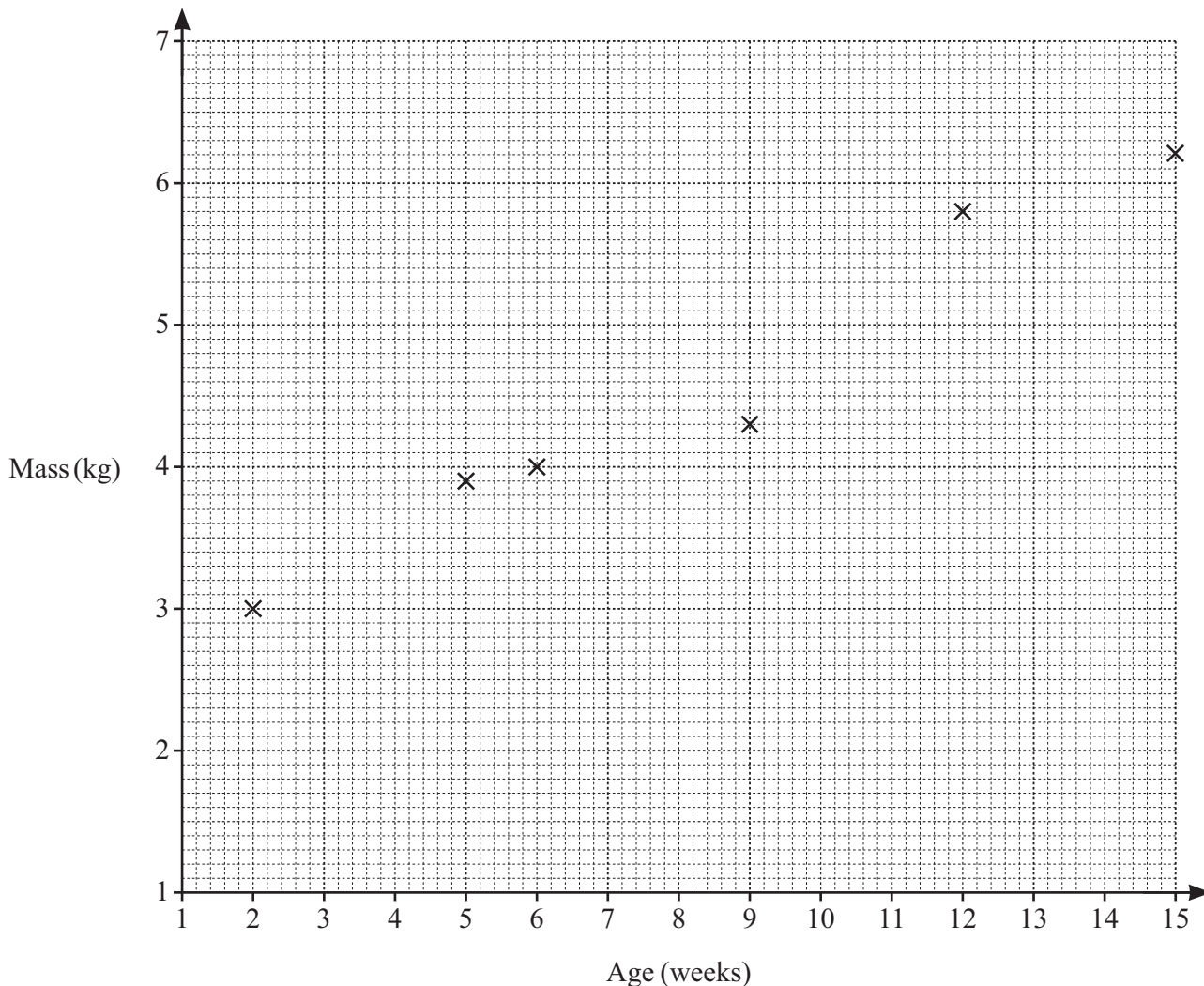




7 The table shows the age and mass of each of 10 babies.

Age (weeks)	9	12	15	2	5	6	9	7	1	11
Mass (kg)	4.3	5.8	6.2	3.0	3.9	4.0	4.6	4.5	2.5	5.3

(a)



Complete the scatter diagram.

The first six points have been plotted for you.

[2]

(b) What type of correlation is shown in the scatter diagram?

..... [1]

(c) On the scatter diagram, draw a line of best fit.

[1]

(d) Use your line of best fit to find an estimate of the mass of a 14-week old baby.

..... kg [1]





- 8 The scale drawing shows the positions of boat *A* and boat *B*.
The scale is 1 cm represents 0.5 km.

North



A•

B•

Scale: 1 cm to 0.5 km

- (a) Find the actual distance between boat *A* and boat *B*.

..... km [2]

- (b) Lighthouse *L* lies to the east of boats *A* and *B*.
L is 4.4 km from boat *A* and 3.3 km from boat *B*.

Using a ruler and compasses only, construct and label the position of *L*. [3]

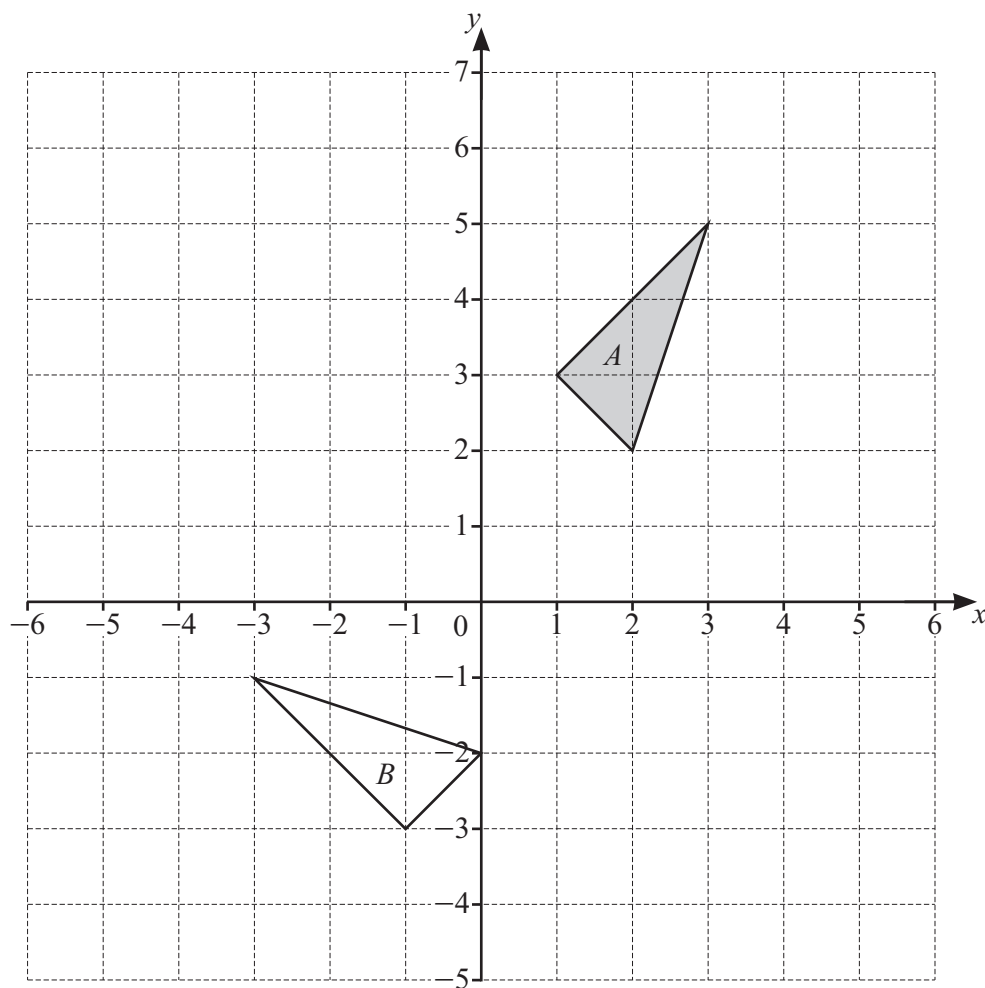
- 9 (a) Write 0.007 09 in standard form.

..... [1]

- (b) Work out $(4 \times 10^4)^2$.
Give your answer in standard form.

..... [2]





(a) Draw the image of

(i) triangle A after a reflection in the line $y = 1$ [2]

(ii) triangle A after a translation by the vector $\begin{pmatrix} -6 \\ 1 \end{pmatrix}$. [2]

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

.....

..... [3]





- 11 (a) Midhil invests \$1500 at a rate of 4.2% per year compound interest.

Calculate the value of the investment at the end of 5 years.

\$ [2]

- (b) Hitanshi invests some money at a rate of $x\%$ per year compound interest.
At the end of 11 years the value of the investment has doubled.

Calculate the value of x .

$x =$ [3]

- 12 A cone has sloping edge 12 cm and base radius 5 cm.

Calculate the **total** surface area of the cone.

..... cm^2 [2]





13 The table shows the first 5 terms of sequences A , B and C .

	1st term	2nd term	3rd term	4th term	5th term	n th term
Sequence A	5	12	31	68	129	
Sequence B	$\frac{10}{3}$	$\frac{9}{4}$	$\frac{8}{5}$	$\frac{7}{6}$	$\frac{6}{7}$	
Sequence C	4	8	16	32	64	

Complete the table to show the n th term of each sequence.

[6]

14 $f(x) = 5 - 4x$

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

..... [1]

(b) Find $f(3 - 2x)$.

Give your answer in its simplest form.

..... [2]

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

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





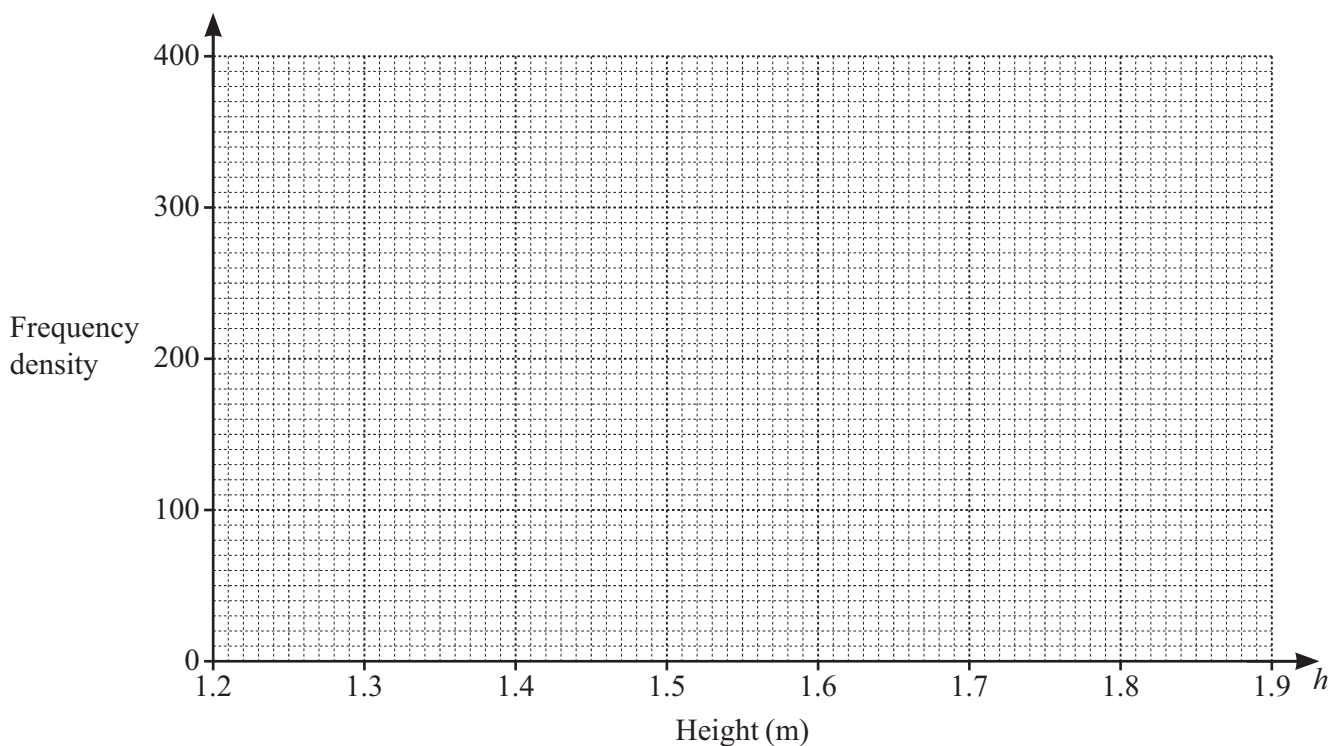
- 15 Virat records the height of each of 80 sunflowers.
The results are shown in the table.

Height (h m)	$1.2 < h \leq 1.5$	$1.5 < h \leq 1.6$	$1.6 < h \leq 1.7$	$1.7 < h \leq 1.9$
Frequency	12	20	34	14

- (a) Calculate an estimate of the mean height.

..... m [4]

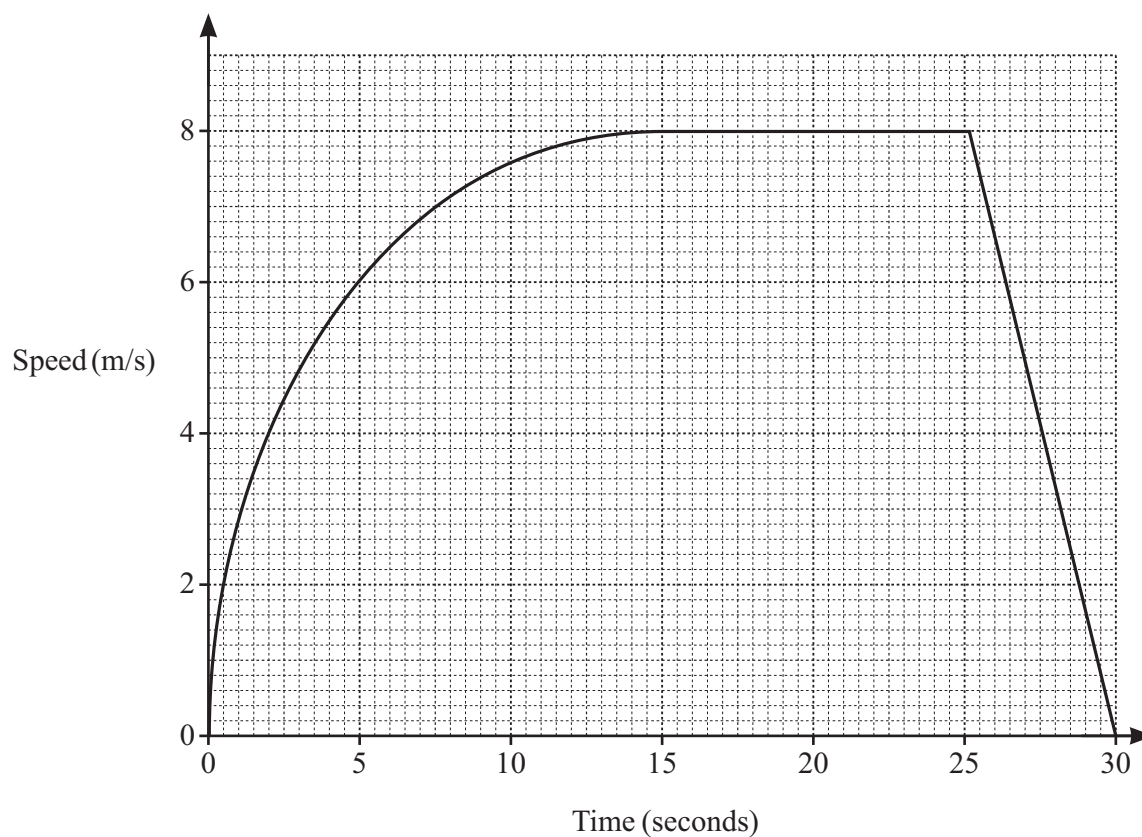
- (b) Draw a histogram to show the information in the table.



[3]



- 16 The graph shows the speed of a cyclist during a journey of 30 seconds.



- (a) Write down the acceleration of the cyclist between 15 seconds and 25 seconds.

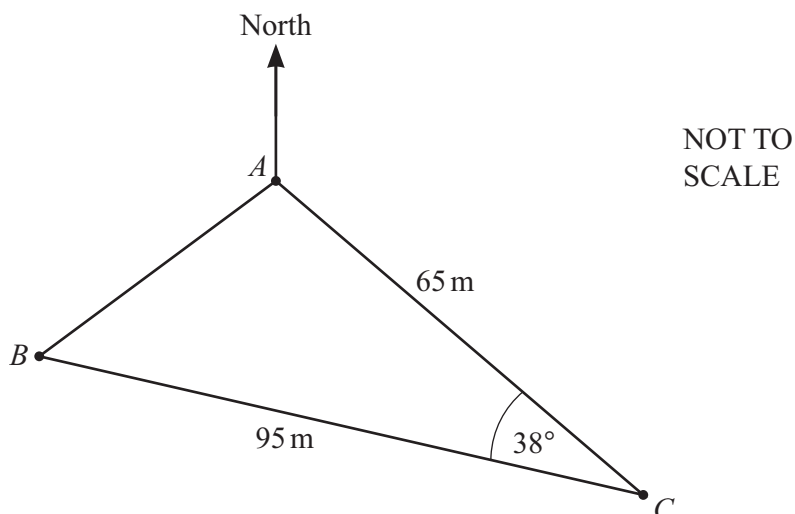
..... m/s^2 [1]

- (b) By drawing a tangent, find an estimate for the acceleration of the cyclist at 7.5 seconds.

..... m/s^2 [2]

- (c) Work out the average speed of the cyclist between 15 seconds and 30 seconds.

..... m/s [3]



The diagram shows three points A , B and C on horizontal ground.
The bearing of C from A is 145° and angle $ACB = 38^\circ$.
 $AC = 65$ m and $BC = 95$ m.

(a) Find the bearing of B from C .

..... [2]

(b) Show that $AB = 59.3$ m, correct to 1 decimal place.

[3]

(c) Angle BAC is obtuse.

Work out the bearing of B from A .

..... [4]





18 (a) Factorise.

$$18a^2 - 98$$

..... [2]

(b) Expand and simplify.

$$(x+4)(2x-1)(x-2)$$

..... [3]

19 Solve the equation $2 + 5 \cos x = 0$ for $0^\circ \leq x \leq 360^\circ$.

$x =$ or $x =$ [3]



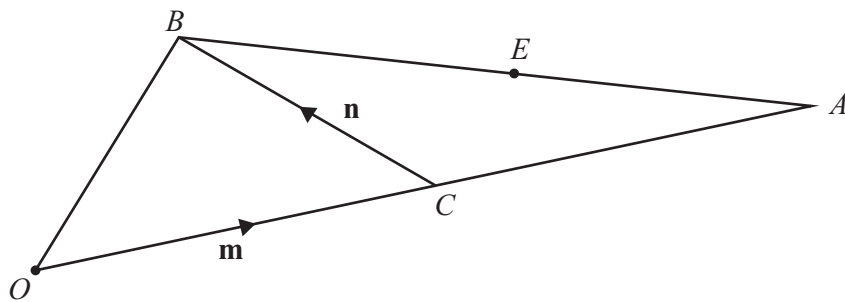


- 20 A piece of metal has volume 1240 cm^3 , correct to the nearest 20 cm^3 .
The mass of the piece of metal is 7800 g , correct to the nearest 100 g .

Calculate the lower bound of the density of the metal.
[Density = mass $\div$ volume.]

..... g/cm^3 [3]

21



NOT TO
SCALE

OAB is a triangle.
 C is the midpoint of OA .
 $\overrightarrow{OC} = \mathbf{m}$ and $\overrightarrow{CB} = \mathbf{n}$.
 E lies on AB and $AE : EB = 4 : 5$.

Find, in terms of $\mathbf{m}$ and $\mathbf{n}$, the position vector of E .
Give your answer in its simplest form.

..... [4]



- 22 The line $y = 4x + 12$ intersects the curve $y = 2x^2 - x - 3$ at point P and point Q .

Find the coordinates of P and Q .

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

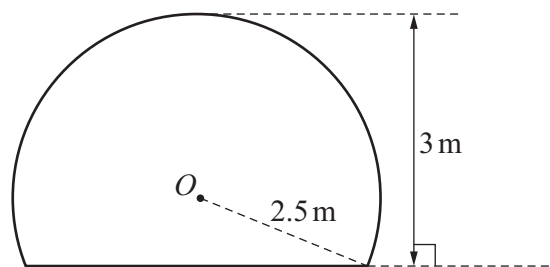
(..... ,)

(..... ,)

[6]

Question 23 is printed on the next page.





NOT TO
SCALE

The diagram shows the major segment of a circle, centre O , radius 2.5 m.
The segment is the cross section of a tunnel with height 3 m.
The length of the tunnel is 800 m and it has the same cross section throughout its length.

Calculate the volume of the tunnel.

..... m^3 [7]

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