Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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.

[Turn over

1 Write down a factor of 28 that is a prime number.

K

.....2..... [1]

2 Simplify.

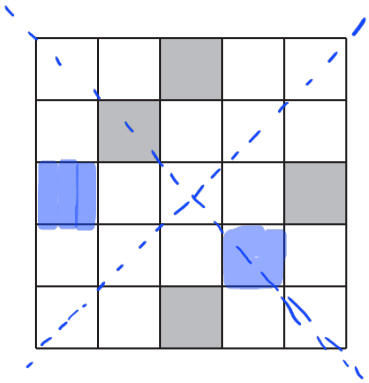
$4y^2 + 3y - y^2 + 2y$

K

.....$3y^2 + 5y$..... [2]

3

K



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

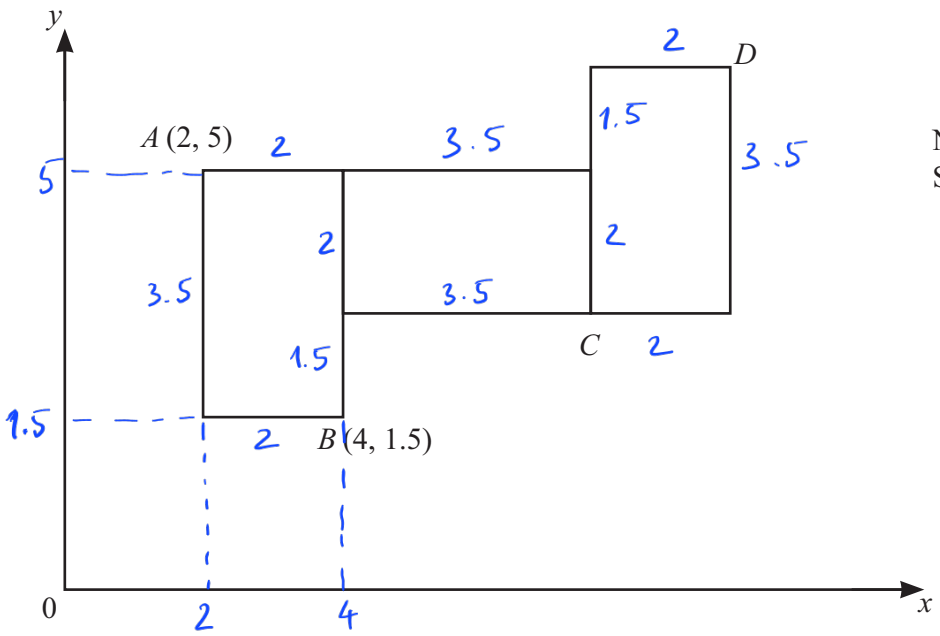
4 Calculate $\dfrac{20.24 - \sqrt[3]{30}}{6.5}$.

K

Give your answer correct to 1 decimal place.

.....2.6..... [2]

5



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 (7.5 , 3)

D (9.5 , 6.5)

[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.

$12 + 12 \times 30\% = 15.6$

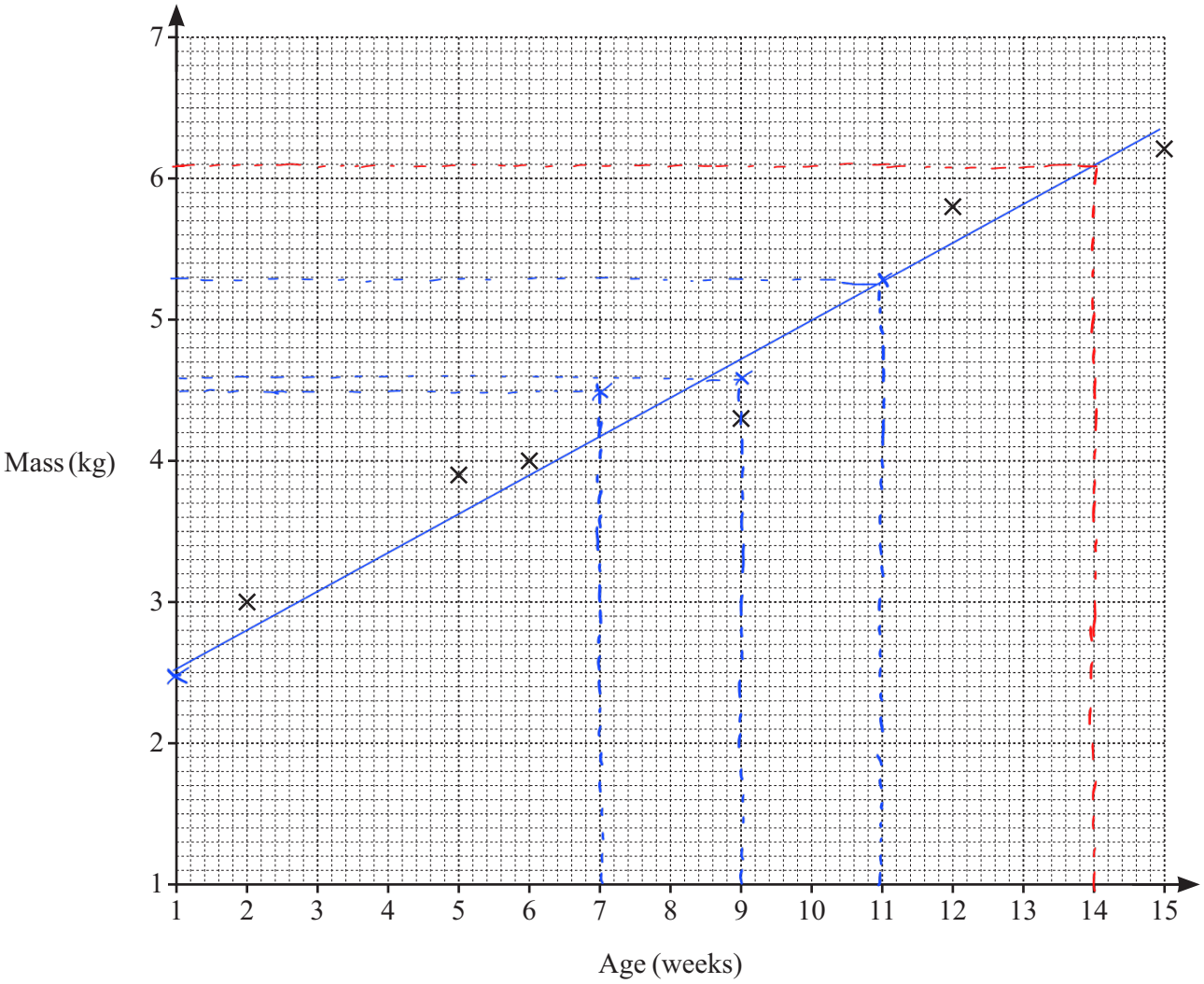
$12 \times 40 + (45.5 - 40) \times 15.6 = 565.8$

\$ 565.8 [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?

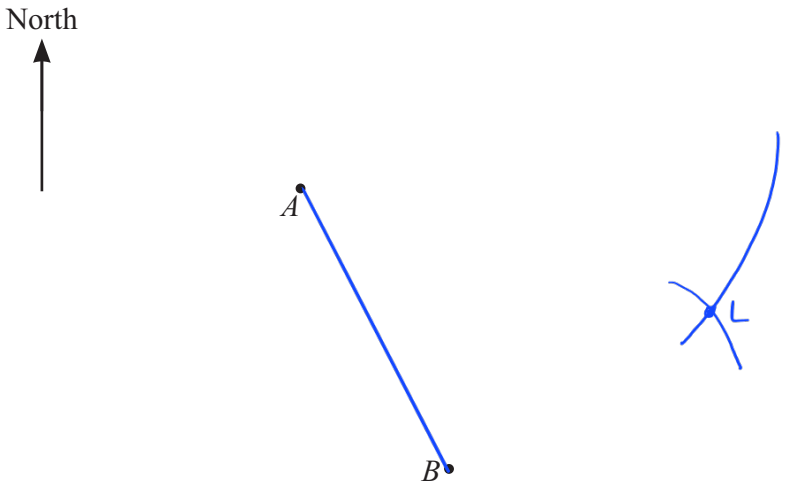
.....positive..... [1]

(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.

.....6.1..... kg [1]

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



Scale: 1 cm to 0.5 km

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

4.2 cm => 2.1 km

..... 2.1 ..... 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 0.00709 in standard form.

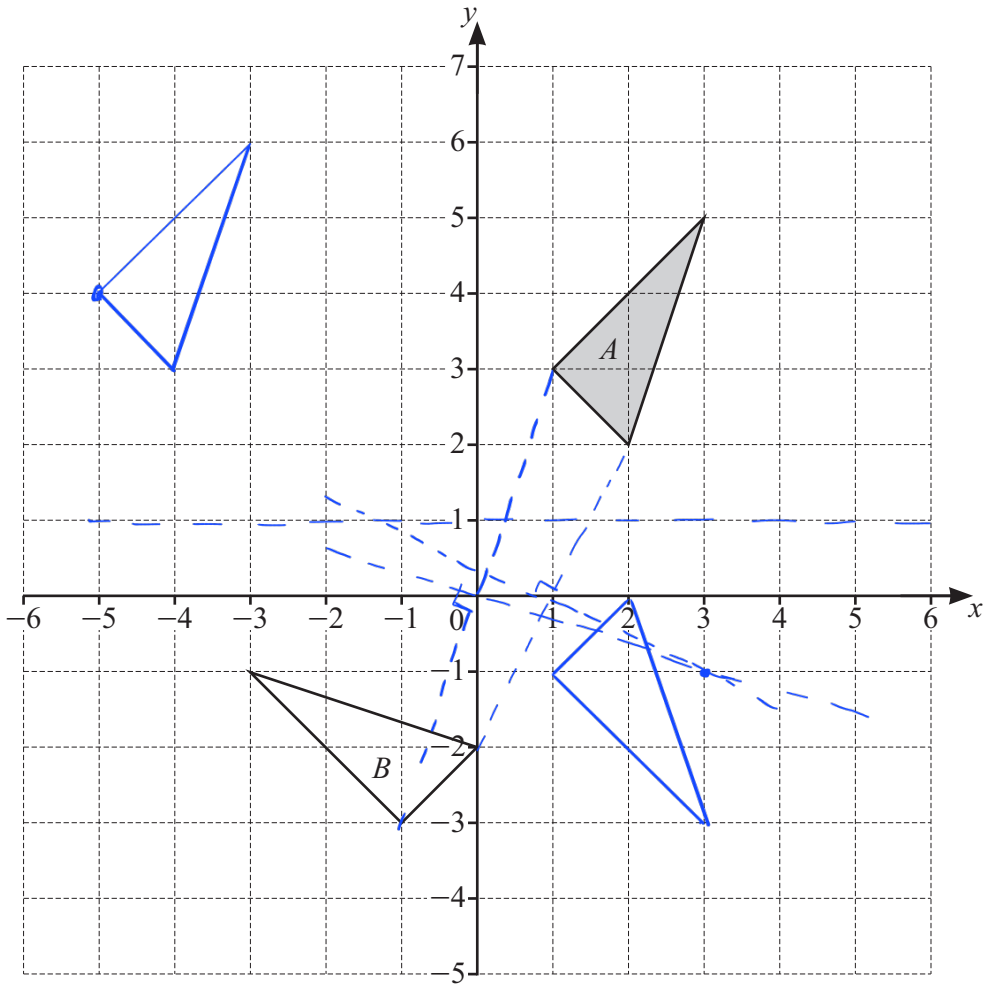
..... 7.09×10^{-3} ..... [1]

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

$(4 \times 10^4)^2 = 4^2 \times (10^4)^2 = 16 \times 10^8 = 1.6 \times 10^9$

..... 1.6×10^9 ..... [2]

10



(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.

Rotation 90° anticlockwise, center (3, −1)

[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.

$1500\left(1+\frac{4.2}{100}\right)^5 \approx 1840$

\$ ..... 1840 ..... [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.

$\text{final} = \text{initial}\left(1+\frac{x}{100}\right)^{11}$

$2 \times \text{initial} = \text{initial}\left(1+\frac{x}{100}\right)^{11}$

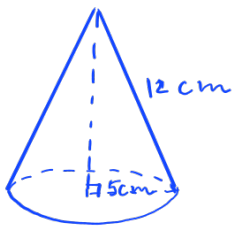
$\left(1+\frac{x}{100}\right)^{11} = 2$

$x = \left(\sqrt[11]{2} - 1\right) \times 100$

$x =$ ..... 6.50 ..... [3]

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

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



Total surface area =

$\pi r l + \pi r^2$

$= \pi \times 5 \times 12 + \pi \times 5^2$

≈ 267

..... 267 ..... 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	nth term
Sequence A	5	12	31	68	129	n^3+4
Sequence B	$\frac{10}{3}$	$\frac{9}{4}$	$\frac{8}{5}$	$\frac{7}{6}$	$\frac{6}{7}$	$\frac{11-n}{n+2}$
Sequence C	4	8	16	32	64	2^{n+1}

Complete the table to show the nth term of each sequence.

Sequence B → numerator : 10, 9, 8, 7, 6 → $11-n$

denominator : 3, 4, 5, 6, 7 → $n+2$

[6]

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

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

$5-4(-3)$

.....17..... [1]

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

Give your answer in its simplest form.

$5-4(3-2x) = 5-12+8x$

.....8x - 7..... [2]

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

$y = 5-4x$

$4x = 5-y$

$x = \frac{5-y}{4}$

$f^{-1}(x) =$ ..... $\frac{5-x}{4}$ ..... [2]

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

Mid point 1.35 1.55 1.65 1.8

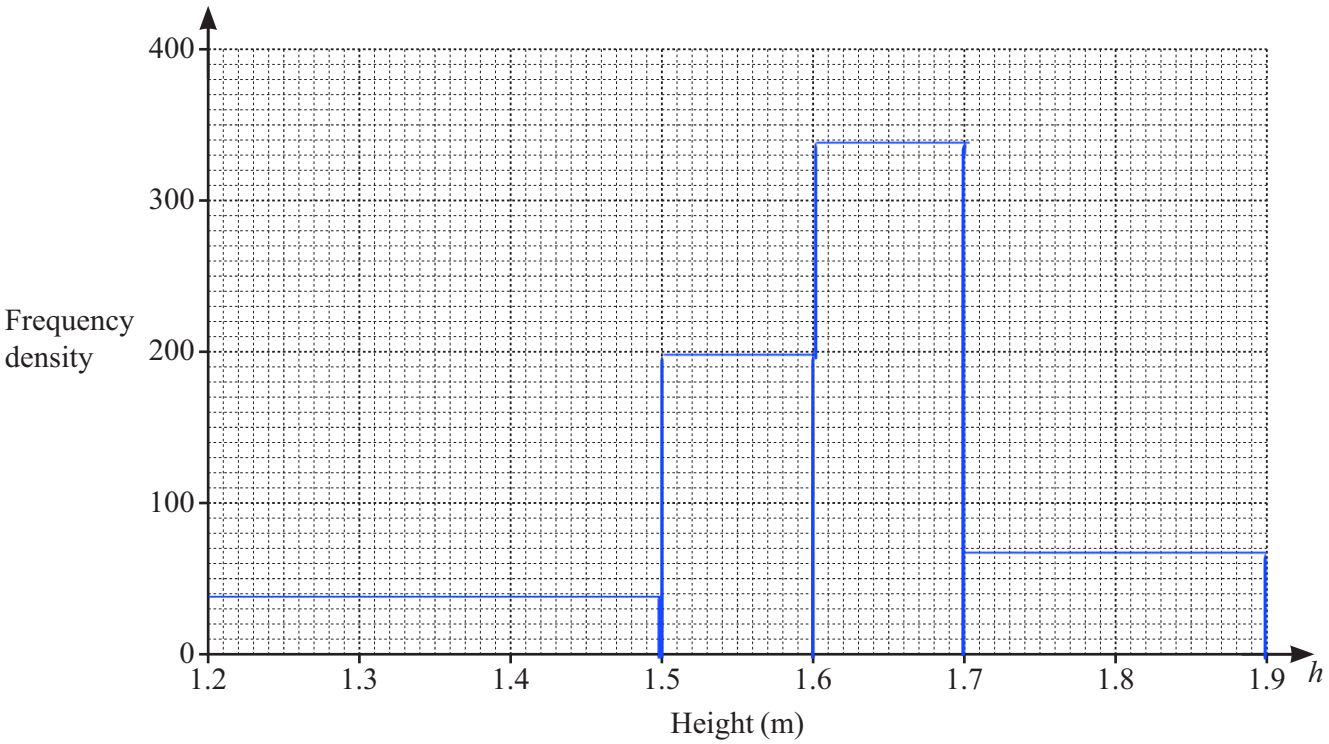
Height (h m)	$1.2 < h \leq 1.5$	$1.5 < h \leq 1.6$	$1.6 < h \leq 1.7$	$1.7 < h \leq 1.9$
Frequency	12	20	34	14

(a) Calculate an estimate of the mean height.

$$\frac{1.35 \times 12 + 1.55 \times 20 + 1.65 \times 34 + 1.8 \times 14}{80} = 1.60625$$

.....1.606 25..... m [4]

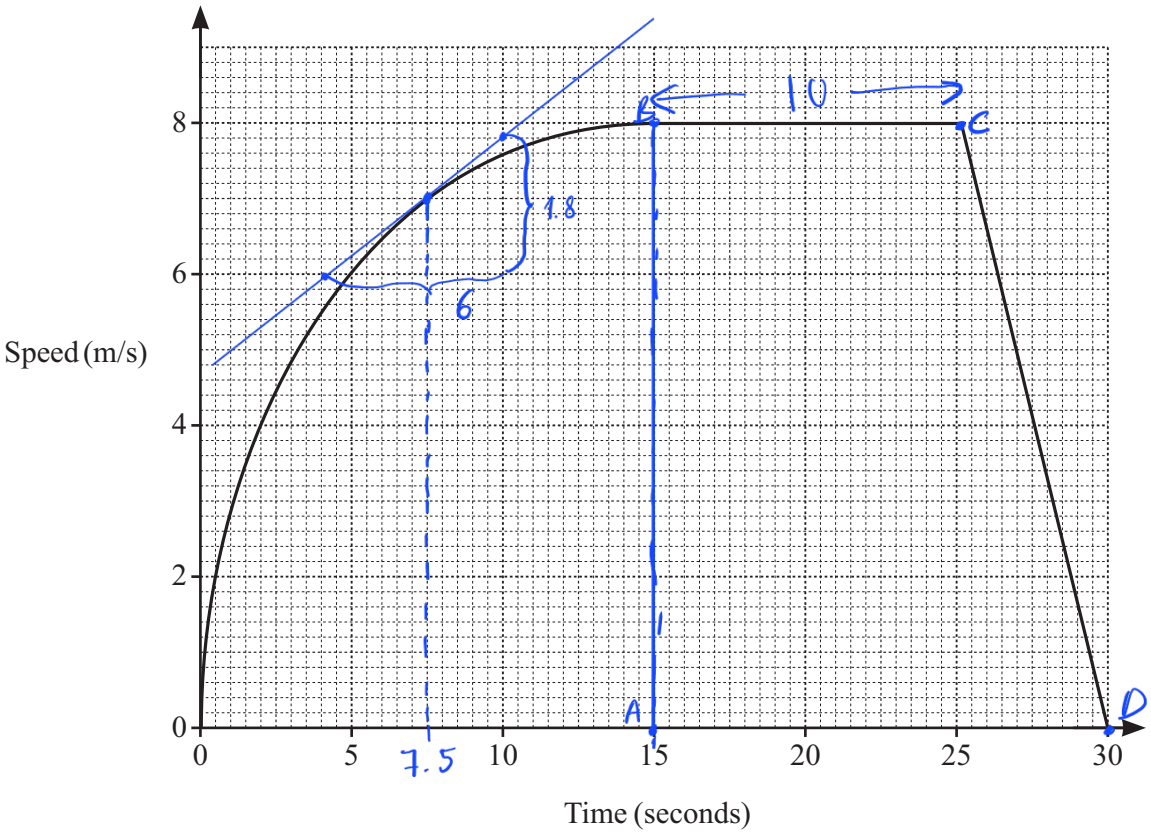
(b) Draw a histogram to show the information in the table.



[3]

Class interval	0.3	0.1	0.1	0.2
Fre. density	40	200	340	70

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.

0 m/s^2 [1]

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

$\frac{1.8}{6} = 0.3$

0.3 m/s^2 [2]

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

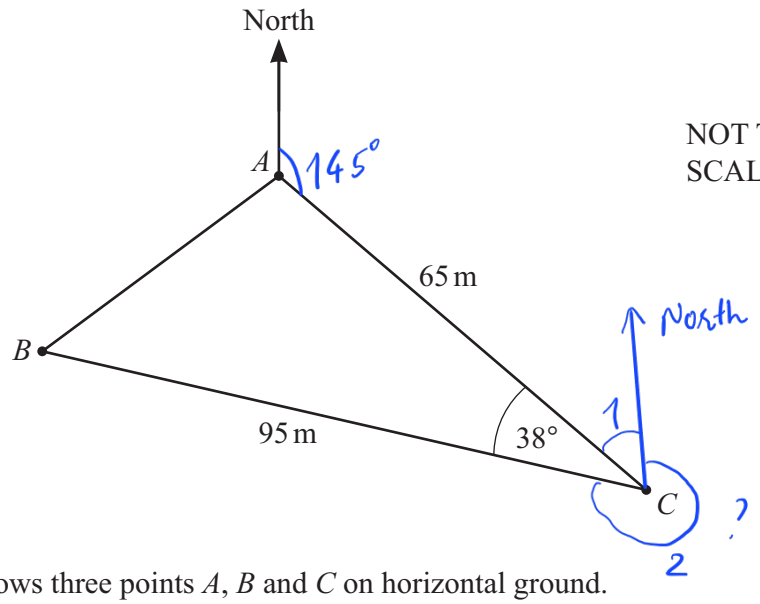
Distance travelled from 15 s to 30s = Area trapezium ABCD

$= \frac{10 + 15}{2} \times 8 = 100$

average speed = $\frac{\text{distance}}{\text{time}} = \frac{100}{15} \approx 6.67$

6.67 m/s [3]

17



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

(a) Find the bearing of B from C.

$\hat{C}_1 = 180° - 145° = 35°$

$\Rightarrow \hat{C}_2 = 360° - 35° - 38° = 287°$

.....287°..... [2]

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

$AB^2 = AC^2 + BC^2 - 2\,AC.BC.\cos 38°$

$AB^2 = 65^2 + 95^2 - 2 \times 65 \times 95 \cos 38°$

$AB^2 \approx 3518.067 \Rightarrow AB \approx 59.3$ [3]

(c) Angle BAC is obtuse.

Work out the bearing of B from A.

sine rule: $\frac{BC}{\sin \hat{BAC}} = \frac{AB}{\sin 38°}$

$\Rightarrow \sin \hat{BAC} = \frac{95 \sin 38°}{\sqrt{3518.067}} \approx 0.98608$

$\Rightarrow \hat{BAC}_{acute} \approx 80.429° \Rightarrow BAC_{obtuse} = 99.571°$

$\Rightarrow$ Bearing B from A $= 145° + 99.571°$

.....244.5°..... [4]

18 **(a)** Factorise.

$18a^2 - 98$

$2(9a^2 - 49) = 2[(3a)^2 - 7^2] = 2(3a-7)(3a+7)$

$2(3a-7)(3a+7)$ [2]

(b) Expand and simplify.

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

$(2x^2 + 8x - x - 4)(x-2)$

$= (2x^2 + 7x - 4)(x-2)$

$= 2x^3 + 7x^2 - 4x - 4x^2 - 14x + 8$

$= 2x^3 + 3x^2 - 18x + 8$

$2x^3 + 3x^2 - 18x + 8$ [3]

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

$5\cos x = -2$

$\cos x = -\frac{2}{5}$

$x = 113.6°$ or $x = -113.6°$ or $x = 246.4°$

Because $0° \leq x \leq 360°$ so $x = 113.6°$ or $x = 246.4°$

$x =$ 113.6° or $x =$ 246.4° [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.

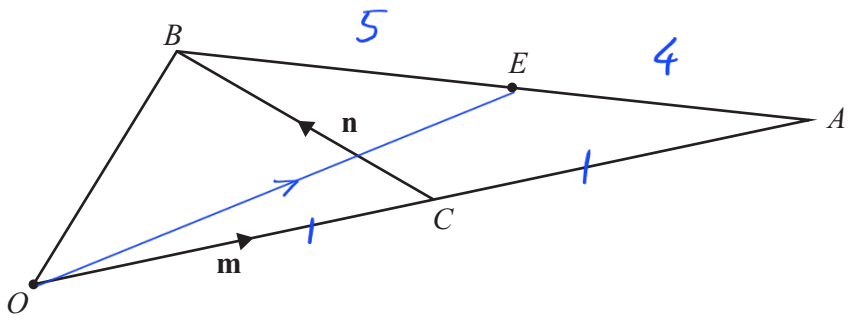
Calculate the lower bound of the density of the metal.
[Density = mass ÷ volume.]

Density (min) = $\frac{\text{mass (min)}}{\text{volume (max)}}$

$= \frac{7800 - 50}{1240 + 10} = 6.2$

..... 6.2 ..... 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 **m** and **n**, the position vector of *E*.
Give your answer in its simplest form.

$\overrightarrow{OB} = \overrightarrow{OC} + \overrightarrow{CB} = m + n$

$\overrightarrow{BA} = \overrightarrow{BO} + \overrightarrow{OA} = -(m+n) + 2m = m - n$

$\overrightarrow{BE} = \frac{5}{9}\overrightarrow{BA} = \frac{5}{9}(m-n)$

$\overrightarrow{OE} = \overrightarrow{OB} + \overrightarrow{BE} = m + n + \frac{5}{9}(m-n)$

..... $\frac{14}{9}m + \frac{4}{9}n$ ..... [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.

$4x + 12 = 2x^2 - x - 3$

$2x^2 - 5x - 15 = 0$

$x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 2(-15)}}{2 \times 2}$

$x \approx -1.7604$ or $x \approx 4.2604$

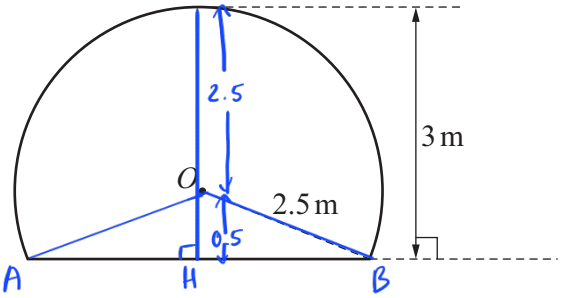
$y \approx 4.96$ or $y \approx 29.04$

(..-1.76....., ...4.96.....)

(..4.26....., ...29.04...)

[6]

23



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.

$\cos \widehat{BOH} = \frac{OH}{OB} = \frac{0.5}{2.5} = \frac{1}{5}$

$\Rightarrow \widehat{BOH} \approx 1.3694$ rad

$\Rightarrow \widehat{BOA} \approx 2.7388$ rad

$\Rightarrow \widehat{BOA}$ reflex $= 2\pi - 2.7388 \approx 3.5444$ rad

$\Rightarrow$ Area major sector $\widehat{BOA} = \frac{1}{2} \times 2.5^2 \times 3.5444$

≈ 11.07625

Area $\triangle AOB = \frac{1}{2} \times 2.5 \times 2.5 \sin 2.7388$

≈ 1.2250

$\Rightarrow$ Area of cross section: $11.07625 + 1.2250$

$= 12.30125$

Volume tunnel $= 12.30125 \times 800$

≈ 9840

..... 9840 ..... m^3 [7]