FOR OFFICIAL USE

N5 National Qualifications 2025

Mark

X847/75/01

Mathematics
Paper 1 (Non-calculator)

WEDNESDAY, 14 MAY
9:00 AM – 10:00 AM

X8477501

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth
Day Month Year

Scottish candidate number

Total marks — 40

Attempt ALL questions.

You must NOT use a calculator.

To earn full marks you must show your working in your answers.

State the units for your answer where appropriate.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA

X8477501

MARKS | DO NOT WRITE IN THIS MARGIN

Total marks — 40

Attempt ALL questions

1. Evaluate $2\frac{4}{5} \times \frac{2}{7}$.

   Give your answer in its simplest form. 2

$$2\frac{4}{5} \times \frac{2}{7}$$
$$= \frac{14^{2}}{5} \times \frac{2}{7_{1}}$$
$$= \frac{4}{5}$$

2. Expand and simplify $(x+3)(x+5)+4(x-2)$. 3

	x	$+3$
x	x^2	$+3x$
$+5$	$+5x$	$+15$

$$(x+3)(x+5)+4(x-2)$$
$$= x^2+8x+15+4x-8$$
$$= x^2+12x+7$$

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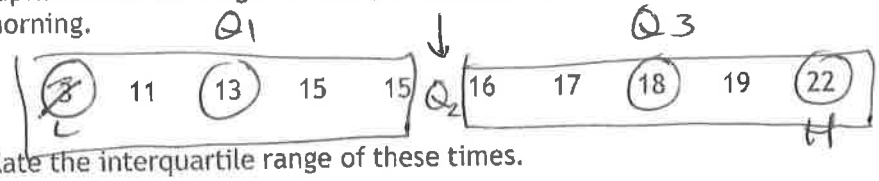
MARKS | DO NOT WRITE IN THIS MARGIN

3. Ten pupils record the length of time, in minutes, it takes them to walk to school one morning.



Calculate the interquartile range of these times. 2

IQR = $Q_3 - Q_1$
= 18 − 13
= 5

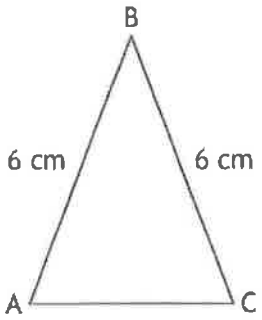
4. In a sale, the price of a wedding dress is reduced by 20%.
The sale price of the dress is £720.
Calculate the price of the dress before the sale. 3

%	£
80	720
10	90
100	900

£900

MARKS | DO NOT WRITE IN THIS MARGIN

5. Triangle ABC is shown in the diagram.



- AB = BC = 6 centimetres.
- $\sin B = \frac{2}{3}$.

Calculate the area of the triangle. 2

Area $= \frac{1}{2}ac\sin B$

$\frac{1}{2}(6)(6)\left(\frac{2}{3}\right)$

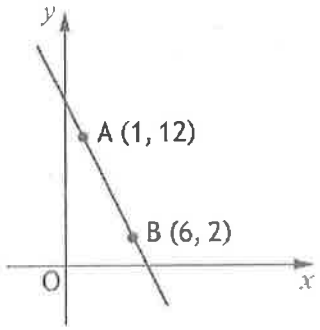
$= \frac{2}{3}$ of 18

$= 12\text{ cm}^2$

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

6. The diagram shows the straight line passing through points A and B.



Find the equation of the line AB.

Give the equation in its simplest form. 3

$M = \frac{12-2}{1-6}$

$= \frac{10}{-5}$

$= -2$

$y - 12 = -2(x-1)$

$y - 12 = -2x + 2$

$y = -2x + 14$

MARKS | DO NOT WRITE IN THIS MARGIN

7. A function is defined as $f(x) = 3x + 7$.

(a) Evaluate $f(6)$. 1

$f(6) = 3(6) + 7$

$= 18 + 7$

$= 25$

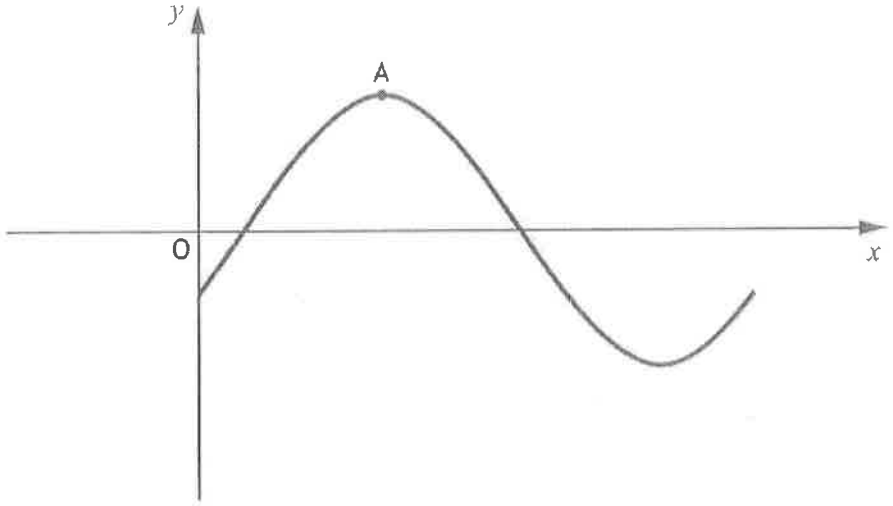
(b) Given that $f(p) = 19$, find the value of p. 2

$f(p) = 3p + 7 \quad \therefore 3p + 7 = 19$

$3p = 12$

$p = 4$

8. Part of the graph of $y = 2\sin(x - 30)°$ is shown in the diagram.



The graph has a maximum turning point at A.

State the coordinates of A. 2

shifted 30° right.

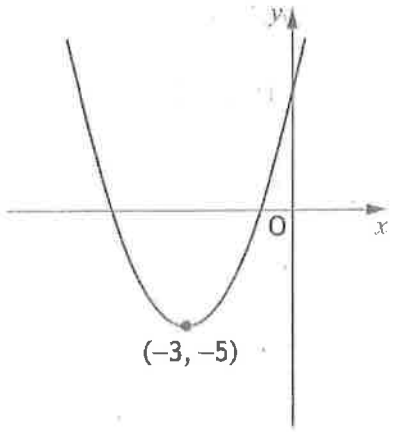
should be (90°, 2)

$\therefore$ (120°, 2)

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

9. The diagram shows a parabola with equation of the form $y=(x+a)^2+b$.



(a) State the value of a. 1

$a=3$

(b) State the value of b. 1

$b=-5$

10. Simplify $\dfrac{n^7\times(n^3)^2}{n^4}$. 3

$$\frac{n^7 \times (n^3)^2}{n^4} = \frac{n^7 \times n^6}{n^4}$$

$$= \frac{n^{13}}{n^4}$$

$$= n^9$$

MARKS | DO NOT WRITE IN THIS MARGIN

11. Determine the nature of the roots of the function $f(x) = 3x^2 + 2x + 1$. 2

$a = 3$
$b = 2$
$c = 1$

$b^2 - 4ac$
$= 2^2 - 4(3)(1)$
$= 4 - 12$
$= -8$
$b^2 - 4ac < 0$ ∴ no real roots.

12. Express $\frac{6}{\sqrt{10}}$ with a rational denominator.

Give your answer in its simplest form. 2

$\frac{6}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}}$

$= \frac{6\sqrt{10}}{10}$

$= \frac{3\sqrt{10}}{5}$

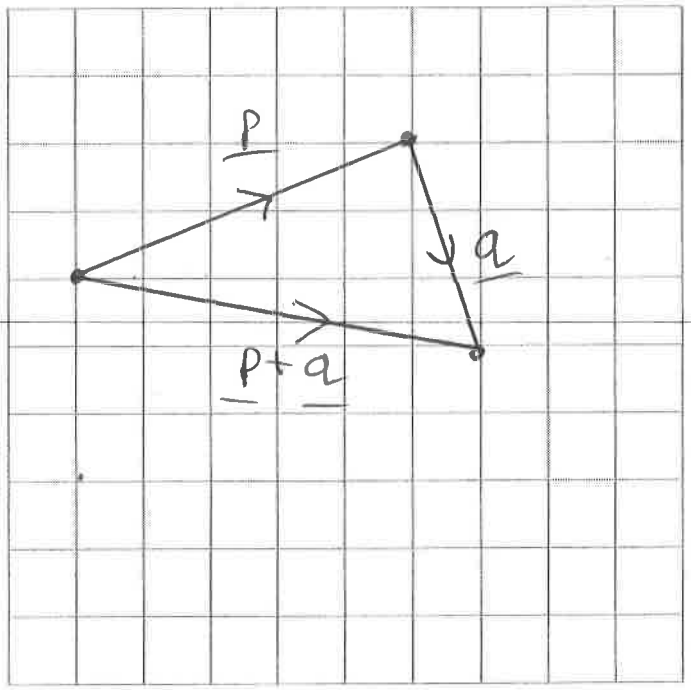
[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

13. Vectors $\mathbf{p}$ and $\mathbf{q}$ have components $\mathbf{p} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$.

Draw the resultant vector $\mathbf{p} + \mathbf{q}$ on the grid. **2**

(An additional grid, if required, can be found on *page 14*.)



MARKS | DO NOT WRITE IN THIS MARGIN

14. Express

$$\frac{5}{x-1} - \frac{4}{x}, \quad x \neq 1, \ x \neq 0$$

as a single fraction in its simplest form. 3

$$\frac{5}{x-1} - \frac{4}{x}$$

$$= \frac{5x - 4(x-1)}{x(x-1)}$$

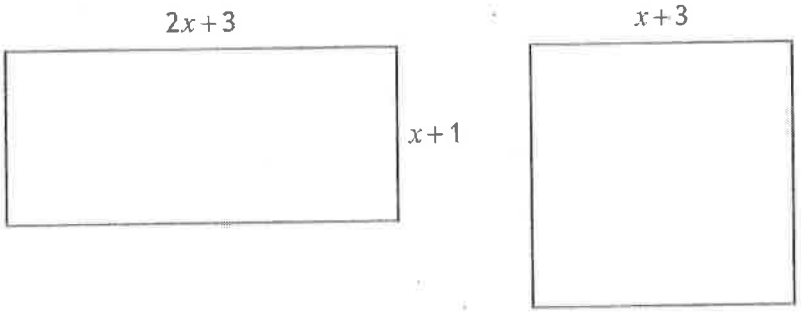
$$= \frac{5x - 4x + 4}{x(x-1)}$$

$$= \frac{x+4}{x(x-1)}$$

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

15. The diagrams of a rectangle and square are shown below.
All measurements are in centimetres.



(a) Find an expression for the area of the **rectangle**. 1

$A = (2x+3)(x+1)$

(b) Given that the area of the rectangle is equal to the area of the square, show that $x^2 - x - 6 = 0$. 2

$(2x+3)(x+1) = (x+3)(x+3)$

$2x^2 + 5x + 3 = x^2 + 6x + 9$

$x^2 - x - 6 = 0$

(as required)

	2x	+3
x	$2x^2$	+3x
+1	+2x	+3

	x	+3
x	x^2	+3x
+3	+3x	+9

MARKS | DO NOT WRITE IN THIS MARGIN

15. (continued)

(c) Hence find, algebraically, the length and breadth of the rectangle. 3

	x	-3
x	x^2	$-3x$
$+2$	$+2x$	-6

-6

$1 \quad 6$

$+2 \quad -3$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

$x = 3, \quad x = -2$

[END OF QUESTION PAPER]

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N5

National Qualifications 2025

Mark

X847/75/02

Mathematics Paper 2

WEDNESDAY, 14 MAY

10:30 AM – 12:00 NOON

X8477502

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day Month Year

Scottish candidate number

Total marks — 50

Attempt ALL questions.

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SQA

X8477502 01

MARKS | DO NOT WRITE IN THIS MARGIN

Total marks — 50

Attempt ALL questions

1. The number of visitors to a zoo in 2024 was 118 750.

   The number of visitors is expected to increase by 4% each year over the next two years.

   Calculate the expected number of visitors in 2026. 3

+4% → 104%

= 1·04

118750×1.04^2

= 128 440

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

2. A shop sells footballs in the shape of a sphere with diameter 21 centimetres.

Calculate the volume of the football.

Give your answer correct to 3 significant figures. 3

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

$= \frac{4}{3}\pi(10.5)^3$

$= 4849.048...$

$= 4850\ cm^3$ (3sf)

MARKS | DO NOT WRITE IN THIS MARGIN

3. The mass of one atom of gold is 3.27×10^{-22} grams.
The mass of one atom of carbon is 6.1% of the mass of an atom of gold.
Calculate the mass of one atom of carbon.
Give your answer in scientific notation. 2

6.1% of 3.27×10^{-22}
$= 3.27 \times 10^{-22} \times 0.061$
$= 1.9947 \times 10^{-23}$ g

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

4. The weights, in kilograms, of a sample of rugby players in Scotland are shown.

93 103 99 105 88 106 92

(a) Calculate the mean and standard deviation of these weights. 4

x	$x-\bar{x}$	$(x-\bar{x})^2$
93	−5	25
103	5	25
99	1	1
105	7	49
88	−10	100
106	8	64
92	−6	36
686	0	300

$\bar{x} = \frac{686}{7}$

$= 98\text{kg}$

$s = \sqrt{\frac{300}{6}}$

$= 7.07\text{kg}$

MARKS | DO NOT WRITE IN THIS MARGIN

4. (continued)

A sample of rugby players in France has a mean weight of 105 kilograms and a standard deviation of 5.9 kilograms.

(b) Make two valid comments comparing the **weights** of the rugby players in the samples from Scotland and France. 2

On average, French players are heavier (as 105kg > 98kg).
The weights of French players are more consistent (as 5.9 < 7.07)

5. Express $x^2+10x+19$ in the form $(x+a)^2+b$. 2

$(x+5)^2+19-25$
$= (x+5)^2-6$

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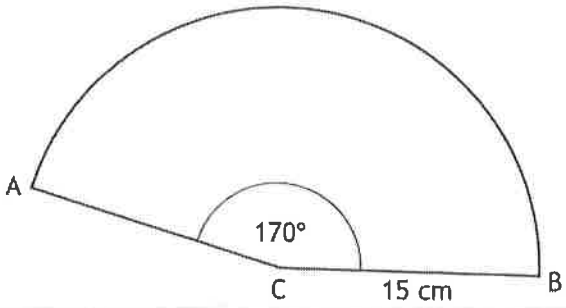
MARKS | DO NOT WRITE IN THIS MARGIN

6. A party hat is made in the shape of a cone, as shown.

The piece of card used for making the hat is a sector of a circle, centre C.



The radius of the circle is 15 centimetres and angle ACB is 170°.

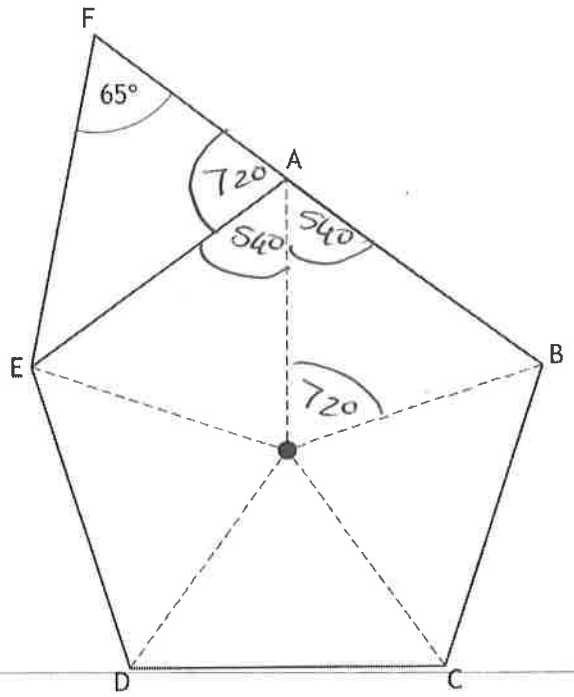
Calculate the area of the sector. 3

$$\text{Area} = \frac{170}{360}\pi(15)^2$$

$$= 333.8 \text{ cm}^2$$

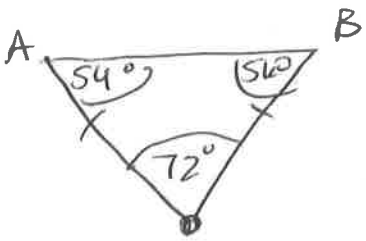
MARKS | DO NOT WRITE IN THIS MARGIN

7. In the diagram, ABCDE is a regular pentagon.
   - Angle EFA is 65°.
   - FAB is a straight line.



Calculate the size of angle FEA. 2

$360 \div 5 = 72^\circ$



$180 - 72$
$= 108$
$108 \div 2 = 54^\circ$

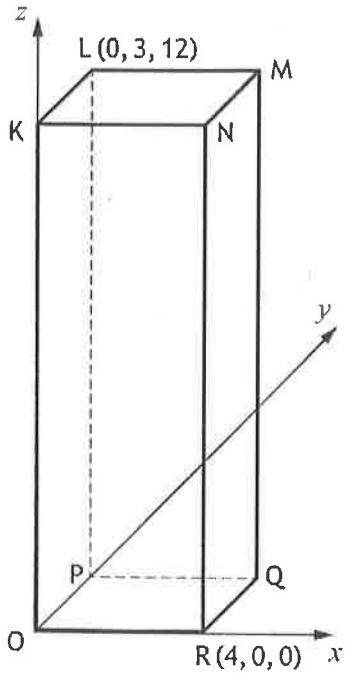
$\angle FAE = 180 - (54^\circ + 2)$
$= 72^\circ$

$\angle FEA = 180 - (65 + 72)$
$= 43^\circ$

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

8. The diagram shows a cuboid, KLMNOPQR, relative to the coordinate axes.



L has coordinates (0, 3, 12).

R has coordinates (4, 0, 0).

(a) Write down the coordinates of M. **1**

$M = (4, 3, 12)$

(b) Calculate the length of the space diagonal OM. **3**

$\overrightarrow{OM} = \begin{pmatrix} 4 \\ 3 \\ 12 \end{pmatrix}$

$|\overrightarrow{OM}| = \sqrt{4^2 + 3^2 + 12^2}$

$= \sqrt{16 + 9 + 144}$

$= \sqrt{169}$

$= 13$ units

MARKS | DO NOT WRITE IN THIS MARGIN

9. Change the subject of the formula $B = \frac{1}{4}kc^2 - 3c$ to k. 3

$$\frac{1}{4}kc^2 - 3c = B$$
$$\frac{1}{4}kc^2 = B + 3c$$
$$kc^2 = 4(B+3c)$$
$$k = \frac{4(B+3c)}{c^2}$$

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

10. On Bob's lorry there are 7 stacks of paving slabs and 3 stacks of edging blocks.
The total weight of these stacks is 2400 kilograms.
Let p be the weight of a stack of paving slabs and e be the weight of a stack of edging blocks.

(a) Write down an equation in p and e to illustrate this information. 1

$7p + 3e = 2400$ (1)

Imran has 3 stacks of paving slabs and 4 stacks of edging blocks on his lorry.
The total weight of these stacks is 1300 kilograms.

(b) Write down an equation in p and e to illustrate this information. 1

$3p + 4e = 1300$ (2)

Beth has 6 stacks of paving slabs and 5 stacks of edging blocks on her lorry.

(c) Calculate the ~~total weight of the stacks of paving slabs and edging blocks~~ on Beth's lorry. 4

(1) $\times 4 \rightarrow 28p + 12e = 9600$ (3)
(2) $\times 3 \rightarrow 9p + 12e = 3900$ (4)

(3) − (4) $19p = 5700$

$p = 300$ ∴ Paving slabs = 300kg

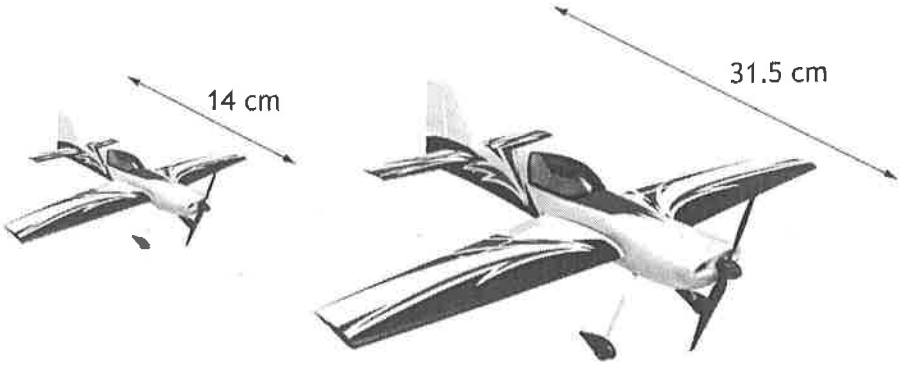
Sub 300 for p in (1)

$7(300) + 3e = 2400$
$2100 + 3e = 2400$
$3e = 300$
$e = 100$ ∴ Edging slabs = 100kg

$6p + 5e = 6(300) + 5(100)$
$= 2300$kg

MARKS | DO NOT WRITE IN THIS MARGIN

11. Two model aircraft are mathematically similar.



The small model is 14 centimetres long, and the area of one wing is 24 square centimetres.

The large model is 31.5 centimetres long.

Calculate the area of one wing of the large model. 3

$SF = \frac{31.5}{14}$

$= \frac{9}{4}$.

$\text{Area} = 24 \times SF^2$

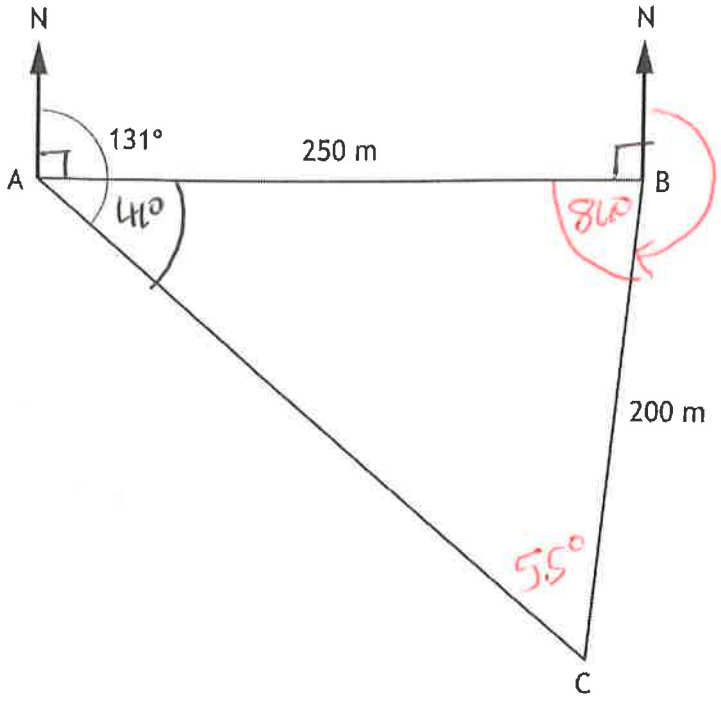
$= 24 \times \left(\frac{9}{4}\right)^2$

$= 121.5 \text{ cm}^2$

[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

12. In the diagram A, B and C represent the positions of three checkpoints in an orienteering course.



- B is 250 metres east of A.
- The bearing of C from A is 131°.
- C is 200 metres from B.

Calculate the bearing of C from B.
Do not use a scale drawing.

∴ Find ∠ABC (need ∠ACB first!) 4

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

$\therefore \frac{200}{\sin 41} = \frac{250}{\sin C}$

$200 \sin C = 250 \sin 41$

$\sin C = \frac{250 \sin 41}{200}$

$C = \sin^{-1}\left(\frac{250 \sin 41}{200}\right)$

$= 55°$

$\angle ABC = 180 - (41 + 55)$

$= 84°$

∴ Bearing

$= 360 - (90 + 84)$

$= 186°$

MARKS | DO NOT WRITE IN THIS MARGIN

13. Solve the equation $\frac{5x+1}{2} = \frac{4x}{3} + 1$. 3

Method 1

$\frac{5x+1}{2} - \frac{4x}{3} = 1$

$\frac{3(5x+1) - 2(4x)}{6} = 1$

$\frac{15x+3-8x}{6} = 1$

$\frac{7x+3}{6} = 1$

$7x+3 = 6(1)$

$7x+3 = 6$

$7x = 3$

$x = \frac{3}{7}$

Method 2

$2\left(\frac{5x+1}{2}\right) = 2\left(\frac{4x}{3}+1\right)$

$5x+1 = \frac{8x}{3} + 2$

$3(5x+1) = 3\left(\frac{8x}{3}+2\right)$

$15x+3 = 8x+6$

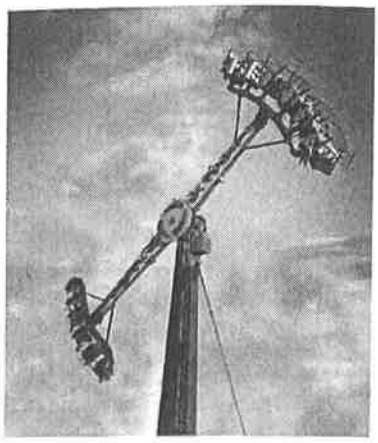
$15x-8x = 6-3$

$7x = 3$

$x = \frac{3}{7}$

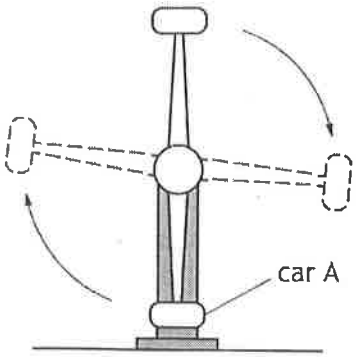
[Turn over

14. A ride at a theme park has a car attached to each end of a rotating arm.



MARKS | DO NOT WRITE IN THIS MARGIN

The starting position of car A is shown in the diagram.



As the arm rotates clockwise, the height, h metres, of car A above the ground in each rotation is given by

$$h = 10 - 8\cos x°, \quad 0 \leq x < 360$$

where $x°$ is the angle the arm has turned from car A's starting position.

Calculate the **two** values of x for which the height of car A is 13 metres above the ground. 4

$13 = 10 - 8\cos x$

$8\cos x + 13 = 10$

$8\cos x = -3$

$\cos x = -\frac{3}{8}$

$x = "\cos^{-1}\left(\frac{3}{8}\right)"$

$x = "68°"$

180 −

S | A

T | C

180 +

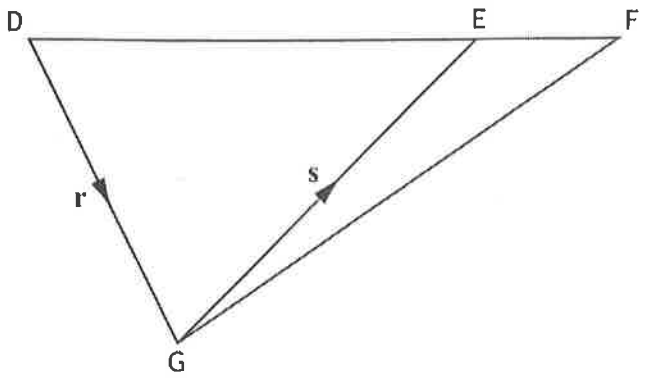
$180 - 68 = 112°$

$180 + 68 = 248°$

$\therefore x = 112°, 248°$

MARKS | DO NOT WRITE IN THIS MARGIN

15. In the diagram, $\overrightarrow{DG}$ and $\overrightarrow{GE}$ are represented by the vectors **r** and **s** respectively, and $\overrightarrow{DE} = 3\overrightarrow{EF}$.



Express $\overrightarrow{GF}$ in terms of **r** and **s**.

Give your answer in its simplest form. **2**

$\overrightarrow{DE} = 3\overrightarrow{EF}$

$\therefore \overrightarrow{EF} = \frac{1}{3}\overrightarrow{DE}$

$\overrightarrow{DE} = \underline{r} + \underline{s}$

$\overrightarrow{Df} = \overrightarrow{DE} + \overrightarrow{Ef}$

$= \overrightarrow{DE} + \frac{1}{3}\overrightarrow{DE}$

$= \frac{4}{3}\overrightarrow{DE}$

$\overrightarrow{Gf} = \overrightarrow{GD} + \overrightarrow{Df}$

$= -\overrightarrow{DG} + \overrightarrow{Df}$

$= -\underline{r} + \frac{4}{3}(\underline{r} + \underline{s})$

$= -\underline{r} + \frac{4}{3}\underline{r} + \frac{4}{3}\underline{s}$

$= \frac{1}{3}\underline{r} + \frac{4}{3}\underline{s}$

[END OF QUESTION PAPER]