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N5

National Qualifications 2022 MODIFIED

Mark

X847/75/02

Mathematics Paper 2

WEDNESDAY, 4 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.

You may 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 ©

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FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle $A = \frac{1}{2}ab\sin C$

Volume of a sphere $V = \frac{4}{3}\pi r^3$

Volume of a cone $V = \frac{1}{3}\pi r^2 h$

Volume of a pyramid $V = \frac{1}{3}Ah$

Standard deviation $s = \sqrt{\dfrac{\Sigma(x - \bar{x})^2}{n - 1}}$

or $s = \sqrt{\dfrac{\Sigma x^2 - \dfrac{(\Sigma x)^2}{n}}{n - 1}}$, where n is the sample size.

Total marks — 50

Attempt ALL questions

1. Expand and simplify $(3x-2)(2x^2+5x-1)$. **3**

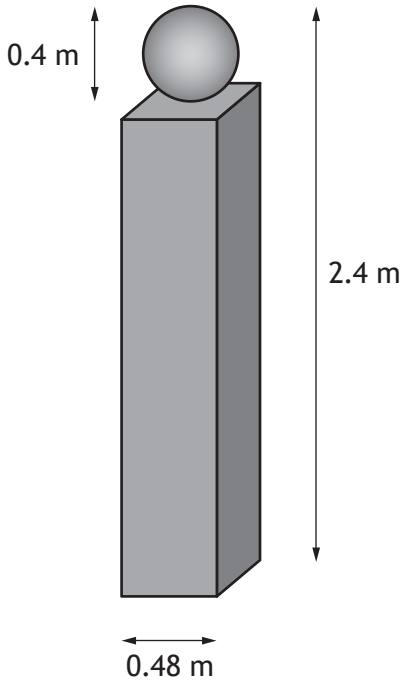
2. A company's annual profit at the end of 2021 was £215,000.

The profit is expected to increase by 3% each year.

Calculate the company's expected annual profit by the end of 2025.

Give your answer correct to the nearest thousand pounds. **3**

3. A concrete gatepost is made in the shape of a cuboid with a sphere on top.



The sphere has diameter 0.4 metres.

The cuboid has a square base of length 0.48 metres.

The total height of the gatepost is 2.4 metres.

Calculate the volume of concrete needed to make a gatepost. **3**

4. Moira buys 4 mangoes and 3 apples at a fruit shop.

The total cost is £4.25.

(a) Write down an equation to illustrate this information. **1**

Sami buys 5 mangoes and 2 apples in the same fruit shop.

The total cost is £4.70.

(b) Write down an equation to illustrate this information. **1**

(c) Calculate, algebraically, the cost of a mango and the cost of an apple. **4**

5. A school netball team recorded the number of sit-ups each player completed in a minute.

The numbers for the seven players were:

29 27 24 31 22 19 30

(a) Calculate the mean and standard deviation of the numbers of sit-ups. **4**

5. (continued)

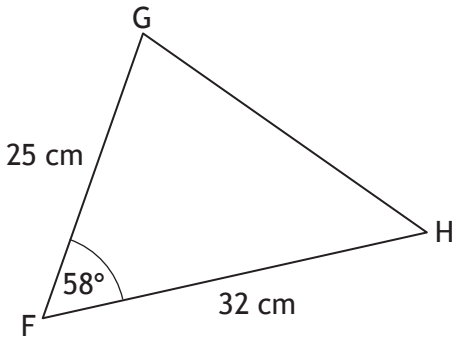
Some players in the school's hockey team also recorded the number of sit-ups they completed in a minute.

Their numbers gave a mean of 29 and a standard deviation of 3.2.

(b) Make two valid comments comparing the numbers of sit-ups of the players in the netball team and the hockey team. **2**

6. The diagram shows triangle FGH.

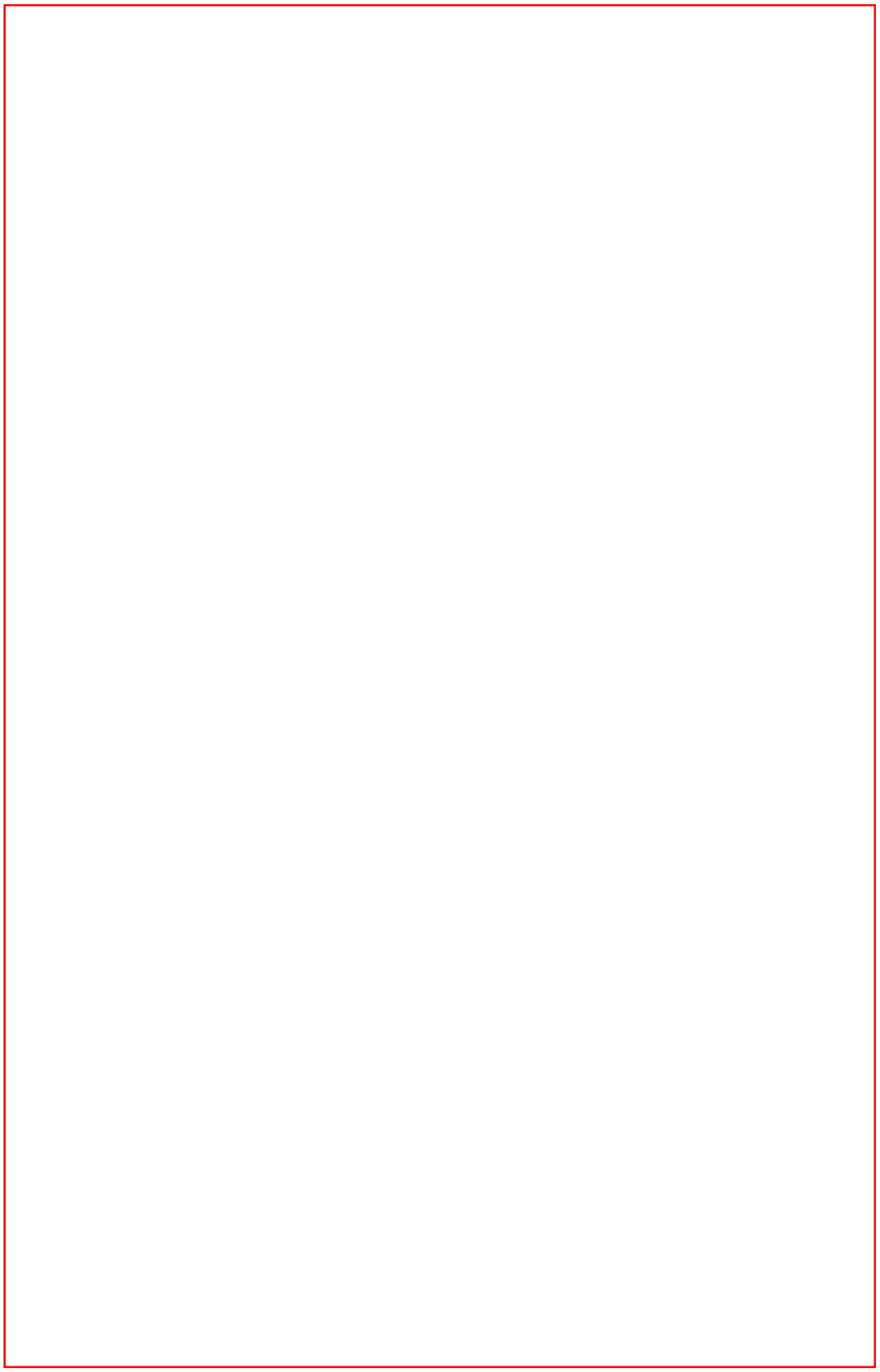
- FG = 25 centimetres
- FH = 32 centimetres
- Angle GFH = 58°



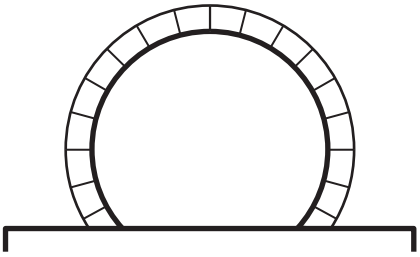
Calculate the area of triangle FGH. **2**

7. Solve the equation $4x^2 + 2x - 7 = 0$.

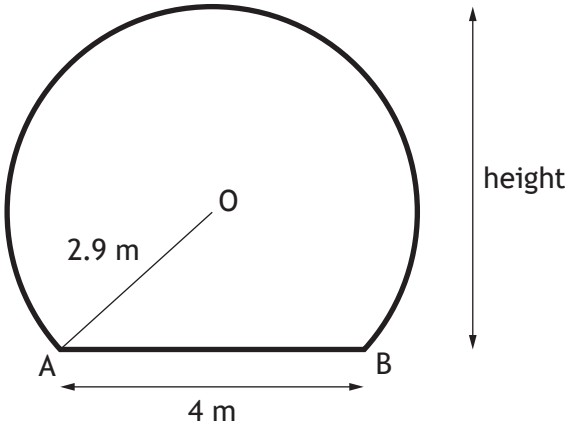
Give your answers correct to 2 significant figures. **4**



8. A train tunnel has a circular cross-section with a horizontal floor.



A diagram of the cross-section is shown below.



- The centre of the circle is O.
- Chord AB is 4 metres.
- The radius OA is 2.9 metres.

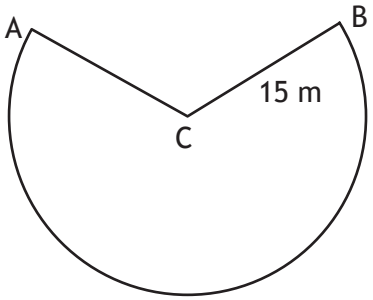
Calculate the height of the tunnel. **4**

MARKS | DO NOT WRITE IN THIS MARGIN

9. Solve the equation $3\sin x^\circ + 4 = 6$, for $0 \leq x \leq 360$. **3**

10. An attraction at a theme park has a carriage attached to an arm.

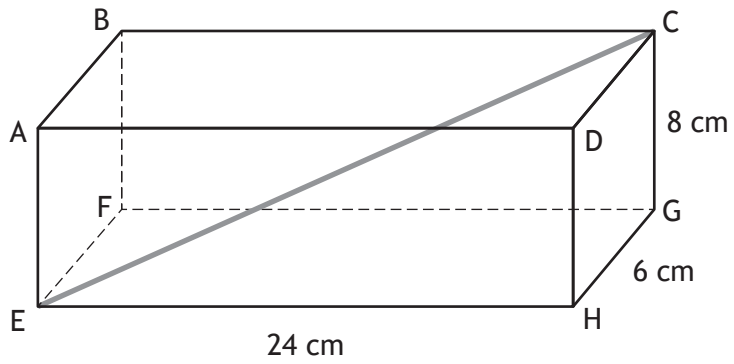
The arm swings from A to B along the arc of a circle, centre C, as shown in the diagram below.



- The length of the arm, CB, is 15 metres.
- The length of the major arc, AB, is 69.4 metres.

Calculate the size of the reflex angle ACB. **3**

11. The diagram shows a cuboid, ABCDEFGH.



- The length of the cuboid, EH, is 24 centimetres.
- The breadth of the cuboid, HG, is 6 centimetres.
- The height of the cuboid, CG, is 8 centimetres.

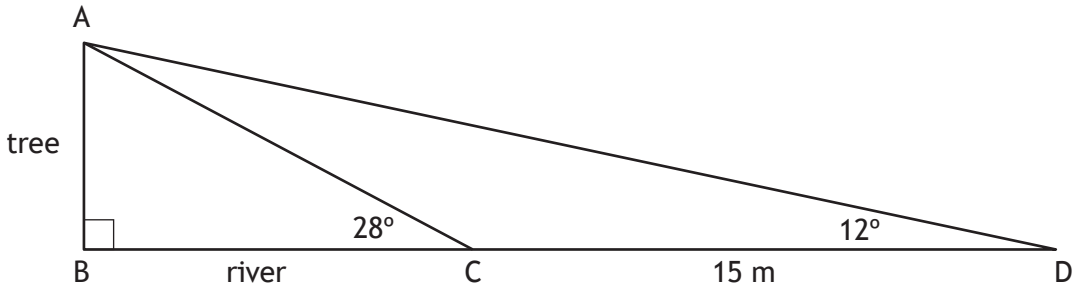
Calculate the length of EC, the space diagonal of the cuboid. **3**

12. Simplify $\frac{2ab+6a}{b^2-9}$. **3**

13. Simplify $\frac{\sin x^\circ + 2\cos x^\circ}{\cos x^\circ}$. **2**

14. The width of a river is represented by BC in the diagram below.

AB represents a tree on the river bank.



- From C, the angle of elevation to A is 28°.
- From D, the angle of elevation to A is 12°.
- The distance from C to D is 15 metres.
- BCD is a straight line.

Calculate BC, the width of the river. **5**

[END OF QUESTION PAPER]

MARKS | DO NOT WRITE IN THIS MARGIN

ADDITIONAL SPACE FOR ANSWERS

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