

Dr Oliver Mathematics
Mathematics: National Qualifications N5
2022 Paper 2: Calculator
1 hour 30 minutes

The total number of marks available is 50.

You must write down all the stages in your working.

1. Expand and simplify

$$(3x - 2)(2x^2 + 5x - 1).$$

(3)

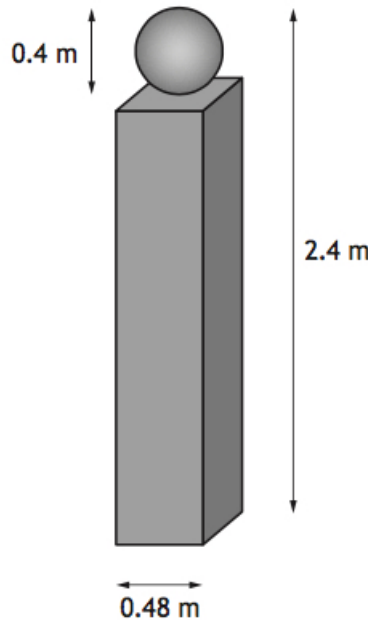
2. A company's annual profit at the end of 2021 was £215 000.
The profit is expected to increase by 3% each year.

(3)

Calculate the company's expected annual profit by the end of 2025.
Give your answer correct to the nearest thousand pounds.

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.

(3)



Calculate the volume of concrete needed to make a gatepost.

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:

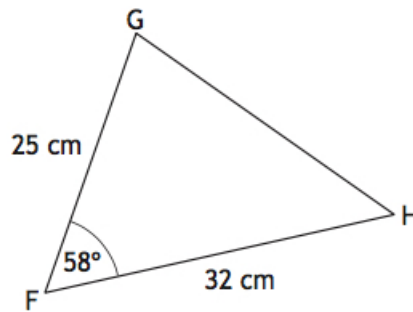
29 27 24 31 22 19 30

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

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 . (2)



- $FG = 25$ centimetres.
- $FH = 32$ centimetres.
- Angle $GFH = 58^\circ$.

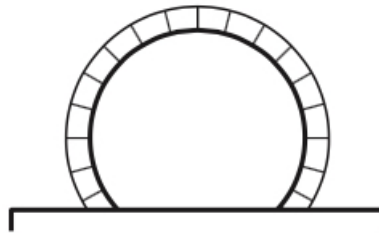
Calculate the area of triangle FGH .

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

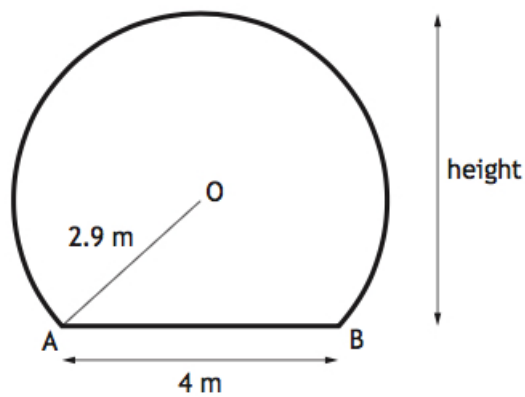
Give your answers correct to 2 significant figures.

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

(4)



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.

9. Solve the equation

$$3 \sin x^\circ + 4 = 6,$$

(3)

for $0 \leq x \leq 360$.

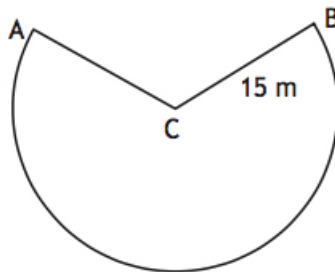
10. An attraction at a theme park has a carriage attached to an arm.

(3)



Mathematics

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

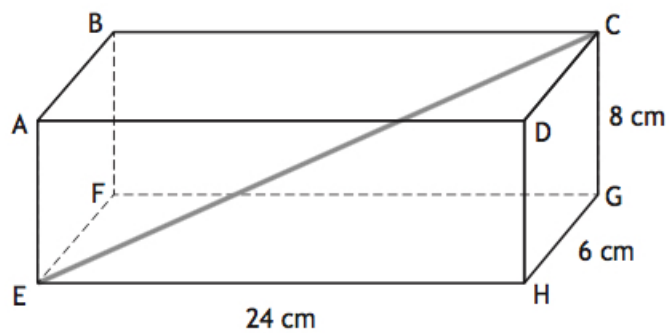


- The length of the arm, CB , is 15 metres.
- The length of the major arc, AB , is 69.4 metres.

Calculate the size of the reflex angle ACB .

11. The diagram shows a cuboid, $ABCDEFGH$.

(3)



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

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- The height of the cuboid, CG , is 8 centimetres.

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

12. Simplify

$$\frac{2ab + 6a}{b^2 - 9}$$

(3)

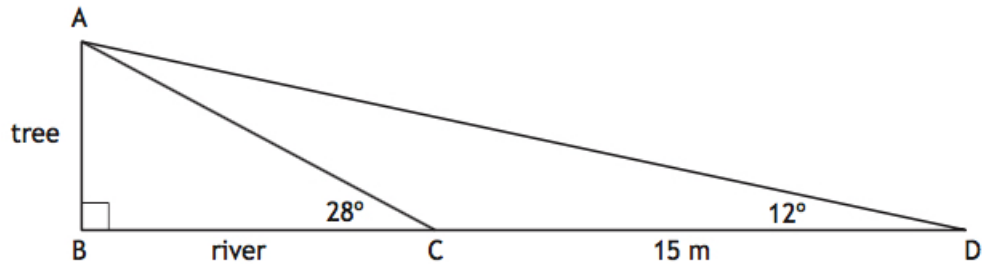
13. Simplify

$$\frac{\sin x^\circ + 2 \cos x^\circ}{\cos x^\circ}$$

(2)

14. The width of a river is represented by BC in the diagram below. AB represents a tree on the river bank.

(5)



- 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.