National 5 Mathematics

2022 Paper 2

Time allowed = 1 hr 30 mins Marks available = 50

For each question, you can click on the link to view the worked solutions for each question.

You can also click on the link below to view this paper's marking scheme;

www.sqa.org.uk/pastpapers/papers/instructions/2022/mi_N5_Mathematics_Paper-2_2022.pdf

Remember to record your percentage for this paper in your analysis grid (your score ÷ 50 × 100).

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

Click here to view the worked solutions.

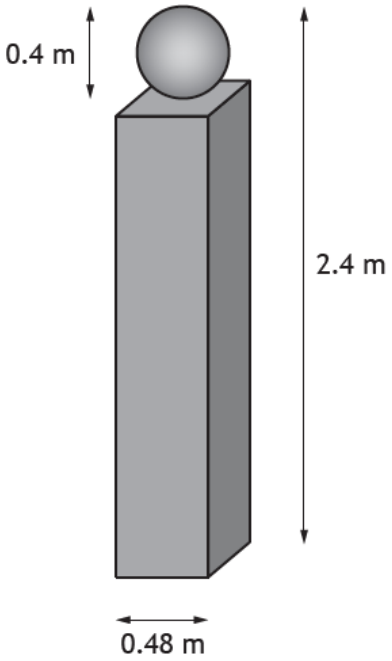
Video Lesson: E+F 1·2a Gold Outcome 3

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

Click here to view the worked solutions.

Video Lesson: APP 1·3b Bronze Outcome 2

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

Click here to view the worked solutions.

Video Lesson: E+F 1·4c Silver Outcome 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

Click here to view the worked solutions.

Video Lesson: REL 1·1d Gold Outcome 1

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.

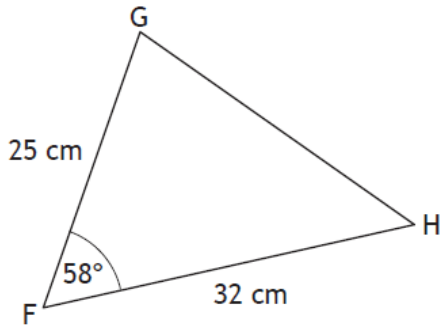
(b) Make two valid comments comparing the numbers of sit-ups of the players in the netball team and the hockey team. **2**

Click here to view the worked solutions.

Video Lesson: APP 1·4 Silver Outcome 2

6. The diagram shows triangle FGH.

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



Calculate the area of triangle FGH. 2

Click here to view the worked solutions.

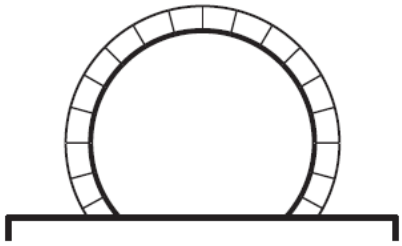
Video Lesson: APP 1·1 Bronze Outcome 1

7. Solve the equation $4x^2 + 2x - 7 = 0$.
Give your answers correct to 2 significant figures. 4

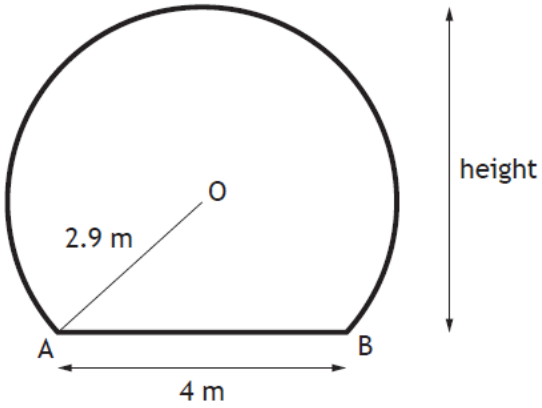
Click here to view the worked solutions.

Video Lesson: REL 1·3a Gold Outcome 3

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

Click here to view the worked solutions.

Video Lesson: REL 1·4a Gold Outcome 1

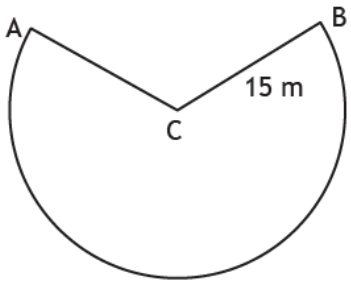
9. Solve the equation $3\sin x^\circ + 4 = 6$, for $0 \leq x \leq 360$. 3

Click here to view the worked solutions.

Video Lesson: REL 1·5b Bronze Outcome 1

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.



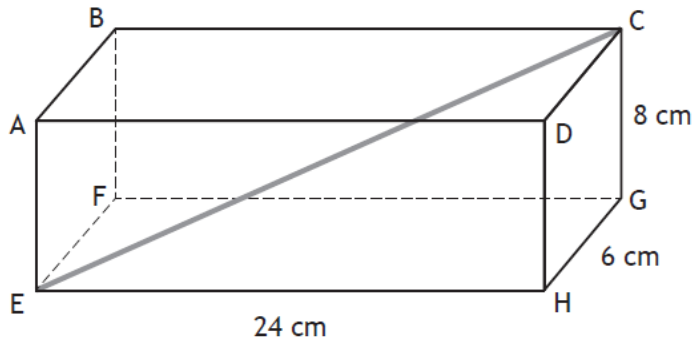
- The length of the arm, CB, is 15 metres.
- The length of the major arc, AB, is 69.4 metres.

Calculate the size of the reflex angle ACB. 3

Click here to view the worked solutions.

Video Lesson: E+F 1·4b Gold Outcome 1

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

Click here to view the worked solutions.

Video Lesson: REL 1·4a Silver Outcome 2

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

Click here to view the worked solutions.

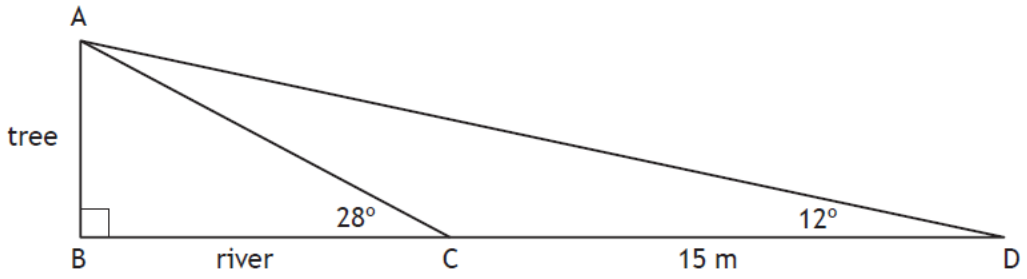
Video Lesson: E+F 1·3 Gold Outcome 1

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

Click here to view the worked solutions.

Video Lesson: REL 1·5b Silver Outcome 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

Click here to view the worked solutions.

Video Lesson: APP 1·1 Bronze Outcome 2

[END OF QUESTION PAPER]