National 5 Mathematics

2024 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/2024/mi_N5_Mathematics_Paper-2_2024.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. Dougie pays £460 for a new laptop.
It is expected that the value of the laptop will depreciate by 26% each year.
Calculate the expected value of Dougie's laptop after 3 years. **3**

Click here to view the worked solutions.

Video Lesson: APP 1·3b Bronze Outcome 3

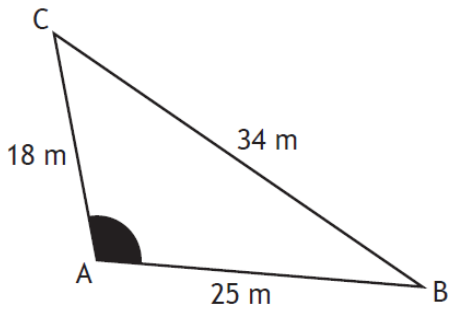
2. An ant colony occupies an area of 250 hectares.
There is an average of 1.22×10^6 ants per hectare.
Calculate the number of ants in the colony.
Give your answer in scientific notation. **2**

Click here to view the worked solutions.

Video Lesson: E+F 1·1b Gold Outcome 3

3. In triangle ABC:

- AB = 25 metres
- AC = 18 metres
- BC = 34 metres.



Calculate the size of the shaded angle at A. **3**

Click here to view the worked solutions.

Video Lesson: APP 1·1 Gold Outcome 3

4. Solve, algebraically, the inequation

$$5(x-2)+4<7x+8.$$ **3**

Click here to view the worked solutions.

Video Lesson: REL 1·1c Silver Outcome 2

5. This year the cost of Charley's car insurance is £278.40.
This is an increase of 16% on last year's cost.
Calculate the cost of Charley's insurance last year. **3**

Click here to view the worked solutions.

Video Lesson: APP 1·3b Bronze Outcome 1

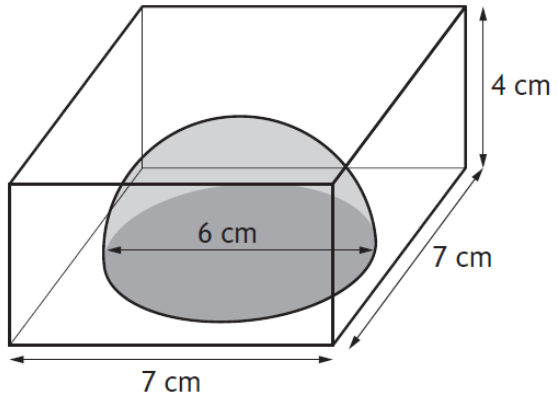
6. (a) Factorise $y^2 - 6y$. **1**

(b) Hence simplify $\dfrac{y^2 - 6y}{y^2 - 3y - 18}$. **2**

Click here to view the worked solutions.

Video Lesson: E+F 1·3 Gold Outcome 1

7. A paperweight is in the shape of a cuboid.
It consists of a hemisphere of red glass surrounded by clear glass.



The cuboid has height 4 centimetres and a square base of length 7 centimetres.
The hemisphere has diameter 6 centimetres.
Calculate the volume of clear glass in the paperweight.
Give your answer correct to 2 significant figures. **4**

Click here to view the worked solutions.

Video Lesson: E+F 1·4c Silver Outcome 3

8. Solve the equation $3x^2 + 8x + 1 = 0$.
Give your answers correct to 2 decimal places. **3**

Click here to view the worked solutions.

Video Lesson: REL 1·3a Bronze Outcome 3

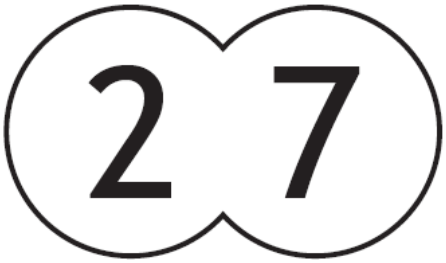
9. Change the subject of the formula $f = \frac{2d+3}{e}$ to d. **3**

Click here to view the worked solutions.

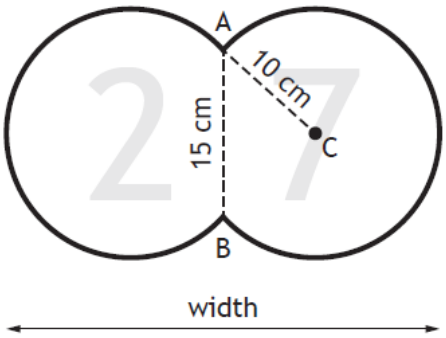
Video Lesson: REL 1·1e Silver Outcome 2

10. Karen buys a door-number sign for her house.

The sign consists of parts of two identical circles.



AB is a chord to both circles.



- AB has length 15 centimetres.
- The radius AC has length 10 centimetres.

Calculate the width of the sign. 4

Click here to view the worked solutions.

Video Lesson: REL 1·4a Gold Outcome 1

11. Solve the equation $17\sin x° + 1 = 9$, for $0 \leq x < 360$. 3

Click here to view the worked solutions.

Video Lesson: REL 1·5b Bronze Outcome 1

12. Express

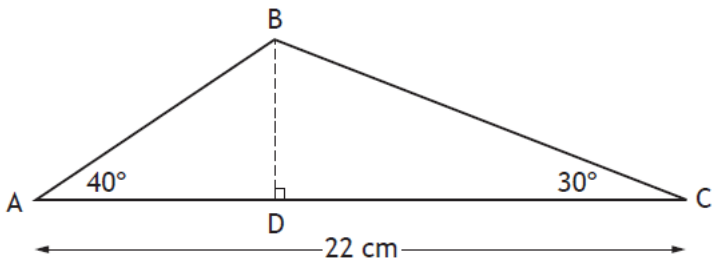
$$\frac{2}{x+5}+\frac{3}{x-4}, \quad x \neq -5, x \neq 4$$

as a single fraction in its simplest form. 3

Click here to view the worked solutions.

Video Lesson: E+F 1·3 Gold Outcome 2

13. In triangle ABC:



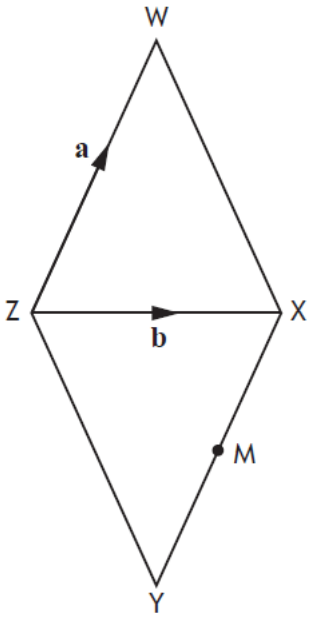
- AC = 22 centimetres
- angle BAC = 40°
- angle BCA = 30°
- BD is perpendicular to AC.

Calculate the length of BD. 5

Click here to view the worked solutions.

Video Lesson: APP 1·1 Bronze Outcome 2

14. The diagram shows a rhombus WXYZ with a diagonal ZX drawn.



$\overrightarrow{ZW}$ represents vector $\mathbf{a}$ and $\overrightarrow{ZX}$ represents vector $\mathbf{b}$.

(a) Express $\overrightarrow{WX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. 1

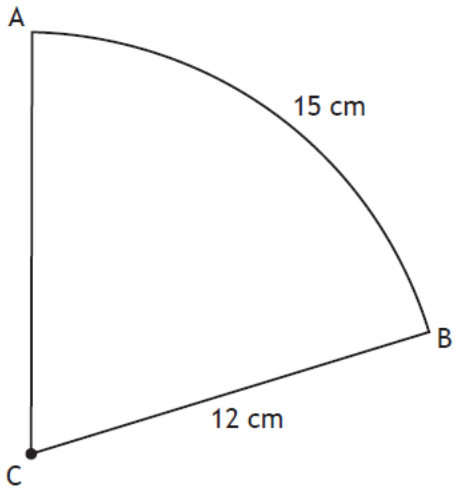
M is the mid-point of XY.

(b) Express $\overrightarrow{WM}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
Give your answer in its simplest form. 2

Click here to view the worked solutions.

Video Lesson: APP 1·2 Gold Outcome 2

15. The diagram shows a sector of a circle, centre C.



The radius of the circle is 12 centimetres.
The length of arc AB is 15 centimetres.
Calculate the area of the sector. **3**

Click here to view the worked solutions.

Video Lesson: E+F 1·4b Gold Outcome 1

16. Express $3\cos^2 x° - 1$ in the form $a + b\sin^2 x°$.
Show your working. **2**

Click here to view the worked solutions.

Video Lesson: REL 1·5b Gold Outcome 2

[END OF QUESTION PAPER]