National 5 Mathematics

2024 Paper 1

Time allowed = 1 hr Marks available = 40

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

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

www.sqa.org.uk/pastpapers/papers/instructions/2024/mi_N5_Mathematics_Paper-1-Non-calculator_2024.pdf

Remember to record your percentage for this paper in your analysis grid (your score ÷ 40 × 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 — 40

Attempt ALL questions

1. Evaluate $3\frac{2}{3}-1\frac{1}{4}$. **2**

Click here to view the worked solutions.

Video Lesson: APP 1·3a Gold Outcome 1

2. Given that $f(x)=(x+3)^2$, evaluate $f(7)$. **2**

Click here to view the worked solutions.

Video Lesson: REL 1·1b Bronze Outcome 1

3. Expand and simplify $(x+1)(x^2-4x+5)$. **3**

Click here to view the worked solutions.

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

4. Given $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \\ -1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 5 \\ 3 \\ 2 \end{pmatrix}$, find the resultant vector $3\mathbf{a} + \mathbf{b}$.

Express your answer in component form. **2**

Click here to view the worked solutions.

Video Lesson: APP 1·4 Silver Outcome 3

5. The prices, in pounds (£), of the cameras on display in a shop are listed below.

155 160 190 210 230 240

(a) Calculate the median and the interquartile range of these prices. **3**

On a website, a sample of camera prices have a median of £195 and an interquartile range of £73.

(b) Make two valid comments comparing the **prices** of the cameras in the shop and on the website. **2**

Click here to view the worked solutions.

Video Lesson: APP 1·4 Silver Outcome 1

6. Simplify $\sqrt{75}-\sqrt{3}$. **2**

Click here to view the worked solutions.

Video Lesson: E+F 1·1a Silver Outcome 1

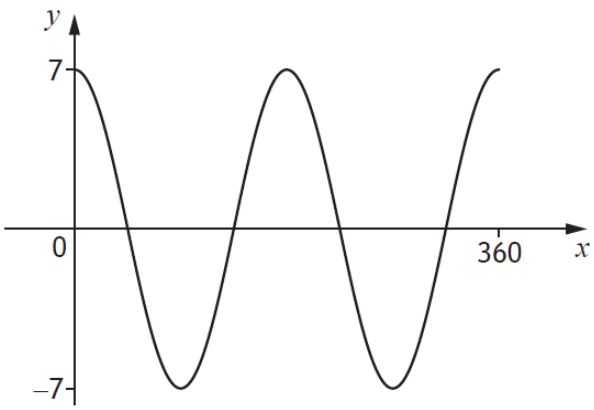
7. Solve, algebraically, the system of equations

$$2p-7r=11$$
$$3p+2r=4$$ **3**

Click here to view the worked solutions.

Video Lesson: REL 1·1d Gold Outcome 1

8. The graph of $y = a\cos bx°$, $0 \leq x \leq 360$, is shown.



(a) State the value of a. **1**

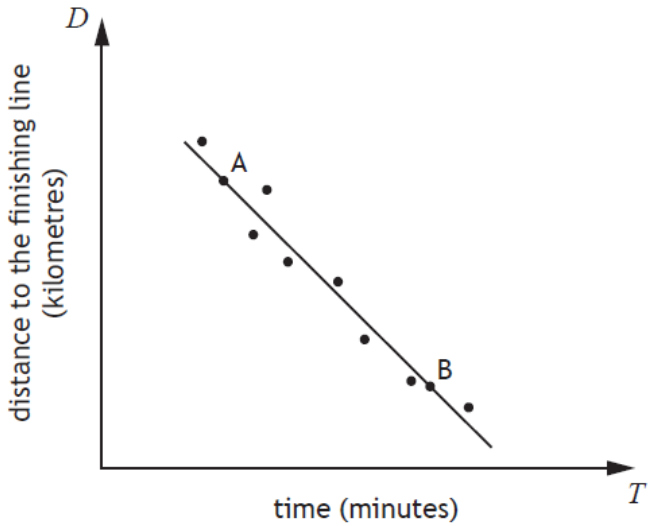
(b) State the value of b. **1**

Click here to view the worked solutions.

Video Lesson: REL 1·5a Bronze Outcome 1

9. In a car rally, competitors start at different times.

The scattergraph shows the relationship between the length of time they have been driving, T minutes, and the distance to the finishing line, D kilometres.



A line of best fit has been drawn.

Point A represents a competitor who has been driving for 3 minutes and is 26 kilometres from the finishing line.

Point B represents a competitor who has been driving for 10 minutes and is 12 kilometres from the finishing line.

(a) Find the equation of the line of best fit in terms of D and T.
Give the equation in its simplest form. 3

Another competitor has been driving for 7 minutes.

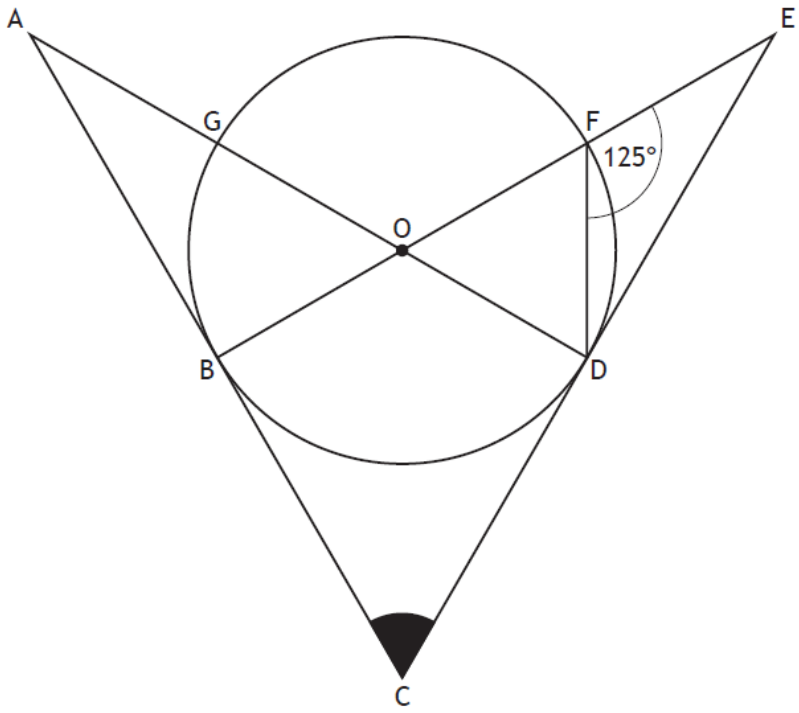
(b) Use your equation from part (a) to estimate the distance the competitor is from the finishing line. 1

Click here to view the worked solutions.

Video Lesson: APP 1·4 Silver Outcome 3 and Gold Outcome 3

10. The diagram below shows a circle centre O.

- AC is a tangent to the circle at the point B.
- CE is a tangent to the circle at the point D.
- DG and BF are diameters of the circle.
- Angle DFE is 125°.



Calculate the size of shaded angle BCD. 3

Click here to view the worked solutions.

Video Lesson: REL 1·4c Gold Outcome 1

11. A straight line has equation $x+4y-24=0$.

Find the gradient of this line. 2

Click here to view the worked solutions.

Video Lesson: REL 1·1a Gold Outcome 1

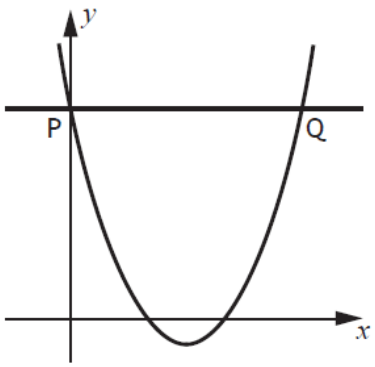
12. (a) Express x^2-6x+8 in the form $(x-a)^2+b$. **2**

(b) Hence, or otherwise, state the coordinates of the turning point of the graph of $y=x^2-6x+8$. **1**

The diagram shows the graph of $y=x^2-6x+8$.

A line PQ has been drawn parallel to the x-axis, where:

- P lies on the y-axis
- P and Q lie on the graph of $y=x^2-6x+8$.



(c) Find the coordinates of Q. **2**

Click here to view the worked solutions.

Video Lesson: E+F 1·2c Bronze Outcome 1 and REL 1·2 Gold Outcome 3

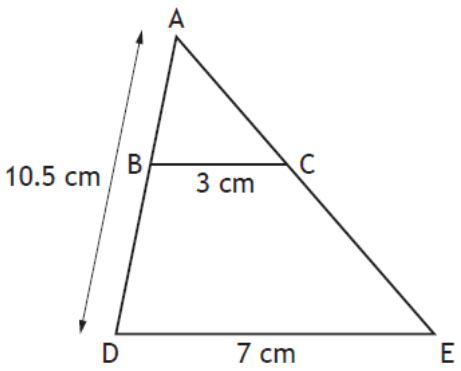
13. Expand and simplify fully $x\left(x^{\frac{1}{2}}+x^{-1}\right)$. 2

Click here to view the worked solutions.

Video Lesson: E+F 1·1b Silver Outcome 2 and Gold Outcome 1

14. In the diagram, triangles ABC and ADE are mathematically similar.

- BC = 3 centimetres
- DE = 7 centimetres
- AD = 10.5 centimetres



Calculate the length of BD. 3

Click here to view the worked solutions.

Video Lesson: REL 1·4c Gold Outcome 1

[END OF QUESTION PAPER]