# National 5 Mathematics

# 2022 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/2022/mi_N5_Mathematics_Paper-1-Non-calculator_2022.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

$$\frac{2}{3}\left(\frac{1}{5}+\frac{3}{4}\right).$$

Give your answer in its simplest form. **2**

Click here to view the worked solutions.

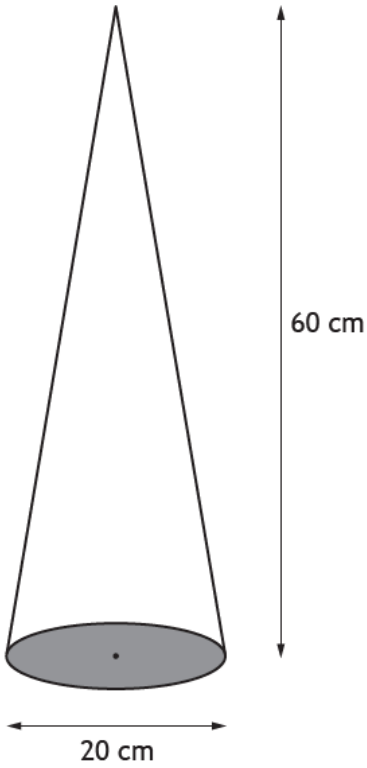
Video Lesson: REL 1·1b Silver Outcomes 1 and 2

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

Click here to view the worked solutions.

Video Lesson: REL 1·1b Silver Outcome 1

3. The diagram below shows a cone with diameter 20 centimetres and height 60 centimetres.



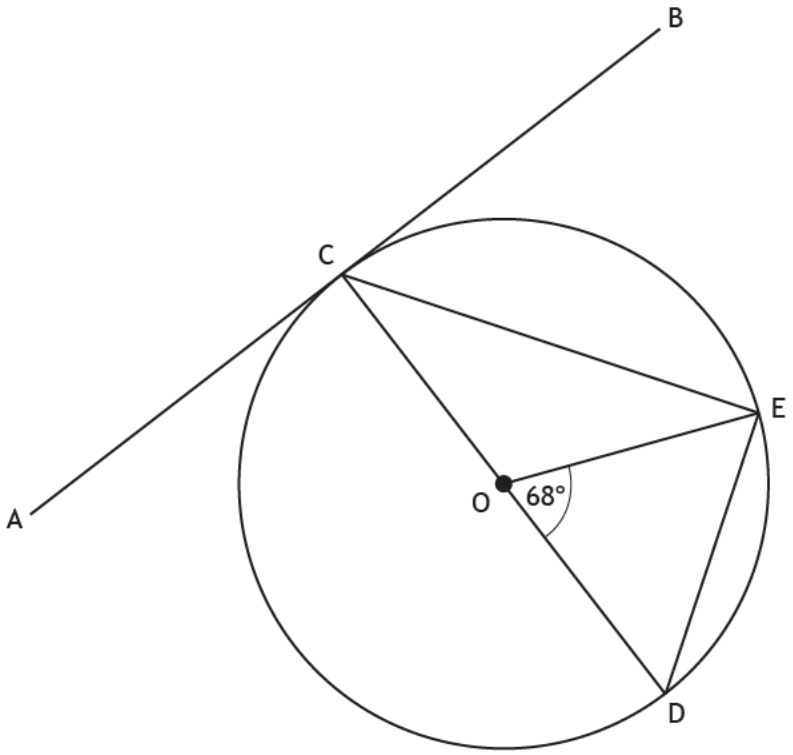

Calculate the volume of the cone. 2

**Take $\pi = 3.14$.**

Click here to view the worked solutions.

Video Lesson: E+F 1·4c Silver Outcome 2

**4.** The diagram below shows a circle with centre O.




AB is a tangent to the circle at the point C.

CD is a diameter of the circle.

Angle EOD is 68°.

Calculate the size of angle ACE. 3

Click here to view the worked solutions.

Video Lesson: REL 1·4b Gold Outcome 1

**5.** (a) Express $x^2+8x+15$ in the form $(x+a)^2+b$. 2

(b) Hence, or otherwise, state the coordinates of the turning point of the graph of $f(x)=x^2+8x+15$. 1

Click here to view the worked solutions.

Video Lesson: E+F 1·2c Bronze Outcome 1

**6.** Find the equation of the line passing through the points $(-3,-1)$ and $(-5,7)$.
Give the equation in its simplest form. 3

Click here to view the worked solutions.

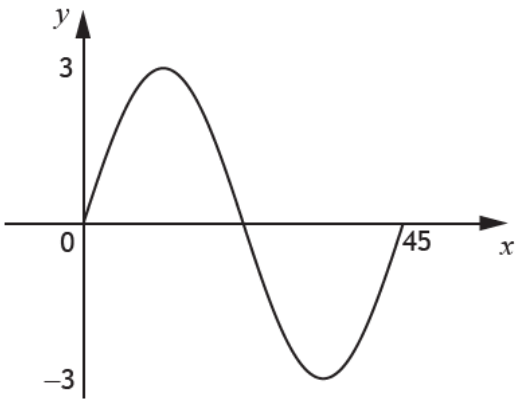
Video Lesson: REL 1·1a Silver Outcome 3

**7.** Change the subject of the formula $D = \frac{B+4}{C^2}$ to $B$. **2**

Click here to view the worked solutions.

Video Lesson: REL 1·1e Silver Outcome 1

**8.** Part of the graph of $y = a\sin bx°$ is shown in the diagram.



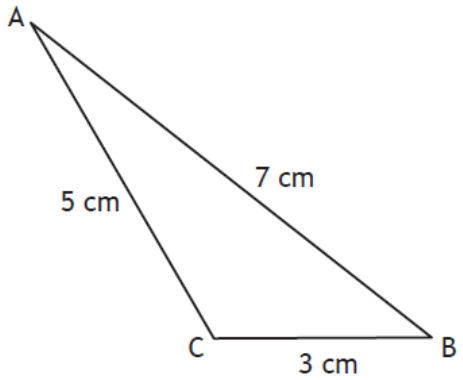

(a) State the value of $a$. **1**

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

Click here to view the worked solutions.

Video Lesson: REL 1·5a Bronze Outcome 1

**9.** The diagram shows triangle ABC.




- AB = 7 centimetres
- BC = 3 centimetres
- AC = 5 centimetres

Calculate the value of cosB.
Give your answer in its simplest form. **2**

Click here to view the worked solutions.

Video Lesson: APP 1·1 Gold Outcome 3

**10.** Tommy buys flower seeds from a website.
Tommy is given a 30% discount. He pays £16.10 for the seeds.
Calculate the cost of the flower seeds without the discount. **3**

Click here to view the worked solutions.

Video Lesson: APP 1·3b Silver Outcome 1

11. Simplify $\left(m^{-2}\right)^4 \times m^{-5}$.
Give your answer with a **positive** power. 3

Click here to view the worked solutions.

Video Lesson: REL 1·1b Bronze Outcomes 1, 2 and Silver Outcome 2

12. Express $\frac{4}{x+2} \div \frac{5}{(x+2)^2}$, $x \neq -2$ as a single fraction in its simplest form. 2

Click here to view the worked solutions.

Video Lesson: E+F 1·3 Silver Outcomes 1 and 4

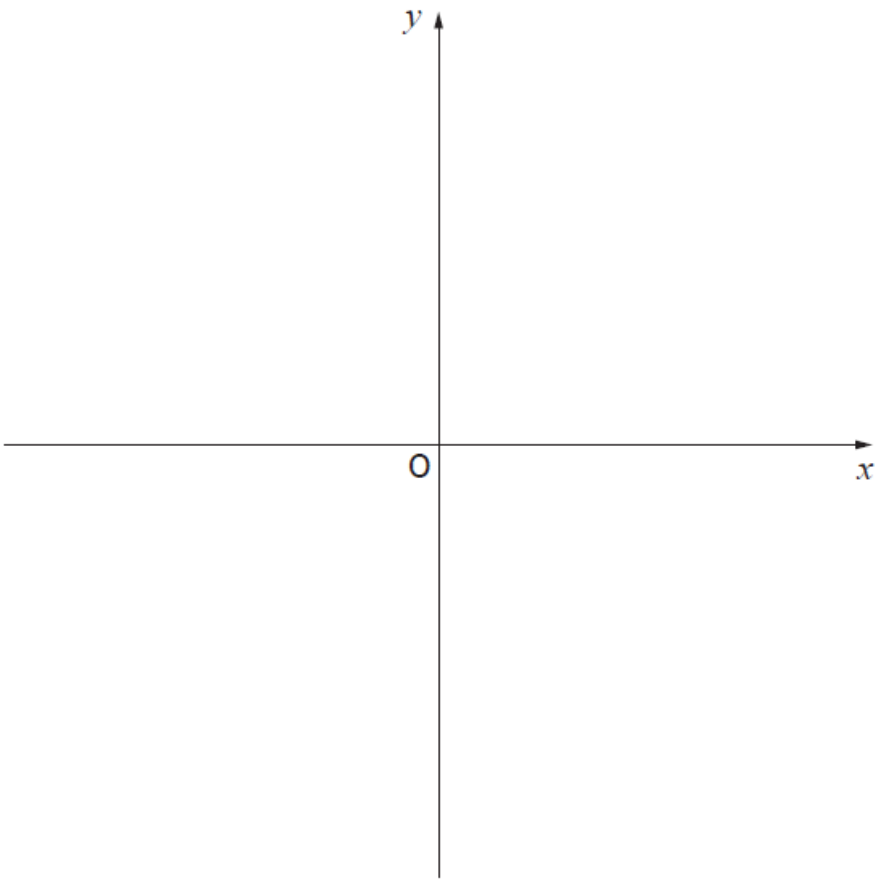
13. Expand and simplify $\sqrt{10}\left(\sqrt{10}-\sqrt{2}\right)+8\sqrt{5}$. 3

Click here to view the worked solutions.

Video Lesson: E+F 1·1a Gold Outcome 1

**14.** Sketch the graph of $y = (x+1)(x-3)$ using the axes provided below.

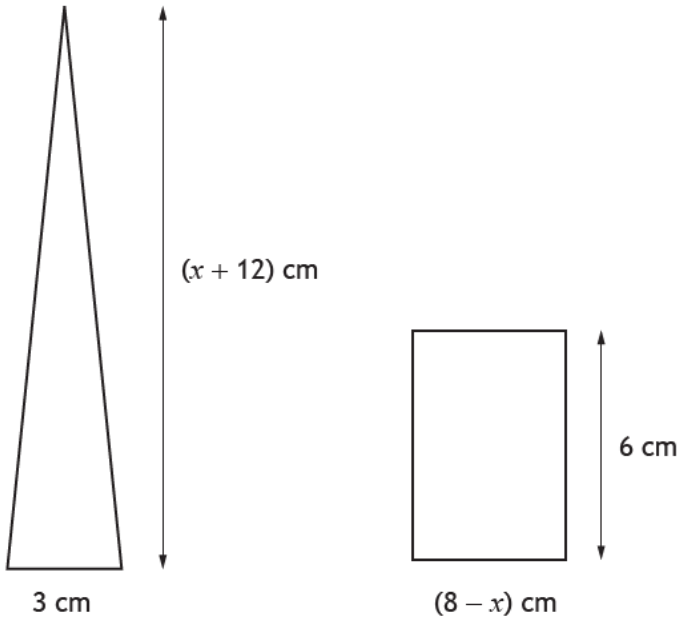
On your sketch, show clearly the points of intersection with the $x$-axis and the $y$-axis, and the coordinates of the turning point. 3




Click here to view the worked solutions.

Video Lesson: REL 1·2 Gold Outcome 2

**15.** A triangle and rectangle are shown in the diagram.




(a) Find an expression for the area of the triangle. **1**

(b) Given that the area of the triangle is equal to the area of the rectangle, find algebraically the value of $x$. **4**

Click here to view the worked solutions.

Video Lesson: REL 1·3a Silver Outcome 2

[END OF QUESTION PAPER]