National 5 Mathematics

2018 Paper 1

Time allowed = 1 hr 15 mins Marks available = 50

For each question, you can scan the QR codes if using a paper copy or click on the links viewing this document electronically. This will allow you to view the worked solutions for each question. You can also either scan this QR Code or click on the link below to view this paper's marking scheme;

https://www.sqa.org.uk/pastpapers/papers/instructions/2018/mi_N5_Mathematics_all_2018.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. Evaluate $2\frac{1}{3}+\frac{4}{5}$. 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/IQXopXA_Z8M

Video Lesson: APP 1·3b Gold Outcome 1

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

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/dFYGOFGw7OE

Video Lesson: E+F 1·2a Gold Outcome 2

3. Solve, algebraically, the system of equations

$$4x+5y=-3$$
$$6x-2y=5.$$

3

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/_F-FdnN_pn8

Video Lesson: REL 1·1d Gold Outcome 1

4. Two vectors are given by $\mathbf{u}=\begin{pmatrix}1\\5\\1\end{pmatrix}$ and $\mathbf{u}+\mathbf{v}=\begin{pmatrix}6\\-4\\3\end{pmatrix}$.

Find vector $\mathbf{v}$.

Express your answer in component form. 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/rv_Qydiy6zU

Video Lesson: APP 1·2 Silver Outcome 3

5. Solve

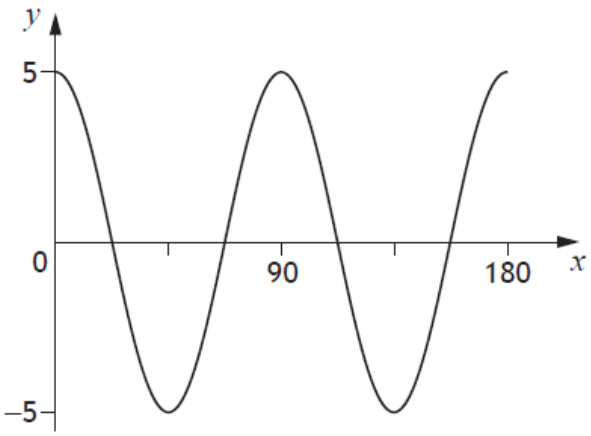
$$x^2 - 11x + 24 = 0\,.$$ 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/9L7Hchjeyq8

Video Lesson: REL 1·3a Silver Outcome 2

6. Part of the graph of $y = a\cos bx°$ is shown in the diagram.



State the values of a and b. 2

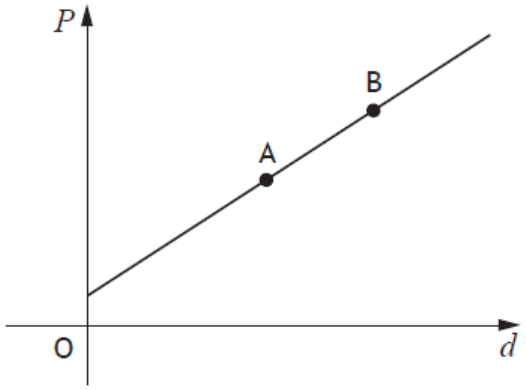
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/B5HX3kuDv0I

Video Lesson: REL 1·5a Bronze Outcome 1

7. The cost of a journey with Tom's Taxis depends on the distance travelled.

The graph below shows the cost, P pounds, of a journey with Tom's Taxis against the distance travelled, d miles.



Point A represents a journey of 8 miles which costs £14.

Point B represents a journey of 12 miles which costs £20.

(a) Find the equation of the line in terms of P and d.
Give the equation in its simplest form. 3

(b) Calculate the cost of a journey of 5 miles. 1

Scan the QR code or click on it to view the worked solutions;

https://youtu.be/5LLzImLaGbo

Video Lesson: APP 1·4 Silver Outcome 3

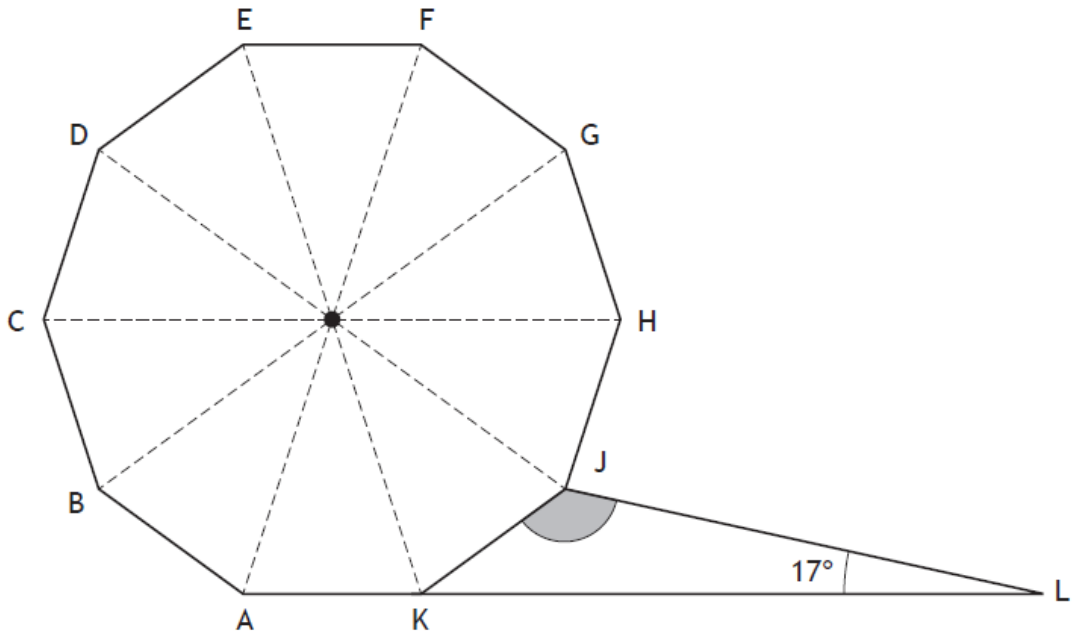
8. Determine the nature of the roots of the function $f(x) = 2x^2 + 4x + 5$. 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/DD6tnCKxpfY

Video Lesson: REL 1·3b Bronze Outcome 1

9. In the diagram shown below, ABCDEFGHJK is a regular decagon.
   - Angle KLJ is 17°.
   - AKL is a straight line.



Calculate the size of shaded angle KJL. 2

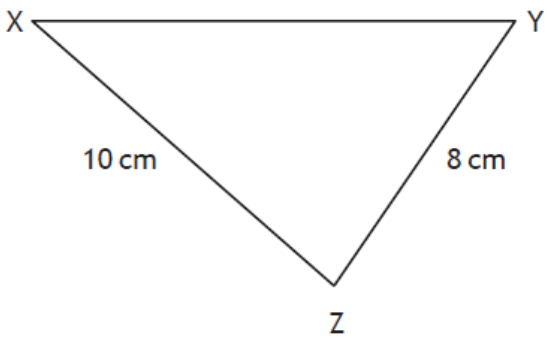
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/i6Of9M_CiDQ

Video Lesson: REL 1·4b Bronze Outcome 1

10. In triangle XYZ:

- XZ = 10 centimetres
- YZ = 8 centimetres
- $\cos Z = \frac{1}{8}$.



Calculate the length of XY. 3

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/FJ9qtzr-jMQ

Video Lesson: APP 1·1 Bronze Outcome 3

11. Express $\frac{9}{\sqrt{6}}$ with a rational denominator.

Give your answer in its simplest form. 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/Vc7kPRO7Qtk

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

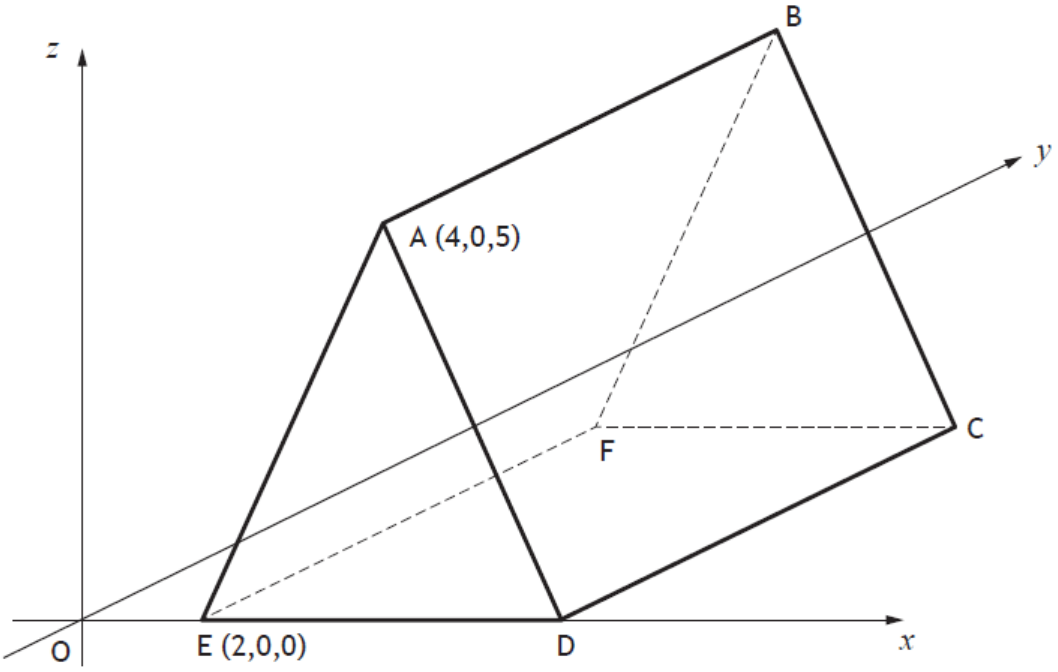
12. Given that $\cos 60° = 0{\cdot}5$, state the value of $\cos 240°$. 1

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/JtKfGiTCGh0

Video Lesson: REL 1·5a Gold Outcome 3

13. The diagram shows a triangular prism, ABCDEF, relative to the coordinate axes.



- AD = AE.
- DC = 8 units.
- Edges EF, DC and AB are parallel to the y-axis.

Write down the coordinates of B and C. 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/DpjA4yetusk

Video Lesson: APP 1·2 Silver Outcome 2

14. Change the subject of the formula $y = g\sqrt{x} + h$ to x. **3**

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/xRYazVXneD8

Video Lesson: REL 1·1e Silver Outcome 2

15. Remove the brackets and simplify $\left(\frac{2}{3}p^4\right)^2$. **2**

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/YJvpaOWFTM8

Video Lesson: REL 1·1b Bronze Outcome 2

16. Sketch the graph of $y=(x-6)(x+4)$.

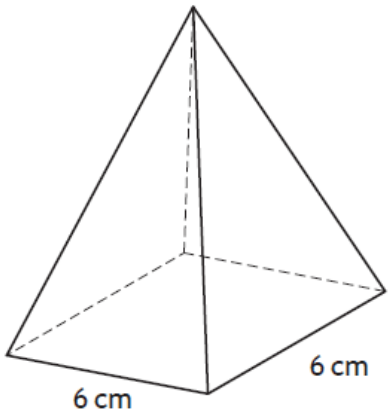
On your sketch, show clearly the points of intersection with the x-axis and the y-axis, and the coordinates of the turning point. 3

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/YJvpaOWFTM8

Video Lesson: REL 1·2 Gold Outcome 2

17. A square based pyramid is shown in the diagram below.



The square base has length 6 centimetres.

The volume is 138 cubic centimetres.

Calculate the height of the pyramid. 3

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/YJvpaOWFTM8

Video Lesson: E+F 1·4c Gold Outcome 2

18. Express $\sin x° \cos x° \tan x°$ in its simplest form.
Show your working. 2

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/YJvpaOWFTM8

Video Lesson: REL 1·5b Silver Outcome 2

19. (a) (i) Express $x^2 - 6x - 81$ in the form $(x-p)^2 + q$. 2

(ii) Hence state the equation of the axis of symmetry of the graph of $y = x^2 - 6x - 81$. 1

(b) The roots of the equation $x^2 - 6x - 81 = 0$ can be expressed in the form $x = d \pm d\sqrt{e}$.
Find, algebraically, the values of d and e. 4

Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/YJvpaOWFTM8

Video Lessons:

E+F 1·2c Bronze Outcome 1

REL 1·2 Bronze Outcome 3

REL 1·3a Gold Outcome 3

[END OF QUESTION PAPER]