National 5 Mathematics

2017 Paper 1

Time allowed = 1 hr Marks available = 40

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/2017/mi_N5_Mathematics_all_2017.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. Given that $f(x) = x^2 + 3x$, evaluate $f(-5)$. 2

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

https://youtu.be/7fKq1VK9eD0

Video Lesson: REL 1·1b Silver Outcome 1

2. The number of calls received by the police was recorded over 10 days.
The results are shown below.

198 216 218 230 232 247 248 250 265 267

Find the semi-interquartile range of this data. 2

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

https://youtu.be/LcJIc0oUbtg

Video Lesson: APP 1·4 Silver Outcome 1

3. Evaluate $1\frac{5}{6} \div \frac{3}{4}$.

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/l9w-tpTq0mc

Video Lesson: APP 1·3b Gold Outcome 3

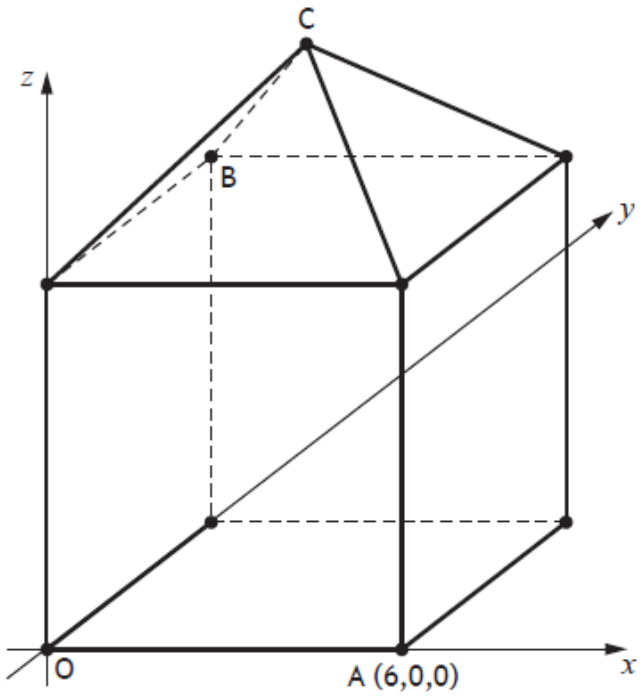
4. Expand and simplify $(2x+3)(x^2-4x+1)$. 3

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

https://youtu.be/z-HU0-WG4a4

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

5. The diagram shows a square-based pyramid placed on top of a cube, relative to the coordinate axes.



The height of the pyramid is half of the height of the cube.

A is the point (6,0,0).

The point C is directly above the centre of the base.

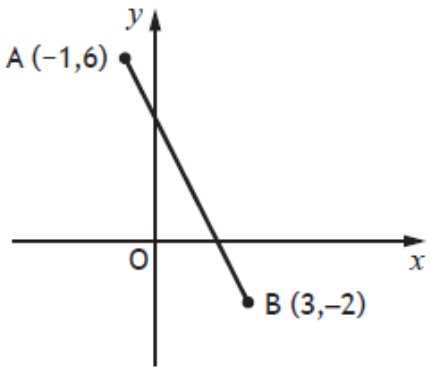
Write down the coordinates of B and C. 2

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

https://youtu.be/HLKvE4rD4OA

Video Lesson: APP 1·2 Silver Outcome 2

6. The diagram below shows the straight line joining points A and B.



Find the equation of the line AB.
Give the equation in its simplest form. 3

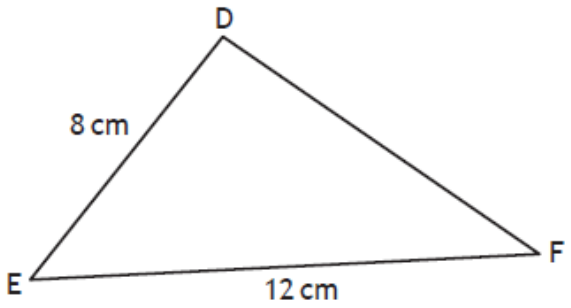
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/F2imdL3V57g

Video Lesson: REL 1·1a Silver Outcome 3

7. In triangle DEF:

- DE = 8 centimetres
- EF = 12 centimetres
- $\sin E = \frac{2}{3}$



Calculate the area of triangle DEF. 2

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

https://youtu.be/gVhNzBnINWQ

Video Lesson: APP 1·1 Bronze Outcome 1

8. Solve, algebraically, the inequality

$$19+x>15+3(x-2).$$ 3

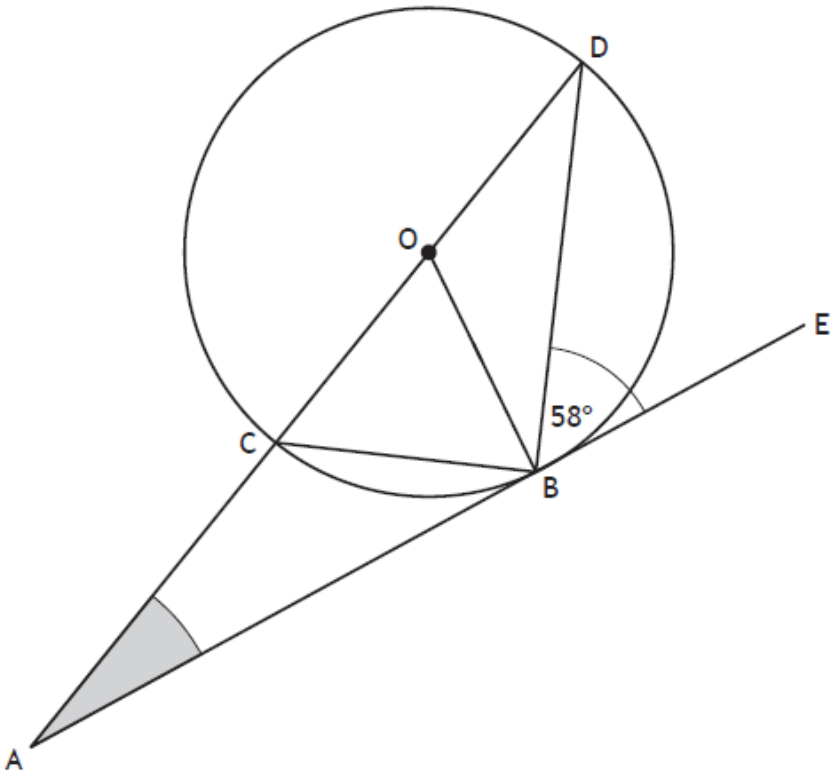
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/XL-LHgEf3Xc

Video Lesson: REL 1·1c Silver Outcome 2

9. In the diagram shown below:

- ABE is a tangent to the circle centre O
- Angle DBE is 58°



Calculate the size of angle CAB. 3

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

https://youtu.be/6kXXw_1wkB0

Video Lesson: REL 1·4b Gold Outcome 1

10. Change the subject of the formula $F = \frac{t^2 + 4b}{c}$ to b. 3

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

https://youtu.be/Z_5fbni0soY

Video Lesson: REL 1·1e Silver Outcome 2

11. Express $\frac{3}{a^2} - \frac{2}{a}$, $a \neq 0$, as a single fraction in its simplest form. 2

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

https://youtu.be/E1pfoAKcZGw

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

12. Gym members are asked to fill out a questionnaire to rate the quality of service provided.

They are asked to give a rating on a scale of 1 to 6.

The ratings given by five members were as follows:

1 4 6 3 6

In its simplest form, the standard deviation of these ratings can be written as $\frac{a\sqrt{b}}{2}$.

Find the values of a and b. 4

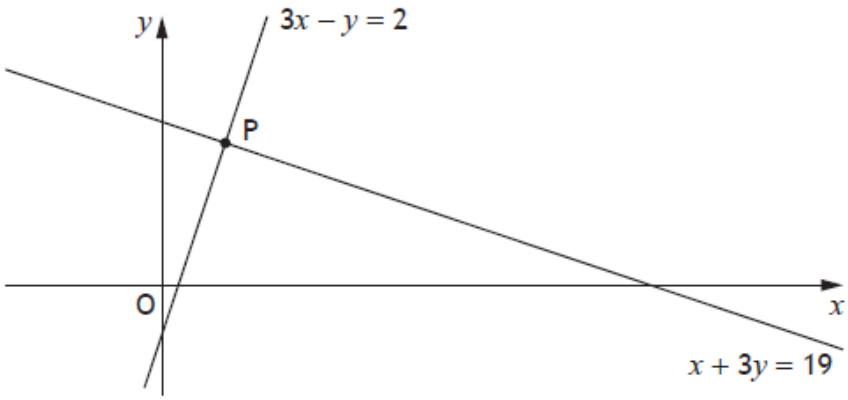
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/yvtRP1qr10o

Video Lesson: APP 1·4 Bronze Outcome 2

13. The graph below shows two straight lines with the equations:

- $3x - y = 2$
- $x + 3y = 19$



The lines intersect at the point P.

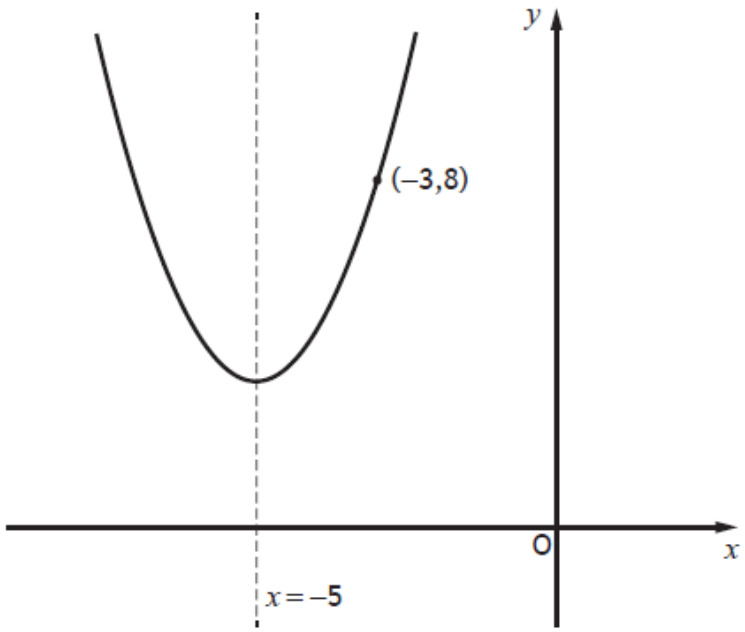
Find, algebraically, the coordinates of P. 3

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

https://youtu.be/SbdbAtWtP0I

Video Lesson: REL 1·1d Gold Outcome 1

14. The graph below shows a parabola with equation of the form $y=(x+a)^2+b$.



The equation of the axis of symmetry of the parabola is $x=-5$.

(a) State the value of a. 1

The point $(-3,8)$ lies on the parabola.

(b) Calculate the value of b. 2

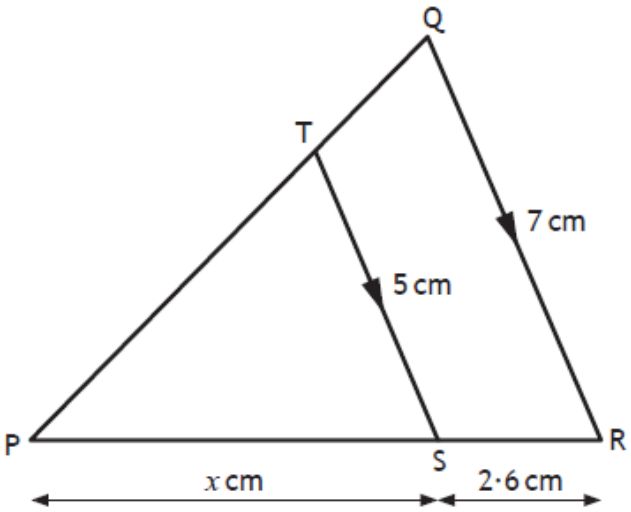
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/C9066OhY7qE

Video Lessons: REL 1·2 Bronze Outcomes 1 and 3

15. In the diagram below:

- TS is parallel to QR
- TS = 5 centimetres
- QR = 7 centimetres
- SR = 2·6 centimetres



The length of PS is x centimetres.

Calculate the value of x. 3

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

https://youtu.be/VCnTjkQDvfU

Video Lesson: REL 1·4c Gold Outcome 1

[END OF QUESTION PAPER]