# National 5 Mathematics

# 2015 Paper 2

Time allowed = 1 hr 30 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/2015/mi_N5_Mathematics_all_2015.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. A house is valued at £240 000.
   Its value is predicted to rise by 2·8% per annum.
   Calculate its predicted value after 2 years. 3

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

https://youtu.be/90SGHYQs8B4

Video Lesson: APP 1·3a Silver Outcome 2

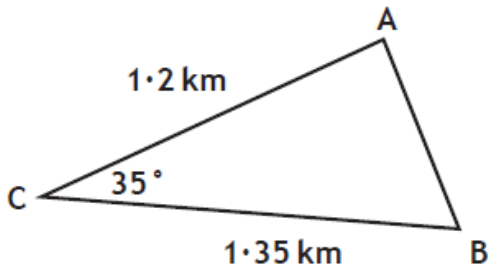
2. A function is defined as $f(x) = 3x + 2$.
   Given that $f(a) = 23$, calculate $a$. 2

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

https://youtu.be/-Z6M8lv0vHs

Video Lesson: REL 1·1b Bronze Outcome 2

3. Triangle ABC is shown below.




Calculate the length of AB. 3

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

https://youtu.be/VQDAn9syGa8

Video Lesson: APP 1·1 Bronze Outcome 3

4. Find $|\mathbf{u}|$, the magnitude of vector $\mathbf{u} = \begin{pmatrix} 6 \\ -13 \\ 18 \end{pmatrix}$. 2

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

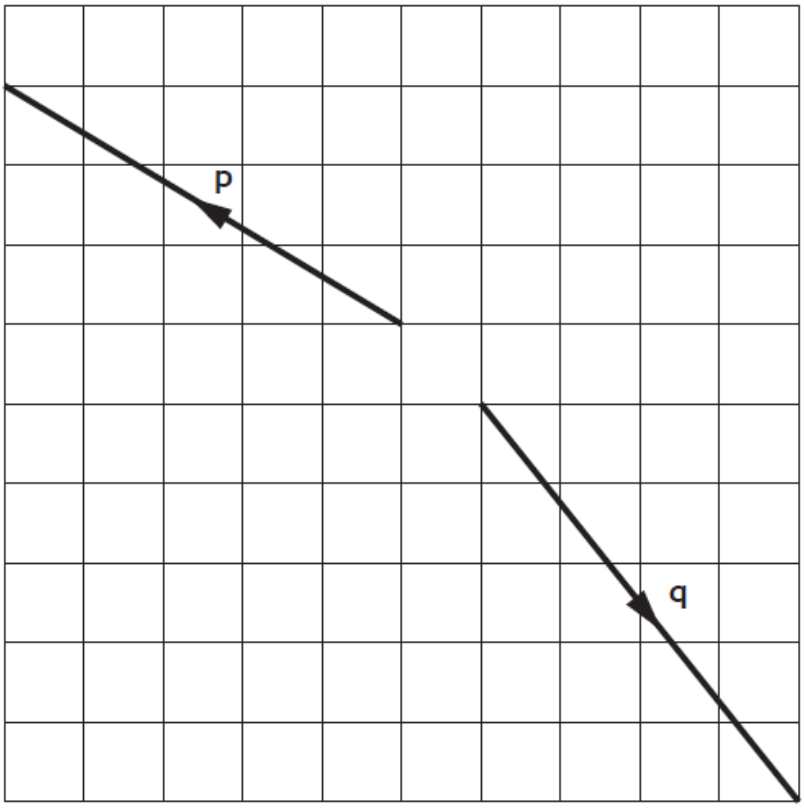
https://youtu.be/q5UrSOl3opw

Video Lesson: APP 1·2 Silver Outcome 4

5. The vectors **p** and **q** are shown in the diagram below.

Find the resultant vector **p** + **q**.

Express your answer in component form.




2

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

https://youtu.be/TW6kf5nyO-8

Video Lesson: APP 1·2 Bronze Outcome 1

6. (a) The Earth is approximately spherical with a radius of 6400 kilometres.

Calculate the volume of the Earth giving your answer in scientific notation, correct to 2 significant figures.

3

(b) The approximate volume of the Moon is $2{\cdot}2 \times 10^{10}$ cubic kilometres.

Calculate how many times the Earth's volume is greater than the Moon's. 2

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

https://youtu.be/qiH4D5FeajE

Video Lessons: E+F 1·4c Bronze Outcome 3, E+F 1·1b Gold Outcome 3

7. Express $\frac{5t}{s} \div \frac{t}{2s^2}$ in its simplest form. 3

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

https://youtu.be/LaCB5d8ux_w

Video Lesson: E+F 1·3 Gold Outcome 4

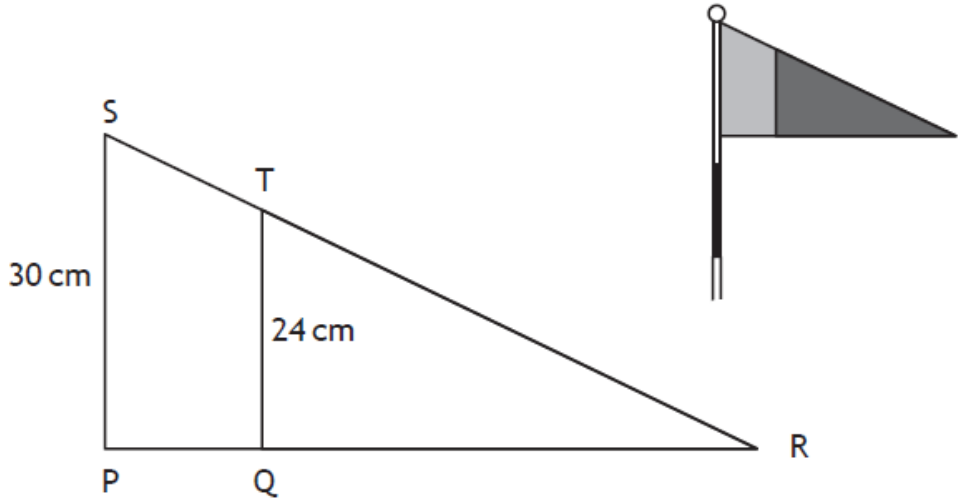
8. James paid £297·50 for a laptop in a sale.
The discount in the sale was 15%.
Calculate the original price of the laptop. 3

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

https://youtu.be/A4MfFFsdaFk

Video Lesson: APP 1·3a Silver Outcome 1

9. The flag at each hole on a golf course is coloured red and blue.
The diagram below represents a flag.
Triangle QRT represents the red section.
PQTS represents the blue section.



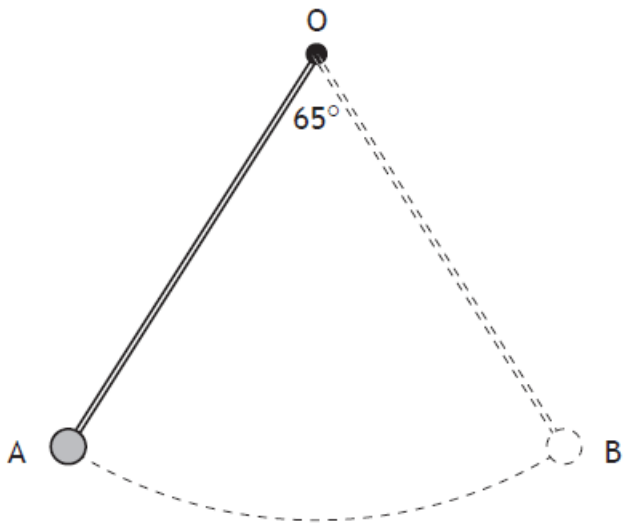

Triangles PRS and QRT are mathematically similar.
The area of triangle QRT is 400 square centimetres.
Calculate the area of PQTS, the blue section of the flag. 4

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

https://youtu.be/Y9K3xvlPYoE

Video Lessons: REL 1·4c Bronze Outcome 2, Gold Outcome 1

10. The pendulum of a clock swings along an arc of a circle, centre O.




The pendulum swings through an angle of 65°, travelling from A to B.

The length of the arc AB is 28·4 centimetres.

Calculate the length of the pendulum. 4

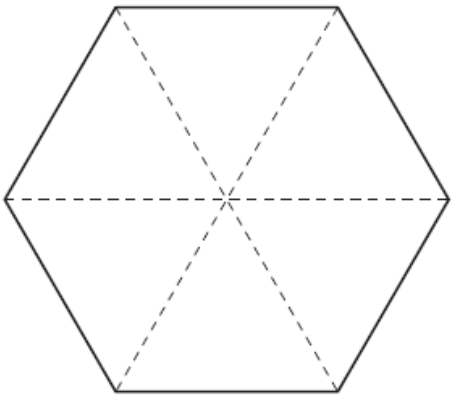
Scan the QR code or click on the link to view the worked solutions;

https://youtu.be/vsir05YSBBo

Video Lesson: E+F 1·4b Gold Outcome 1

11. The top of a table is in the shape of a regular hexagon.

The three diagonals of the hexagon which are shown as dotted lines in the diagram below each have length 40 centimetres.



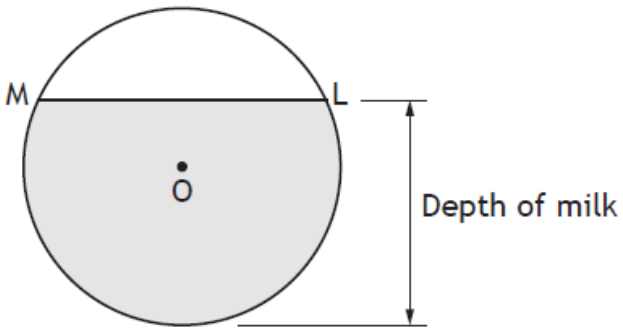
Calculate the area of the top of the table. 4

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

https://youtu.be/Pz-bybnkhtc

Video Lesson: APP 1·1 Silver Outcome 1

12. The diagram below shows the circular cross-section of a milk tank.




The radius of the circle, centre O, is 1·2 metres.

The width of the surface of the milk in the tank, represented by ML in the diagram, is 1·8 metres.

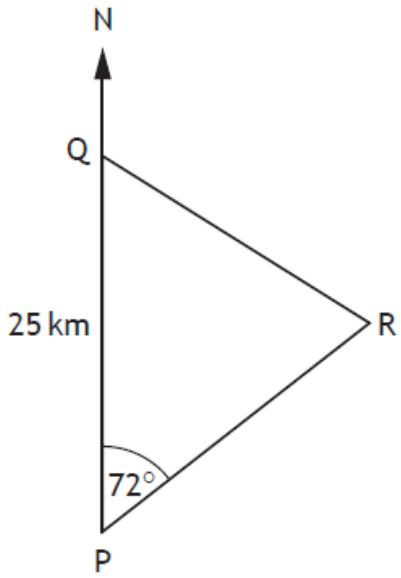
Calculate the depth of the milk in the tank. 4

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

https://youtu.be/nL9frgPjMB0

Video Lesson: REL 1·4a Gold Outcome 1

13. In the diagram below P, Q and R represent the positions of Portlee, Queenstown and Rushton respectively.




Portlee is 25 kilometres due South of Queenstown.
From Portlee, the bearing of Rushton is 072°.
From Queenstown, the bearing of Rushton is 128°.

Calculate the distance between Portlee and Rushton.

**Do not use a scale drawing.** 4

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

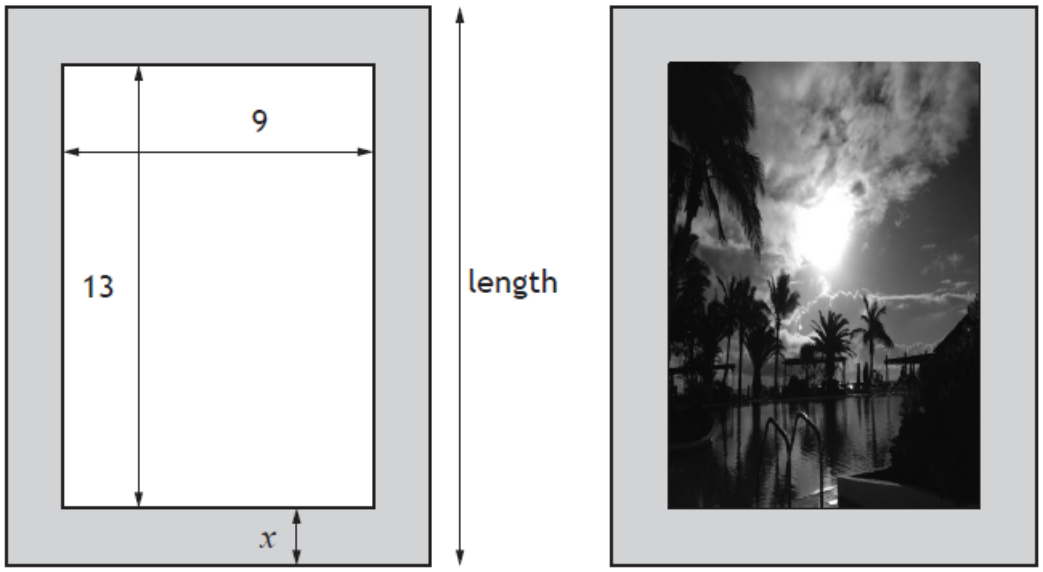
https://youtu.be/9zWCblxksu0

Video Lesson: APP 1·1 Silver Outcome 2

**14.** A rectangular picture measuring 9 centimetres by 13 centimetres is placed on a rectangular piece of card.

The area of the card is 270 square centimetres.

There is a border $x$ centimetres wide on all sides of the picture.




(a) (i) Write down an expression for the length of the card in terms of $x$. 1

(ii) Hence show that $4x^2 + 44x - 153 = 0$. 2

(b) Calculate $x$, the width of the border.

Give your answer correct to one decimal place. 4

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

https://youtu.be/39IYUZYyxyY

Video Lesson: REL 1·3a Gold Outcome 3

[END OF QUESTION PAPER]