N5

Mαthematics

National 5 Practice Paper G

Paper 2

Duration – 1 hour and 30 minutes

Total marks – 50

- You may use a calculator
- Attempt all the questions.
- Use **blue** or **black** ink.
- Full credit will only be given to solutions which contain appropriate working.
- State the units for your answer where appropriate.

FORMULAE LIST

The roots of are $ax^2 + bx + c = 0 \quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A \quad \text{or} \quad \cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: $A = \dfrac{1}{2}ab\sin C$

Volume of a Sphere: $V = \dfrac{4}{3}\pi r^3$

Volume of a cone: $V = \dfrac{1}{3}\pi r^2 h$

Volume of a pyramid: $V = \dfrac{1}{3}Ah$

Standard deviation: $s = \sqrt{\dfrac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\dfrac{\sum x^2 - (\sum x)^2/n}{n-1}}$, where n is the sample size.

MARKS

1. $E = mc^2$

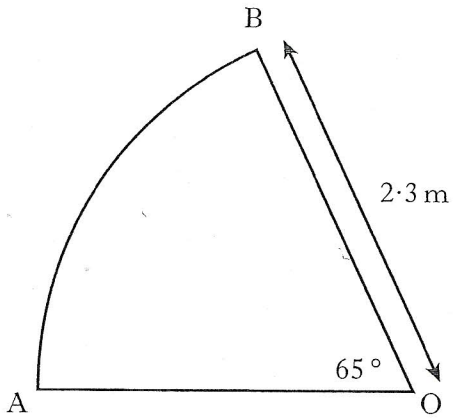
Find the value of E when $m = 3{\cdot}6 \times 10^{-2}$ and $c = 3 \times 10^{8}$.

Give your answer **in scientific notation.** 3

2. Expand fully and simplify $x(x-1)^2$. 2

MARKS

3. A sector of a circle, centre O, is shown below.



The radius of the circle is 2·3 metres.

Angle AOB is 65°.

Find the length of the arc AB. 3

4. Change the subject of the formula $p = q + 2r^2$ to r. 3

MARKS

5. Solve the equation $2x^2 + 3x - 7 = 0$.

Give your answer **correct to 2 significant figures.** 4

6. The marks of a group of students in their October test are listed below.

41 56 68 59 43 37 70 58 61 47 75 66

(a) Calculate the median and the interquartile range. 3

The teacher arranges extra homework classes for the students before the next test in December.

In this test, the median is 67 and the interquartile range is 14.

(b) Make **two** appropriate comments comparing the marks in the October and December tests. 2

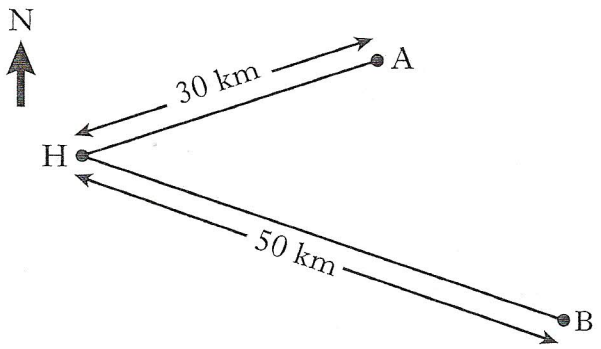
Total marks 5

MARKS

7. Two yachts leave from harbour H.

Yacht A sails on a bearing of 072° for 30 kilometres and stops.

Yacht B sails on a bearing of 140° for 50 kilometres and stops.

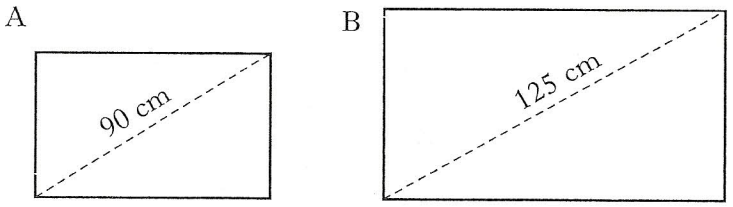


How far apart are the two yachts when they have both stopped?

Do not use a scale drawing. 4

8. Two rectangular solar panels, A and B, are mathematically similar.

Panel A has a diagonal of 90 centimetres and an area of 4020 square centimetres.



A salesman claims that panel B, with a diagonal of 125 centimetres, will be double the area of panel A.

Is this claim justified?

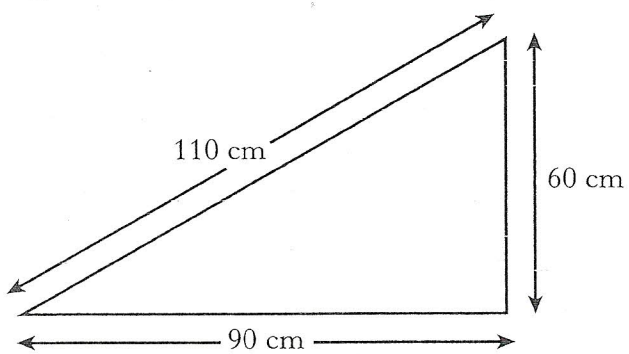
Show all your working. 4

MARKS

9. Vector **u** has components $\begin{pmatrix} 2 \\ 0 \\ 1 \end{pmatrix}$ and vector **v** has components $\begin{pmatrix} 1 \\ 2 \\ -4 \end{pmatrix}$.

Calculate the magnitude of $2\mathbf{u} - \mathbf{v}$. 2

10. A triangular paving slab has measurements as shown.

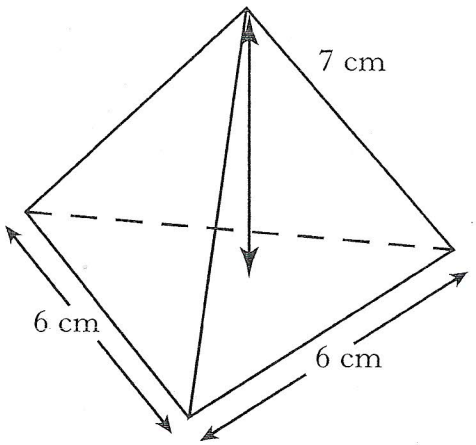


Is the slab in the shape of a right angled triangle?

Show your working. 3

MARKS

11. The diagram below shows a pyramid.

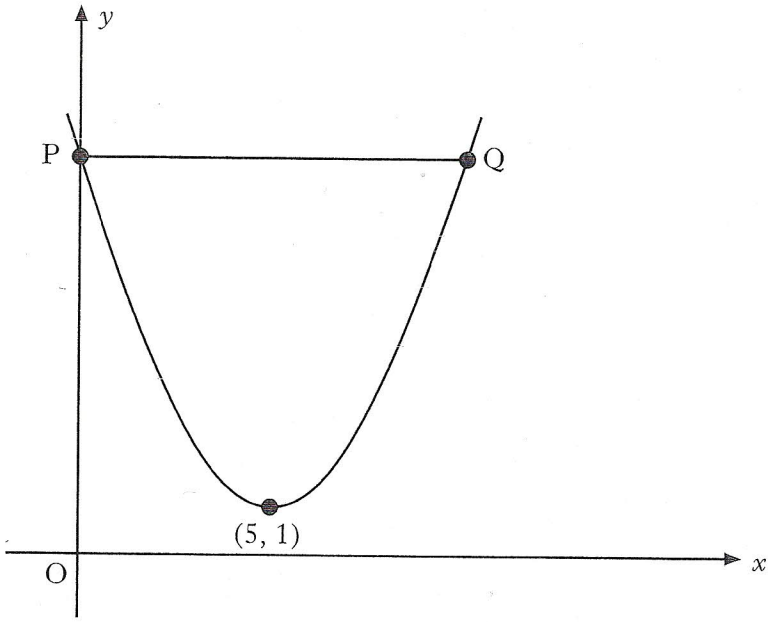


The base of the pyramid is an equilateral triangle of side 6 centimetres.
The height of the pyramid is 7 centimetres.
Calculate the volume of the pyramid. 3

MARKS

12. The graph below shows part of a parabola with equation of the form

$$y = (x+a)^2 + b\,.$$



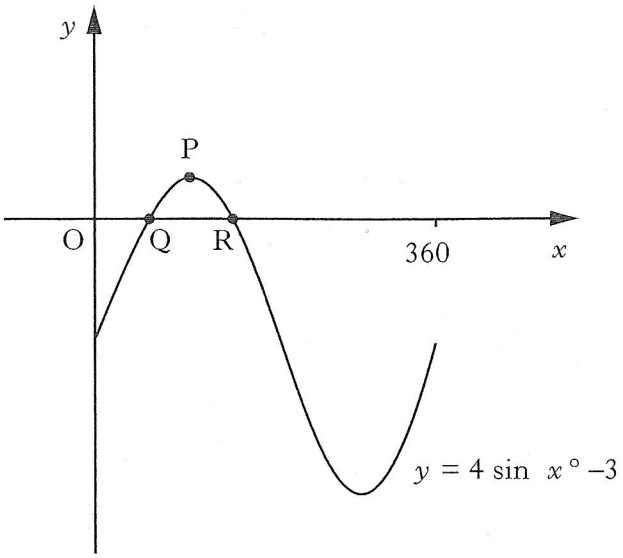
(a) State the values of a and b . 2

(b) The line PQ is parallel to the x - axis.
Find the coordinates of points P and Q. 3

Total marks 5

MARKS

13. Part of the graph of $y = 4\sin x^o - 3$ is shown below.



The graph cuts the x - axis at Q and R.

P is the maximum turning point.

(a) Write down the coordinates of P. **1**

(b) Calculate the x - coordinates of Q and R. **4**

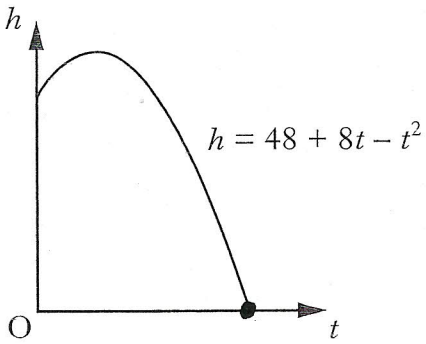
Total marks 5

MARKS

14. The diagram shows the path of a flare after it is fired.

The height, h metres above sea level, of the flare is given by

$h = 48 + 8t - t^2$ where t is the number of seconds after firing.



Calculate, **algebraically**, the time taken for the flare to enter the sea. 4

[END OF PRACTICE QUESTION PAPER]