N5

Mαthematics

National 5 Practice Paper H

Paper 1

Duration – 1 hour

Total marks – 40

- You may NOT 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. Evaluate

$$4\frac{1}{3}-1\frac{1}{2}$$

2

2. Expand and simplify

$$(3x-2)(2x^2+x+5)$$

3

3. Change the subject of the formula to m.

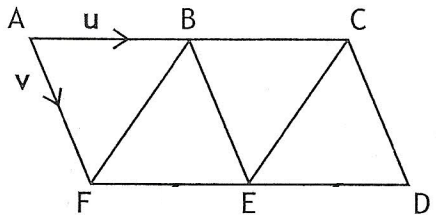
$$L=\frac{\sqrt{m}}{k}$$

2

MARKS

4. The diagram shows a tiling of congruent triangles.

Vectors **u** and **v** are represented by $\overrightarrow{AB}$ and $\overrightarrow{AF}$ respectively.

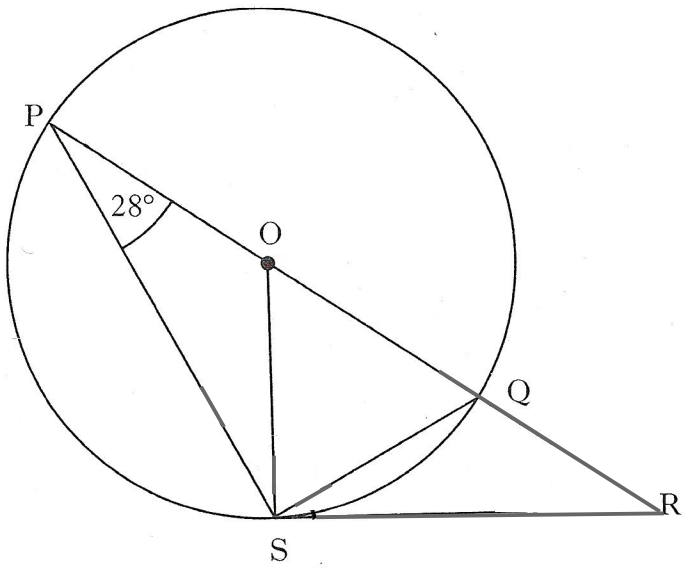


(a) Express $\overrightarrow{AD}$ in terms of **u** and **v**.

(b) Express $\overrightarrow{CE}$ in terms of **u** and **v**. 1

Total marks 2

5.



In the above diagram,

- O is the centre of the circle
- PQ is a diameter of the circle
- PQR is a straight line
- RS is a tangent to the circle at S
- angle QPS is 28°

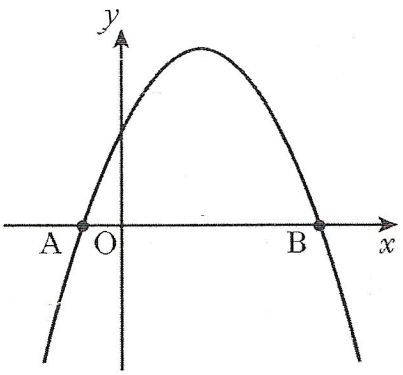
Calculate the size of angle QRS. 3

MARKS

6. Express $\frac{3y^2-6y}{y^2+y-6}$ in its simplest form. 3

7. Evaluate $9^{\frac{3}{2}}$. 2

8. The diagram shows part of the graph of $y=5+4x-x^2$.



$y=5+4x-x^2$

A is the point (-1, 0).

B is the point (5, 0).

(a) State the equation of the axis of symmetry of the graph. 2

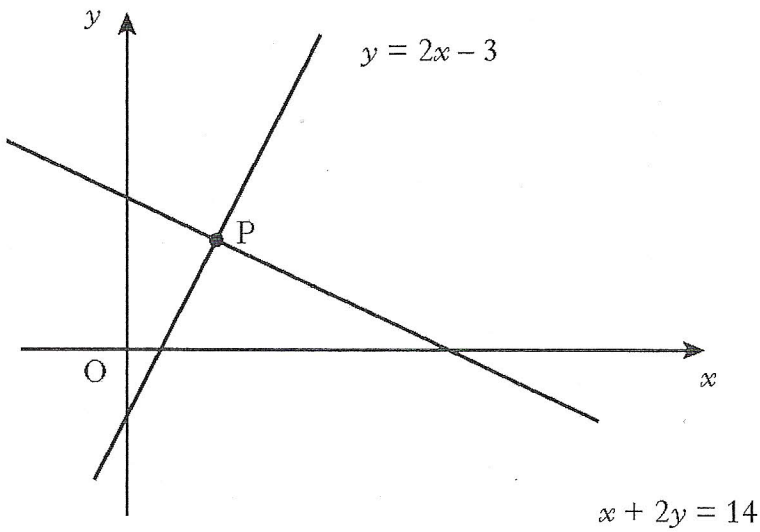
(b) Hence, find the maximum value of $y=5+4x-x^2$. 2

Total marks 4

MARKS

9. The graph below shows two straight lines.

- $y = 2x - 3$
- $x + 2y = 14$

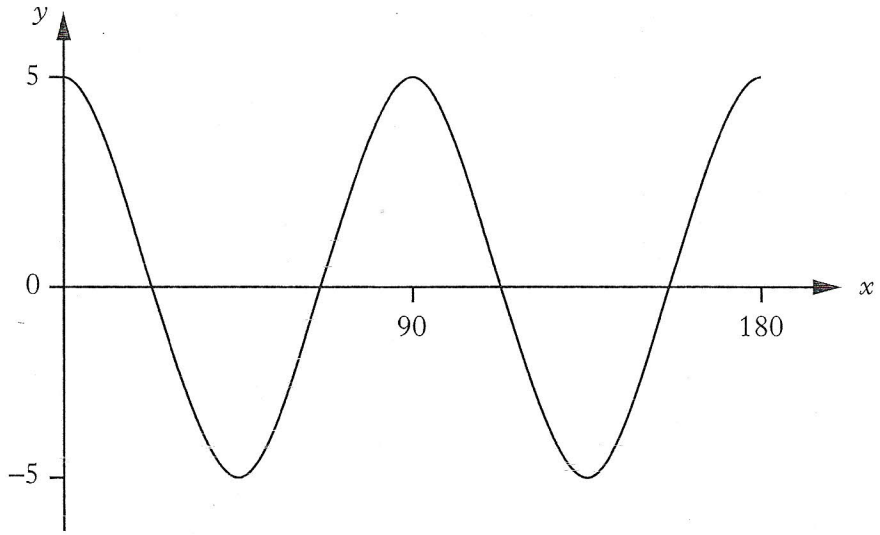


The lines intersect at the point P.

Find, **algebraically**, the coordinates of P. 4

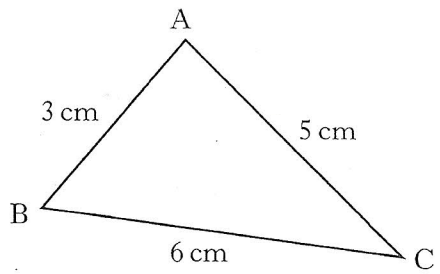
MARKS

10. Part of the graph of $y = a\cos bx^{o}$ is shown in the diagram.



State the values of a and b. **2**

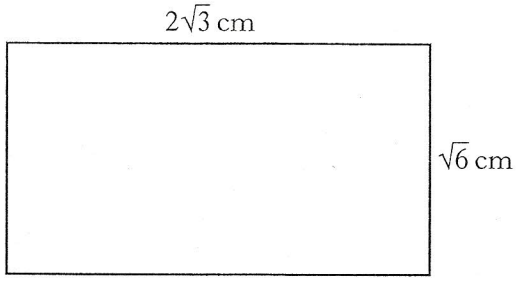
11.



In triangle ABC, show that cos B = $\frac{5}{9}$. **3**

MARKS

12.



The rectangle above has length $2\sqrt{3}$ centimetres and breadth $\sqrt{6}$ centimetres.

Calculate the area of the rectangle.

Express your answer as a surd in its simplest form. 3

13. Simplify $\frac{3}{m}+\frac{4}{m+1}$. 3

14. Prove that the roots of the equation $2x^2+8x+5=0$ are real and irrational. 4

[END OF PRACTICE QUESTION PAPER]