N5

Mαthematics

National 5 Practice Paper D

Paper 1

Duration – 1 hour

Total marks – 40

- o   You may NOT use a calculator
- o   Attempt all the questions.
- o   Use **blue** or **black** ink.
- o   Full credit will only be given to solutions which contain appropriate working.
- o   State the units for your answer where appropriate.

FORMULAE LIST

The roots of are

$$ax^2 + bx + c = 0 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine rule:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule:

$$a^2 = b^2 + c^2 - 2bc \cos A \quad \text{or} \quad \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Area of a triangle:

$$A = \frac{1}{2} ab \sin C$$

Volume of a Sphere:

$$V = \frac{4}{3} \pi r^3$$

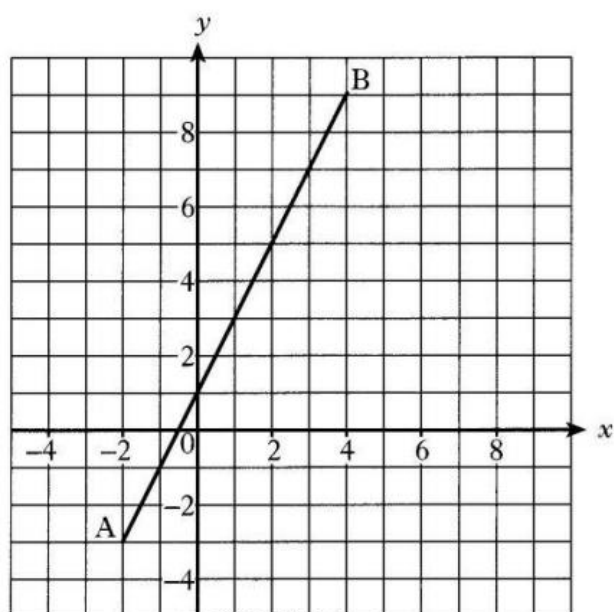Volume of a cone:

$$V = \frac{1}{3} \pi r^2 h$$

Volume of a pyramid:

$$V = \frac{1}{3} Ah$$

Standard deviation:

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

1.   Find the gradient of the straight line joining points A(3, -7) and B(-5, 3)   2

2.   Evaluate $\dfrac{2}{5}$ of $3\dfrac{1}{2} + \dfrac{4}{5}$ 3

3.

Find the equation of the straight line AB.   3

4. The marks scored by 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:

          (i)   The median mark;

          (ii)   The semi-interquartile range for the data.   2

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

   In this test the median mark is 67 and the semi-interquartile range is 7.

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

5. Marmalade is on special offer.
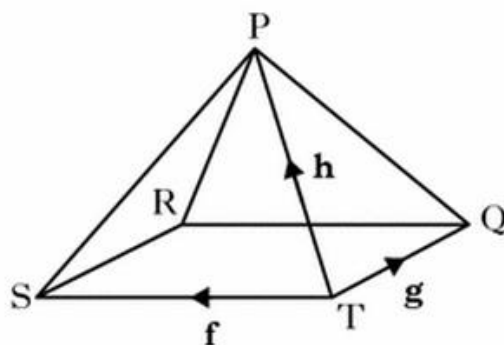   Each jar on special offer contains 12.5% more than the standard jar.

   A jar on special offer contains 450 g of marmalade.
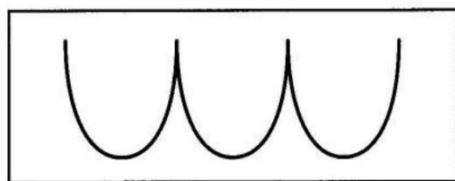
   How much does the standard jar contain?   3
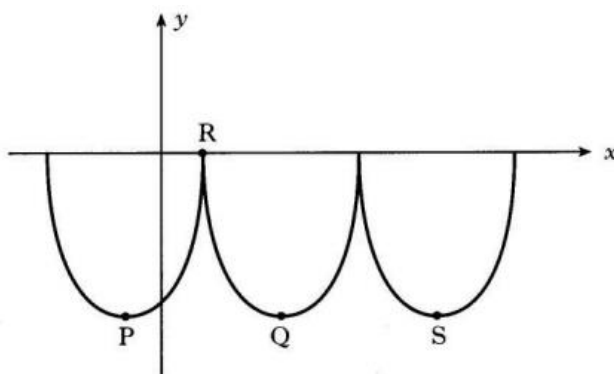
6.   The diagram shows a square based pyramid $PQRST$.

Express $\overrightarrow{RP}$ in terms of $\boldsymbol{f}, \boldsymbol{g}$ and $\boldsymbol{h}$.   3

7.   William Watson Fast Foods use a logo based on parts of three identical parabolas.

The logo is represented on the diagram below.

The first parabola has turning point P and equation $y = (x + 2)^2 - 16$

(a)   State the coordinates of P.   2

(b)   If R is the point $(2,0)$, find the coordinates of Q, the minimum turning
        point of the second parabola.   1

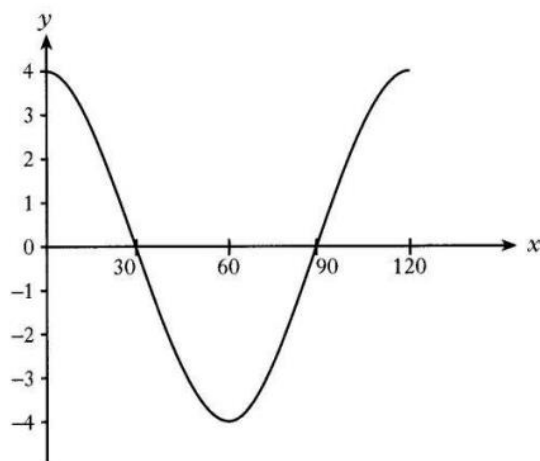(c)   Find the equation of the parabola with turning point S.   2

8. Write $\dfrac{3}{m} + \dfrac{4}{(m+1)}$ as a single fraction in its simplest form.   3

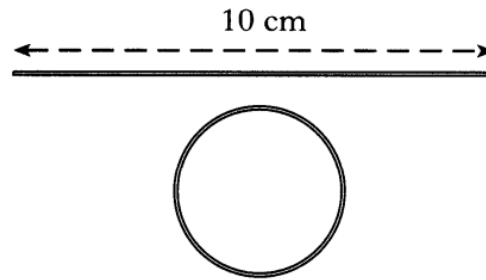9. Part of the graph of $y = a\cos bx°$ is shown in the diagram.

State the values of a and b.   2

10. Evaluate $2^0 + 3^{-1}$.   2

11. Express $\sqrt{12} + 5\sqrt{3} - \sqrt{27}$ as a surd in its simplest form.   3

12. A piece of gold wire 10 centimetres long is made into a circle.

10 cm

The circumference of the circle is equal to the length of the wire.

Show that the area of the circle is exactly $\frac{25}{\pi}$ square centimetres.

4

13. Two variables x and y are connected by the relationship $y = ax + b$.

Sketch a possible graph of y against x to illustrate this relationship when a and b are both less than zero.

3

[End of question paper]