N5

Mathematics

National 5 Practice Paper E

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.

1. Evaluate $2\frac{1}{3}+\frac{5}{6}$ of $1\frac{2}{5}$ 3

2. Multiply out the brackets and collect like terms.

$$(4x+2)(x-5)+3x$$ 3

3. In an experiment involving two variables, the following values for x and y were recorded.

x	1	2	3	4
y	4	2	0	-2

The results were plotted and a straight line was drawn through the points.

Find the gradient of the line **and** write down its equation. 3

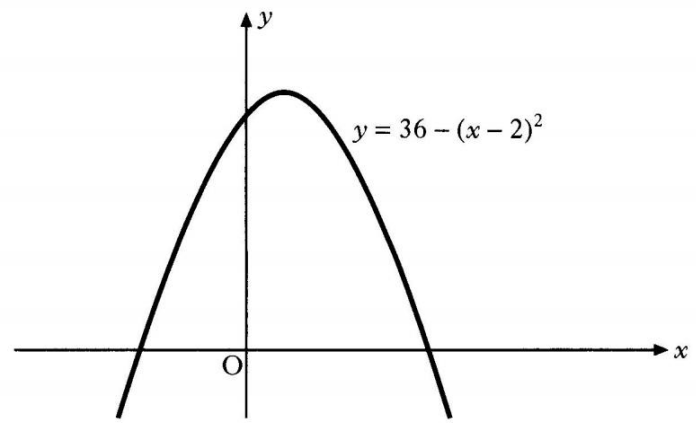
4. Solve the equation

$$\frac{2}{x}+9=16$$ 3

5. Given $2x^2-2x-1=0$, show that

$$x=\frac{1\pm\sqrt{3}}{2}$$ 4

6. The diagram below shows part of the graph of $y = 36 - (x - 2)^2$.

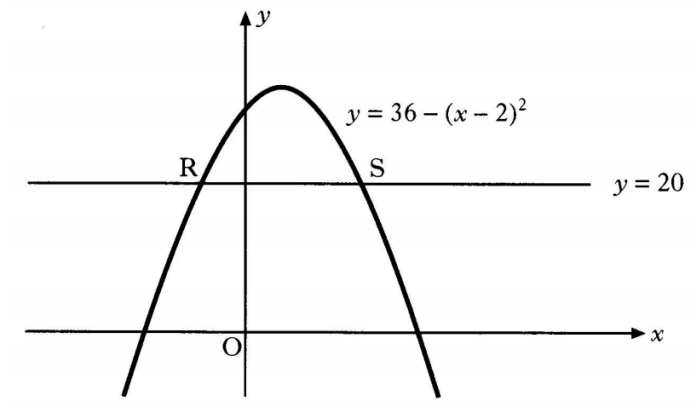


(a) State the coordinates of the maximum turning point. 2

(b) State the equation of the axis of symmetry. 1

The line $y = 20$ is drawn.

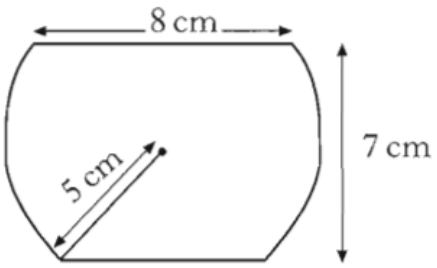
It cuts the graph of $y = 36 - (x - 2)^2$ at R and S as shown below.



(c) S is the point (6, 20). Find the coordinates of R. 2

7. A badge is made from a circle of radius 5 centimetres.
Segments are taken off the top and bottom of the circle as shown.

The straight edges are parallel.



The badge measures 7 centimetres from the top to the bottom.
The top is 8 centimetres wide.

Calculate the width of the base. 5

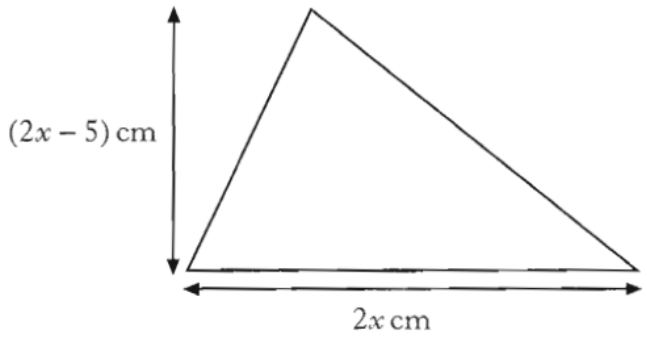
8. Sketch the graph of $y = \sin 2x°$, $0 \leq x \leq 360$. 3

9. $f(x) = 4\sqrt{x} + \sqrt{2}$

(a) Find the value of $f(72)$ as a surd in its simplest form. 3

(b) Find the value of t, given that $f(t) = 3\sqrt{2}$. 3

10. The height of a triangle is $(2x - 5)$ centimetres and the base is $2x$ centimetres.



The area of the triangle is 7 square centimetres.

Calculate the value of x. 5

[End of question paper]