



Mathematics

National 5 Practice Paper A

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

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

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

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

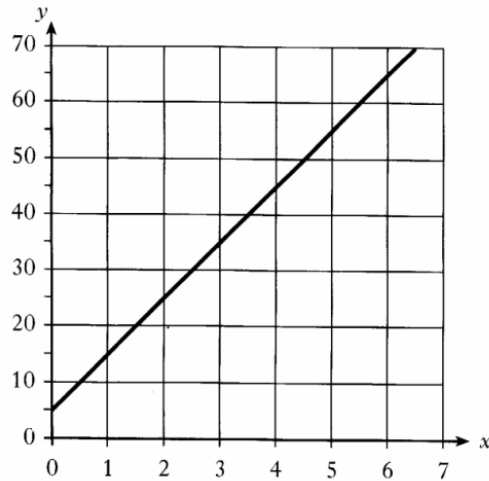
Volume of a pyramid: $V = \frac{1}{3}Ah$

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

1. Evaluate $3\frac{2}{5} - 1\frac{3}{4}$ 2

2. Factorise $x^2 + 2x - 15$. 2

3.



Find the equation of this straight line in the form $y = mx + c$ 3

4. Express $y = x^2 + 8x - 7$ in the form $y = (x + a)^2 + b$ and hence state the coordinates of the turning point. 3

5. $P = R^3b - 5$
Change the subject of the formula to R . 3

6. Two vectors are defined as $\mathbf{u} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$.

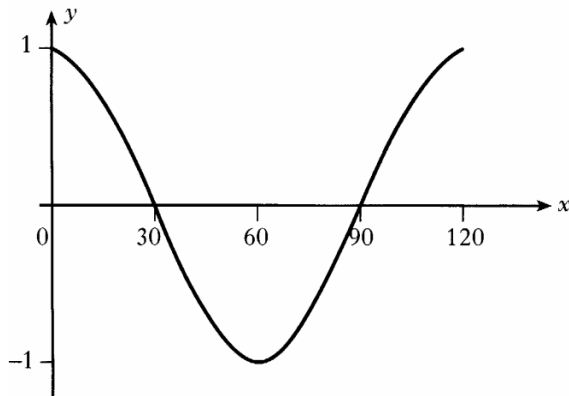
(a) Find the resultant vector $\mathbf{u} + 3\mathbf{v}$.

1

(b) Find $|\mathbf{u} + 3\mathbf{v}|$.

2

7.



Part of the graph of $y = \cos bx^\circ$ is shown in the diagram.

State the value of b .

1

8. Find the point of intersection of the straight lines with equations

$$2x + y = 5 \quad \text{and} \quad x - 3y = 6.$$

4

9. A parabola has equation $y = x^2 - 3x + 7$.

Using the discriminant, determine the nature of its roots.

3

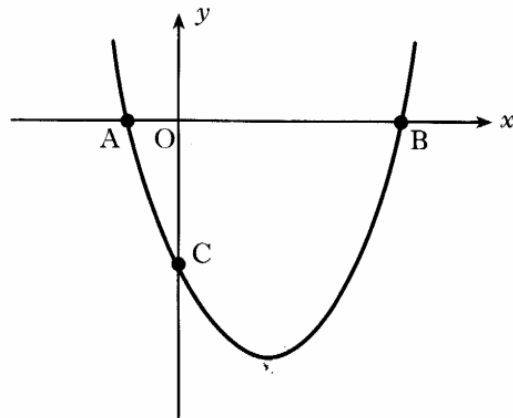
10. A straight line has the equation $3x - y = 9$.

A second line is parallel to this and passes through the point $(5, -3)$.

Write down the equation of the second line.

3

11.



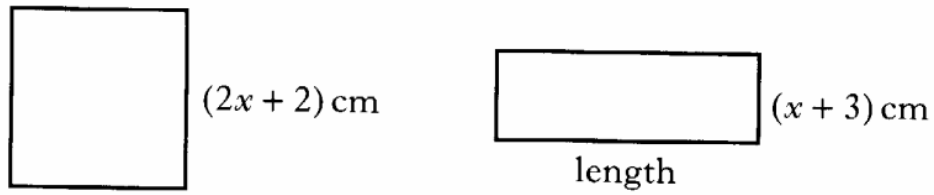
The equation of the parabola in the diagram above is $y = (x - 2)^2 - 9$.

(a) State the coordinates of the minimum turning point of the parabola. 2

(b) Find the coordinates of C. 2

(c) A is the point $(-1, 0)$. State the coordinates of B. 1

12. The square and rectangle shown below have the same perimeter.



Show that the length of the rectangle is $(3x + 1)$ centimetres.

2

13. (a) Express $\frac{3}{x} - \frac{5}{x+2}$, $x \neq 0, x \neq -2$, as a single fraction in its simplest form. 3

- (b) Express $\sqrt{18} - \sqrt{2} + \sqrt{72}$ as a surd in its simplest form. 3

[End of question paper]