

## $M\alpha$ the matics

## 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 <i>n</i> is the sample size.

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

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

3.



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

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

3

2

2

5. 
$$P = R^3 b - 5$$

Change the subject of the formula to R.

- 6. Two vectors are defined as  $\boldsymbol{u} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$  and  $\boldsymbol{v} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$ .
  - (a) Find the resultant vector u + 3v.
  - (b) Find |u + 3v|.

0

-1

7.



 $60^{+}$ 

30

► x

120

50



$$2x + y = 5$$
 and  $x - 3y = 6$ .

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

Using the discriminant, determine the nature of its roots.

2

1

4

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

A second line is parallel to this and passes throught the point (5, -3). Write down the equation of the second line.

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



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

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]