

**National 5 Maths**  
**Assessment – Mixed Topics**

1. Multiply out the brackets and collect like terms

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

2. Find  $h(-2)$

$$h(t) = 15t - 3t^2$$

3. Change the subject to R

$$M = R^2T - 3$$

4. Solve algebraically the inequality

$$2y < 3 - (y + 6)$$

5. Solve the simultaneous equations

Calculator allowed!

$$2x + 6y = 36$$

$$3x - 2y = -1$$

6. Express  $\frac{3y^5 \times 4y^{-1}}{6y}$  in its simplest form.

7. Express

$$\sqrt{63} + \sqrt{28} - \sqrt{7}$$

as a surd in its simplest form.

8. Express  $\frac{3}{\sqrt{5}}$  as a fraction with a rational denominator.

9.  $3\frac{5}{8} + 4\frac{2}{3}$ .

10. simplify

$$\frac{4x^2 - y^2}{6x + 3y}$$

11. Express as a single fraction in its simplest form

$$\frac{5}{x} - \frac{3}{(x-2)}, \quad x \neq 0 \quad \text{or} \quad x \neq 2.$$

12. Solve the quadratic equation  $x^2 - 4x - 6 = 0$ .

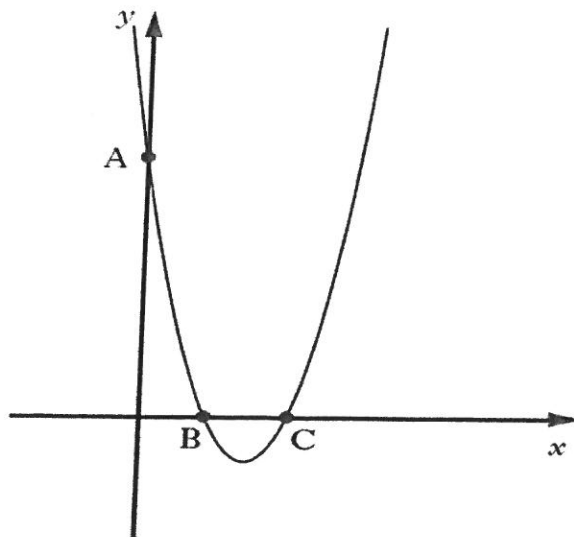
Give your answers **correct to 1 decimal place**.

*calculator allowed!*

13. The equation  $x^2 - 6x + 8 = 0$  can also be written as  $(x-2)(x-4) =$

(a) Write down the roots of the equation  $x^2 - 6x + 8 = 0$ .

Part of the graph of  $y = x^2 - 6x + 8$  is shown below.



(b) State the coordinates of the points A, B and C.

(c) What is the equation of the axis of symmetry of this graph?

## National 5 Assessment

SOLUTIONS

1.

$$\begin{aligned}(4x+2)(x-5) + 3x \\ 4x^2 - 20x + 2x - 10 + 3x \\ 4x^2 - 18x - 10 + 3x \\ 4x^2 - 15x - 10\end{aligned}$$

$$\begin{aligned}2. \quad h(-2) &= 15(-2) - 3(-2)^2 \\ &= -30 - 3(4) \\ &= -30 - 12 \\ &= -42\end{aligned}$$

$$3.) \quad m = R^2 T - 3$$

$$m + 3 = R^2 T$$

$$\frac{m+3}{T} = R^2$$

$$R = \sqrt{\frac{m+3}{T}}$$

$$4.) \quad 2y < 3 - (y+6)$$

$$2y < 3 - y - 6$$

$$2y < -3 - y$$

$$2y + y < -3$$

$$3y < -3$$

$$y < -1$$

$$5.) \quad \begin{array}{r} 2x + 6y = 36 \quad \times 2 \\ 3x - 2y = -1 \quad \times 6 \end{array}$$

$$+ \quad \begin{array}{r} 4x + 12y = 72 \\ 18x - 12y = -6 \\ \hline \end{array}$$

$$\begin{array}{r} 22x = 66 \\ x = 3 \end{array}$$

$$\begin{array}{r} 2(3) + 6y = 36 \\ 6 + 6y = 36 \\ 6y = 30 \\ y = 5 \end{array}$$

$$6.) \quad \frac{3y^5 \times 4y^{-1}}{6y}$$

$$= \frac{12y^{5+(-1)}}{6y}$$

$$= \frac{12y^4}{6y^1}$$

$$= 2y^{4-1}$$

$$= 2y^3$$

$$7.) \quad \sqrt{63} + \sqrt{28} - \sqrt{7}$$

$$\sqrt{9\sqrt{7}} + \sqrt{4\sqrt{7}} - \sqrt{7}$$

$$3\sqrt{7} + 2\sqrt{7} - \sqrt{7}$$

$$= 4\sqrt{7}$$

$$8.) \quad \frac{3}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$$

$$= \frac{3\sqrt{5}}{5}$$

$$9.) \quad 3\frac{5}{8} + 4\frac{2}{3}$$

$$\frac{29}{8} + \frac{14}{3}$$

$$= \frac{(3 \times 29) + 8(14)}{8 \times 3}$$

$$= \frac{199}{24}$$

$$\begin{array}{r} 229 \\ \times 3 \\ \hline 87 \end{array}$$

$$\begin{array}{r} 314 \\ \times 8 \\ \hline 112 \end{array}$$

$$\begin{array}{r} 112 \\ 87 \\ \hline 199 \end{array}$$

$$10.) \quad \frac{4x^2 - y^2}{6x + 3y}$$

$$= \frac{(2x+y)(2x-y)}{3(2x+y)}$$

$$= \frac{2x-y}{3}$$

$$11.) \quad \frac{5}{x} - \frac{3}{x-2}$$

$$\frac{5(x-2) - 3x}{x(x-2)}$$

$$= \frac{5x - 10 - 3x}{x(x-2)}$$

$$= \frac{2x - 10}{x(x-2)}$$

$$= \frac{2(x-5)}{x(x-2)}$$



$$12.) \quad x^2 - 4x - 6 = 0 \quad a=1 \quad b=-4 \quad c=-6$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-6)}}{2(1)}$$

$$= \frac{4 \pm \sqrt{16 + 24}}{2}$$

$$= \frac{4 \pm \sqrt{40}}{2}$$

$$x = \frac{4 + \sqrt{40}}{2}$$

$$= 5.2$$

$$x = \frac{4 - \sqrt{40}}{2}$$

$$= -1.2$$

13.)

Roots

$$x^2 - 2x - 4x + 8 = 0$$

$$x(x-2) - 4(x-2) = 0$$

$$(x-2)(x-4) = 0$$

$$x=2 \quad x=4$$

$$B(2,0) \quad C(4,0)$$

Turning Point

$$x^2 - 6x + 8$$

$$(x-3)^2 + 8$$

$$(x-3)^2 + 8 - 9$$

$$(x-3)^2 - 1$$

$$\underline{\underline{TP}}(3, -1)$$

line of symmetry  $x=3$

intercept

$$y = (0)^2 - 6(0) + 8$$

$$= 8$$

$$A(0,8)$$