

Scoil Mhuire IV – Summer Exam 2014

Teachers: Mr.Crowe Ms. O’Leary

Duration: 2 hours. Answer all questions. Formulae & Tables supplied by student.

1. Factorise the following:

(i) $6xy + 3x^2y - 9x^2x^3$	(iii) $6x^2 - 13x - 5$
(ii) $(x + y)^2 - 25z^2$	(iv) $27x^3 + 8y^3$

2. A quadratic function has roots of -2 and -1. It also contains the point (-3, 8). Evaluate the function in the form $ax^2 + bx + c = 0$ where $a, b, c \in \mathbb{Z}$

3. The function $f(x) = 2x^2 + 8x - 4$ can be expressed as $a(x+b)^2 + c$, where $a, b, c \in \mathbb{Z}$

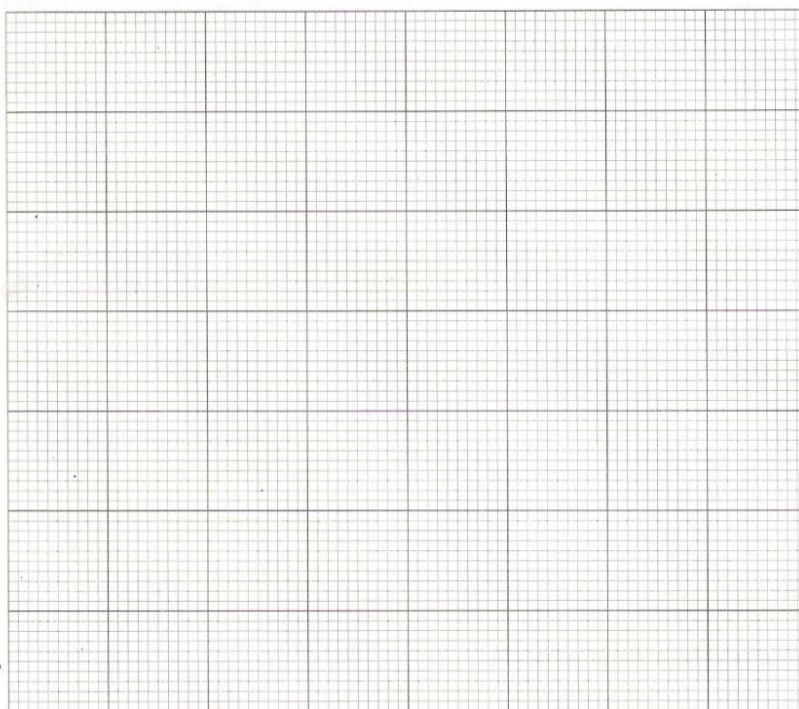
(i) Find the values of a, b and c .

(ii) Hence, find the co-ordinates of the local minimum of the curve.

(iii) Solve the equation $f(x) = 0$, writing your answers in surd form.

(iv) Where does the graph cut the y-axis?

(v) Draw a rough sketch of $f(x)$ on the graph paper given.



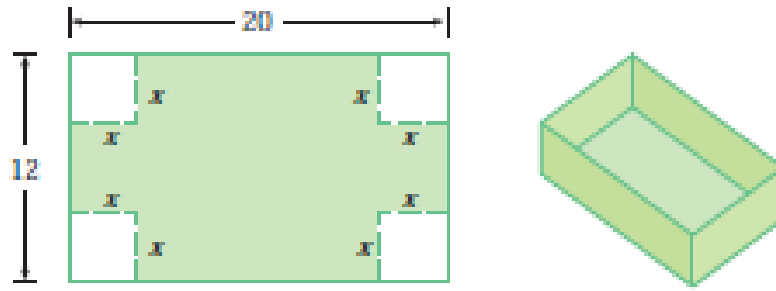
4. Let $f(x) = \frac{x^3 - 1}{x^2 - 1}$, with $x \neq \pm 1$ and $g(x) = \frac{x^2 + x + 1}{x^2 - x - 2}$, with $x \neq -1, 2$.

If $f(x) \div g(x) = ax + b$, find the value of a and b .

5. Show that $1 - x + x^2 - \frac{1}{1+x} = \frac{x^3}{1+x}$ for $x \neq -1$.

6. Prove that $k + 1$ is a root of the function $f(x) = x^2 - 2x - k^2 + 1$, where k is a constant.

6. A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 12 cm by 20 cm by cutting out equal squares of side x at each corner and then folding up the sides as in the figure.



(i) Express the volume of the box as a function of x . (ii) What

Find the value of x if the volume is 1512 cm^3 (i.e the equation has one whole number root, find it.)