Scoil Mhuire V - Problem Set 2 - For Friday 12th September 2014

Scoil Mhuire IV – Summer Exam 2013 [Answer all Questions]

1.(a) Simplify each of the following algebraic expressions.

(i) $\frac{12m^2n^3}{(6m^4n^5)^2}$ (ii) $\frac{3+\frac{1}{x}}{\frac{5}{x}+4}$ (iii) $\frac{2+\frac{x}{2}}{x^2-16}$

(b) Solve for x and y:

(i) $y = x + 4$
$5y + 2x = 6$

(ii) $3x + y = 7$
$x^2 + y^2 = 13$

(c) Find the integers a and b such that

(i) $(3 - \sqrt{2})^2 = a - b\sqrt{2}$ (ii) $\left(\frac{1-\sqrt{2}}{1+\sqrt{2}}\right) = a\sqrt{2} - b.$

(d) If $p(x - q)^2 + r = 2x^2 - 12x + 5$ for all values of x, find the values of p, q and r.

(e) Solve the simultaneous equations $3x + 5y - z = -3$
$2x + y - 3z = -9$
$x + 3y + 2z = 7.$

(f) Simplify $(b + 1)^3 - (b - 1)^3$.

(g) Factorise the following:

(i) $6xy+3x^2y-9x^2x^3$ (ii) $4x^2-25y^2$ (iii) $2x^2-11x+5$ (iv) x^3+y^3 (v) $27x^3-8x^3$

(h) The time taken for one complete cycle of a pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$

where l is the length of the pendulum and g is the acceleration due to gravity.

(i) Find l in terms of the other variables.

(ii) Given that $T = 3$ and $g = 10$, calculate the length of the pendulum correct to one decimal place.

(i) Three times the width of a certain rectangle exceeds twice the length by 3 cm.
Four times the length is 12 cm more than its perimeter.
Find the dimensions of the rectangle.

(j) The area of a rectangle, $A(x) = 6x^2 + 4x - 2$. If the length is given by $(3x-1)$, find

(i) an expression for the width of the rectangle.

(ii) an expression for the perimeter, $P(x)$, of the rectangle.