Scoil Mhuire V – Hons Maths 17/18

Problem Set 12 – For Monday

1. Find the values of θ for which $\text{Cos}\,\theta = \frac{\sqrt{3}}{2}$ where $0^o \le \theta \le 360^o$.

2. In a triangle *pqr*, $|\angle pqr| = 30^o$, $|qr| = 15$ and $|rp| = 5\sqrt{3}$.
(i) Find two values for $|\angle qpr|$ and sketch the two resulting triangles.
(ii) Calculate the ratio of the areas of the two triangles.

3. Express sin *A* in terms of *t* if $\text{Tan}\,\theta = \frac{t}{2}$ where $t > 0$ and $0^o < A < 90^o$.

4. (i) The *x* axis is a tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$. Show that $g^2 = c$.
(ii) The *x* axis is a tangent to a circle *K* at the point (3, 0). The point $(-1,4) \in K$.
Find the equation of *K*.

5. The circle *K* has equation $x^2 + y^2 = 100$. Show, by calculation, that the point $A(12,-9)$ lies outside *K*.
(i) Find the equation of the line *OA*, where *O* is the origin.
(ii) Find the coordinates of the points where *OA* intersects *K*.

6. The following equation is true for all x:

$$ax^2 + bx(x-4) + c(x-4) = x^2 + 13x - 20.$$

Find the values of the constants a, b and c.

7. Given that the quadratic equation $x^2 + 2tx - 2x + 2t + 1 = 0$ has equal roots,
(i) find the value of t where $t > 0$.
(ii) use this value of t to evalute the roots.

Answers: **1.** 150^o **2. (i)** 60^o, 120^o; **(ii)** 2:1 **3.** $\text{Sin}\,\theta = \frac{t}{\sqrt{t^2+4}}$ **4(ii)** $x^2 + y^2 - 6x - 8y + 9 = 0$

5. (i) $3x + 4y = 0$; **(ii)** $(8,-6), (-8,6)$ **6.** a = 3, b = −2 and c = 5 **7. (i)** t = 4 **(ii)** x = −3,−3