Scoil Mhuire V – Hons Maths [2014-15]

Problem Set 7 – For Monday 2nd February

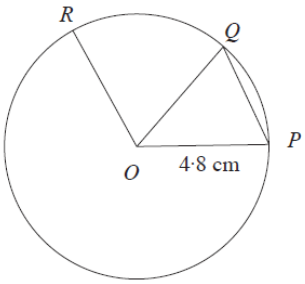
1. Find the values of θ for which $\cos\theta = \frac{\sqrt{3}}{2}$ where $0^o \le x \le 360^o$.

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 $\tan A = \frac{t}{2}$ where $t > 0$ and $0^o < A < 90^o$.

4. The diagram shows three points *P*, *Q* and *R* on a circle with centre *O* and radius 4·8 cm.



(i) Given that $|\angle POQ| = 0.7$ radians, find the area of triangle *POQ*. Give your answer correct to two decimal places.

(ii) The length of the arc *RQ* is *L* cm and the area of sector *ROQ* is *A* cm^2. Given that $A = k\,L$, find the value of *k*.

5. 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.

6. Solve the following equation: $2\log_3(x+2) - \log_3(x+1) = \log_3(x+5)$

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.

8. Solve the following inequalities (i) $x^2 - x - 12 \le 0$, $x \in \mathrm{R}$ (ii) $\frac{x+2}{x-1} < 3$, $x \in \mathrm{R}$

9. Draw a graph of the function 3 sin2x in the domain $0^o \le \theta \le 360^o$. What is its period and range?

10. Light intensity is measured in lux. The light intensity at the surface of a lake is 6000 lux. The light intensity, *I* lux, a distance *s* below the surface of the lake is given by

$$I = Ae^{-ks}$$ where *A* and *k* are constants.

(i) Write down the value of *A*.

(ii) If the light intensity is 1000 lux at a depth of 6m below the surface, find *k*.

Answers: **1.** $30^o, 330^o$ **2. (i)** $60^o, 120^o$ **(ii)** 2 :1 **3.** Sin $\theta = \frac{t}{\sqrt{t^2+4}}$ **4.** (i) 7.42 cm^2 (ii) k = 2.4

5. a = 3, b = −2 and c = 5 **6.** $x = \frac{-1}{2}$ **7. (i)** t = 4 **(ii)** x = −3,−3 **9.** [3,-3] π **10.** *A*= 6000, *k* = 0.299