S.4 Add Maths Quiz 6(b)

Time allowed: 25 minutes

Total Mark:17

1. (a) Express $5\cos\theta + 12\sin\theta$ in the form $r\cos(\theta - \alpha)$, where $r > 0$ and $0 < \alpha < \frac{\pi}{2}$.

   (b) Let $f(\theta) = (5\cos\theta + 12\sin\theta)^2 + 10\cos\theta + 24\sin\theta + 1$.
   Using the result of (a), find the maximum and minimum values of $f(\theta)$.

   (2 + 3 marks)

2. Show that $\cos^2 n\theta - \cos^2 m\theta = \sin(m+n)\theta \sin(m-n)\theta$.
   Hence, or otherwise, solve the equation $\cos^2 2\theta - \cos^2 3\theta - \sin 5\theta = 0$ for $0 \le \theta \le \pi$.

   (5 marks)

3. In ΔABC, let $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = k$, where A, B and C are interior angles.

   (a) Show that $\frac{a}{\sin A} = \frac{a+b+c}{\sin A + \sin B + \sin C}$.

   (b) Show that $\sin A + \sin B + \sin C = 4\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$.

   (c) Given that $a + b + c = 2m$, by using the results of (a) and (b), show that

   (4 + 3 marks)

End of Quiz