**Core 3 Topic Assessment 7 – Further Trigonometry**

**1.** (*a*) (i) By writing 3*θ* = (2*θ* + *θ*), show that

sin 3*θ* = 3 sin *θ* – 4 sin3 *θ*.

**(4)**

(ii) Hence, or otherwise, for 0 < *θ* < , solve

8 sin3 *θ* – 6 sin *θ* + 1 = 0.

Give your answers in terms of *π*.

**(5)**

(*b*) Using sin (*θ* – *α*) =sin *θ* cos *α* – cos *θ* sin *α*, or otherwise, show that

sin 15° = (√6 – √2).

**(4)**

**2.** f(*x*) = 5 cos *x* + 12 sin *x*.

Given that f(*x*) = *R* cos (*x* – *α*), where *R* > 0 and 0 < *α* < ,

(*a*) find the value of *R* and the value of *α* to 3 decimal places.

**(4)**

(*b*) Hence solve the equation (for 0 ≤ *x* < 2*π*)

5 cos *x* + 12 sin *x* = 6

**(5)**

(*c*) (i) Write down the maximum value of 5 cos *x* + 12 sin *x*.

**(1)**

(ii) Find the smallest positive value of *x* for which this maximum value occurs.

**(2)**

**3.** (i) Prove that

sec2 *x* – cosec2 *x* ≡ tan2 *x* – cot2 *x*.

**(2)**

(ii) Given that

*y* = arccos *x*, –1 ≤ *x* ≤ 1 and 0 ≤ *y* ≤ *π*,

(*a*) express arcsin *x* in terms of *y*.

**(2)**

(*b*) Hence evaluate arccos *x* + arcsin *x*. Give your answer in terms of *π*.

**(1)**