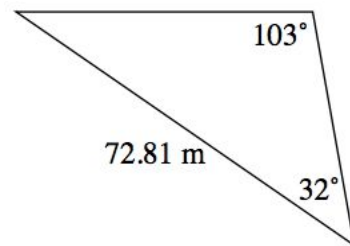# Math SL PROBLEM SET 30

Section A (Short Answer)

1. (**T3.6 - R**) (**CA**) The diagram shows a triangular building lot. The distance are given in meters. Find the perimeter and area of this lot, giving your answers correct to the nearest hundredth. (**Cirrito 9.5.1, p290**)

   (diagram: triangle with angles 103° and 32°, side 72.81 m)

2. (**T3.5 - E**) (**CI**) The equation $\cos^2(x) - \sin^2(x) = 0$ can be solved in a variety of ways: (**Cirrito 10.2.2, p332**)

   a. Solve $\cos^2(x) - \sin^2(x) = 0$ by factoring $\cos^2(x) - \sin^2(x)$
   b. Solve $\cos^2(x) - \sin^2(x) = 0$ using a Pythagorean identity
   c. Solve $\cos^2(x) - \sin^2(x) = 0$ using a tangent identity
   d. Solve $\cos^2(x) - \sin^2(x) = 0$ using a double angle identity

3. (**V4.3 - N**) (**CA**) Find the angle between the V_1, which is defined in the Cartesian form of $\frac{2x-5}{4} = \frac{y+3}{-2}$ and V_2, which is defined in parametric form as $x(t) = -2 + 3t$ and $y(t) = 4 + t$. (HINT: Change equations to function form …..) (**Cirrito 12.7.1, p444**)

4. (**F2.5, C6.1 - R,E**) (**CI & CA**) Given $g(x) = \frac{x+7}{2x-5}$, determine: (**Cirrito 5.3.5, p144**)

   a. The value(s) of the x- and y-intercepts.

   b. The equation(s) of the asymptote(s).

   c. Sketch the function.

   d. (**CA**) Determine the value of the following limits:

      i. $\lim_{x \to \infty} g(x)$

      ii. $\lim_{x \to -\infty} g(x)$

      iii. $\lim_{x \to 2.5} g(x)$

      iv. $\lim_{x \to 2} g(x)$

   e. Determine the equation of $y = g^{-1}(x)$

5. (**A1.2, F2.7 - E**) (**CI**) Solve the following logarithmic equations: (**Cirrito 7.4, p244**)

   a. $\ln(3x + 1) - \ln(4 - x) = \ln(4)$
   b. $\log_2(3x^2 + 28) - \log_2(3x - 2) = 1$

6. (**SP5.6 - R**) (**CI**) Two events A and B are such that p(A) = 0.6 and p(B) = 0.3 and p(A∩B) = 0.3.
   (Cirrito 15.2, p509)

   a. Are the events dependent or independent?
   b. Find the probability of the following events:

   i. A U B   ii. A | B   iii. B | A   iv. A | B'

Section B (Extended Response/Investigation)

7. (**C6.1 - N**) (**CA**) Use calculator to draw tangent lines to following functions at the given points. For each function, include a sketch of the function with the tangent line, write down the equation of the tangent line, the slope of tangent as well as the meaning of the tangent line with respect to the function at that given point. (HINT: Make sure you are viewing the graph, then find the **draw** menu ⟹ 2nd program and then scroll down until ….)   **(Cirrito 18.3, p591)**

   a. The function $f(x) = 2x^2 + x - 1$ at $x = 3$
   b. The function $g(x) = \sin(x)$ at x = $\frac{\pi}{4}$
   c. The function $h(x) = 2e^x + 1$ at $x = \ln(3)$

8. We know from experience as consumers that the demand for a product tends to decrease as the price increases. This "fact" can be represented by a **demand function**. The demand function for a particular product is given by $p(x) = 500 - \frac{3}{5}e^{0.0004x}$, where p is the price per unit and x is total demand in number of units.   **(Cirrito 7.2, p210)**

   a. Find the price, p, to the nearest dollar for a demand of:

      i.   1000 units
      ii.   5000 units
      iii. 10,000 units

   b. Sketch a graph of the demand function
   c. What level of production will produce a print per unit of $200?
   d. Determine the value of $\lim_{x \to \infty} p(x)$ and interpret the meaning of this limiting value.
   e. Use your calculator to draw the tangent line to the function at x = 2500 and interpret the meaning of the slope of the tangent line.