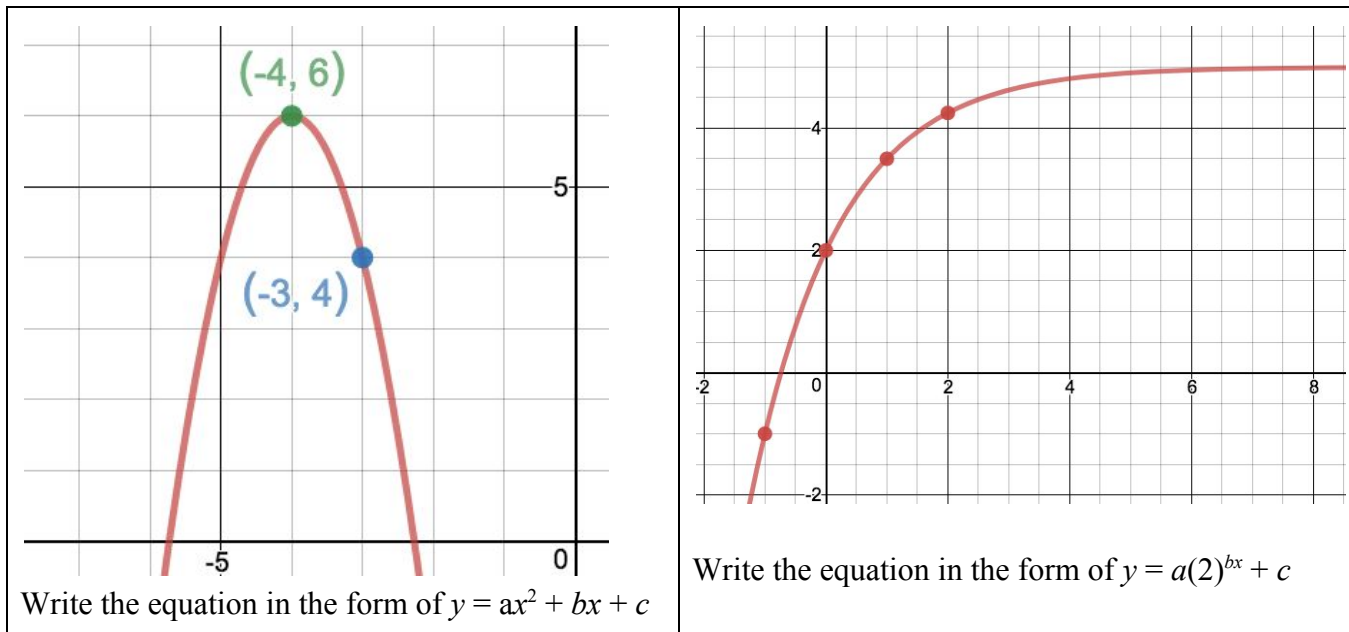# Math SL PROBLEM SET 36

Section A (Short Answer)

1. **(SP5.7, SP5.8 - N) (CI)** A fair six-sided dice has a "1" on one face, has a 2 on two of its faces and has a 3 on three of its faces. The dice is thrown twice. The random variable, T, represents the total score resulting from the two dice being thrown. **(Cirrito 16.3, p545)**

   a. Find $P(T = 3)$ and explain what the answer means in the context of the problem.
   b. Prepare a probability distribution table for this "experiment".
   c. Find the probability that the total score is more than 4.

2. **(V4.2 - N) (CA)** Find the angle between the two vectors c and d, if c is parametrically defined as $x(t) = 2 - 5t$ and $y(t) = -3 + 3t$ and d is defined as $\frac{2 - 3x}{5} = \frac{5y + 8}{3}$. At what point do the lines intersect? **(Cirrito 12.6.1, p432)**

3. **(F2.2, F2.4, F2.6 - R) (CI)** Determine the equations of the following graphs: **(Cirrito 2.4, p39 & Cirrito 5.3.3, p131)**

Write the equation in the form of $y = ax^2 + bx + c$

Write the equation in the form of $y = a(2)^{bx} + c$

4. **(V4.2 - N) (CA)** Find the value of k such that the lines $\frac{x-2}{k} = \frac{y}{2} = \frac{3-z}{3}$ and $\frac{x}{k-1} = \frac{y+2}{3} = \frac{z}{4}$ are perpendicular. Then, if possible, find the point at which the lines intersect. **(Cirrito 12.6.1, p432)**

5. **(SP5.7, SP5.8 - N) (CA)** For a discrete random variable, X, the probability distribution is

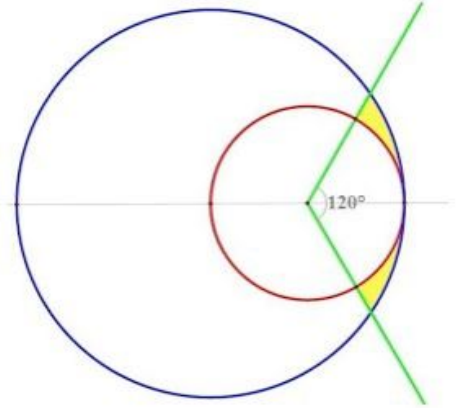$$P(X = x) = f(x) = \begin{cases} kx & x = 1, 2, 3, 4, 5 \\ k(10 - x) & x = 6, 7, 8, 9 \end{cases}$$

defined by the equation : **(Cirrito C16.1, p533)** Find:

    a. The value of the constant, k.

    b. Hence, find $P(X = 3)$

    c. Find the mean (now called the **expected value** of X)

6. **(T3.1 - N) (CI)** Find the area of the region in yellow. NOTE: the center of the red circle is marked and the red circle passes through the center of the blue circle. **(Cirrito 9.7.3, p311)**

Section B (Extended Response/Investigation)

7. **(F2.1, F2.4, C6.1 - R,E) (CI)** A quadratic function is given by the equation $f(x) = x^2 + 4x + B$. **(Cirrito 5.4.2, p157)**

    a. Determine the value of B if $f^{-1}(x) = -2 + \sqrt{x-6}$.

    b. Perform the following compositions: (i) $f \circ f^{-1}(x)$ and (ii) $f^{-1} \circ f(x)$. Describe what happens and explain why.

    c. At what point would you expect the tangent line drawn to the quadratic function to have a zero slope? Explain why.

8. **(C6.1 - N) (CA)** Given the function $g(x) = 2x^3 + x$: **(Cirrito 18.3, p592)**

    a. Determine the value of $g(-2)$ as well as determining an expression for $g(-2 + h)$ and hence, determine an expression for the difference quotient, $\frac{g(-2 + h) - g(-2)}{h}$

    b. What does the difference quotient represent, geometrically?

    c. What does $\lim_{h \to 0} \frac{g(-2 + h) - g(-2)}{h}$ represent, geometrically?

    d. What limiting value does $\lim_{h \to 0} \frac{g(-2 + h) - g(-2)}{h}$ reach?

    e. What is the slope of the function at the point where $x = -2$?

    f. Hence, what is the equation of the tangent of $g(x)$ at $x = -2$.