Differentiation I

1. The first derivative will give you the value of the _____ of the tangent to the curve for any value of ____, or vice versa. Recall that the equation of the line is ___=_____, where ___ is the _____ and ___ is the ___- intercept.

2. Find the derivative of each of the following. You might need to revise your fractional and negative exponent rules first.

   a) $f(x) = x^3 + 3x^2 - 2x + 2$

   b) $y = 7 - 4x^2 + 3x - 3x^4$

   c) $f(x) = \frac{-2x^3}{3} - \frac{4}{x^2}$

   d) $f(x) = \frac{-1}{x} - \frac{3}{x^2}$

   e) $y = 8 + \frac{7}{x} - \frac{4}{x^3} + 5x$

3. Explain what $f'(2) = 20$ means in a short sentence.

4. A function, $y = 2x^3 - 18x$, has a tangent at $x = 2$.
   a) Work out **the gradient** of the tangent.
   b) Work out **the equation** of the tangent.

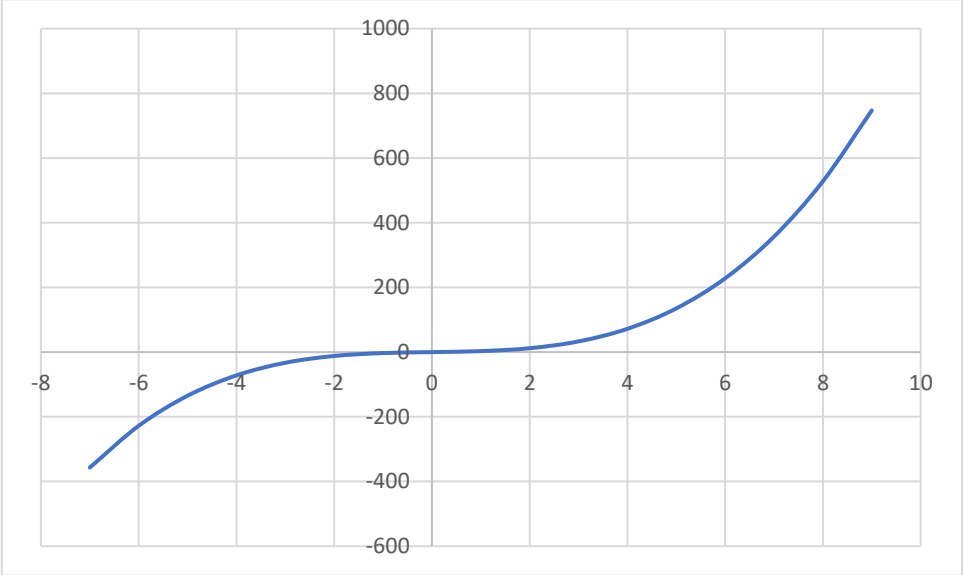
5. At x, the tangent to a function, $f(x) = \frac{x^3}{3} - 2x^2 - 8$ has a gradient of 5. Find the possible values of x.

6. If the gradient of a tangent is _____ then the function, $f(x)$ is increasing.

7. If the gradient of a tangent is _____ then the function, $f(x)$ is decreasing.

8. At a _____ or a _____ the gradient has a value of 0.

9. This graph shows the function $f(x) = x^3 + 2x$.



Find the equation of the tangent to the curve $f(x)$ at $x = 5$. Draw the tangent on the graph as well.