Plotting and Using Curved Graphs

Note Title 06/07/2010

An equation of the form $y = mx + c$ gives a straight line graph (eg $y = 3x + 4$)

Any other equation (eg $y = x^2 - 3x + 4$ or $y = x^3 - 4x^2$ or $y = \frac{12}{x}$) gives a curved graph.

Example Plot the graph $y = x^3 - 4x^2 + 5$ for values of x from -3 to 5.

We can get the table using the TABLE MODE on a calculator :–

- Press MODE, then choose 3 : TABLE
- Display says $f(x) =$ Type in the equation
  [$f(x)$ is in place of y]
  $f(x) = x^3 - 4x^2 + 5$
- To get "X" press ALPHA, then the red X
- Press "=" when finished.
- Choose where to start the table : -3 (press "=")
- Choose where to end the table : 5 (press "=")
- Choose what step to go up in : 1 (press "=")

x	-3	-2	-1	0	1	2	3	4	5
y	-58	-19	0	5	2	-3	-4	5	30

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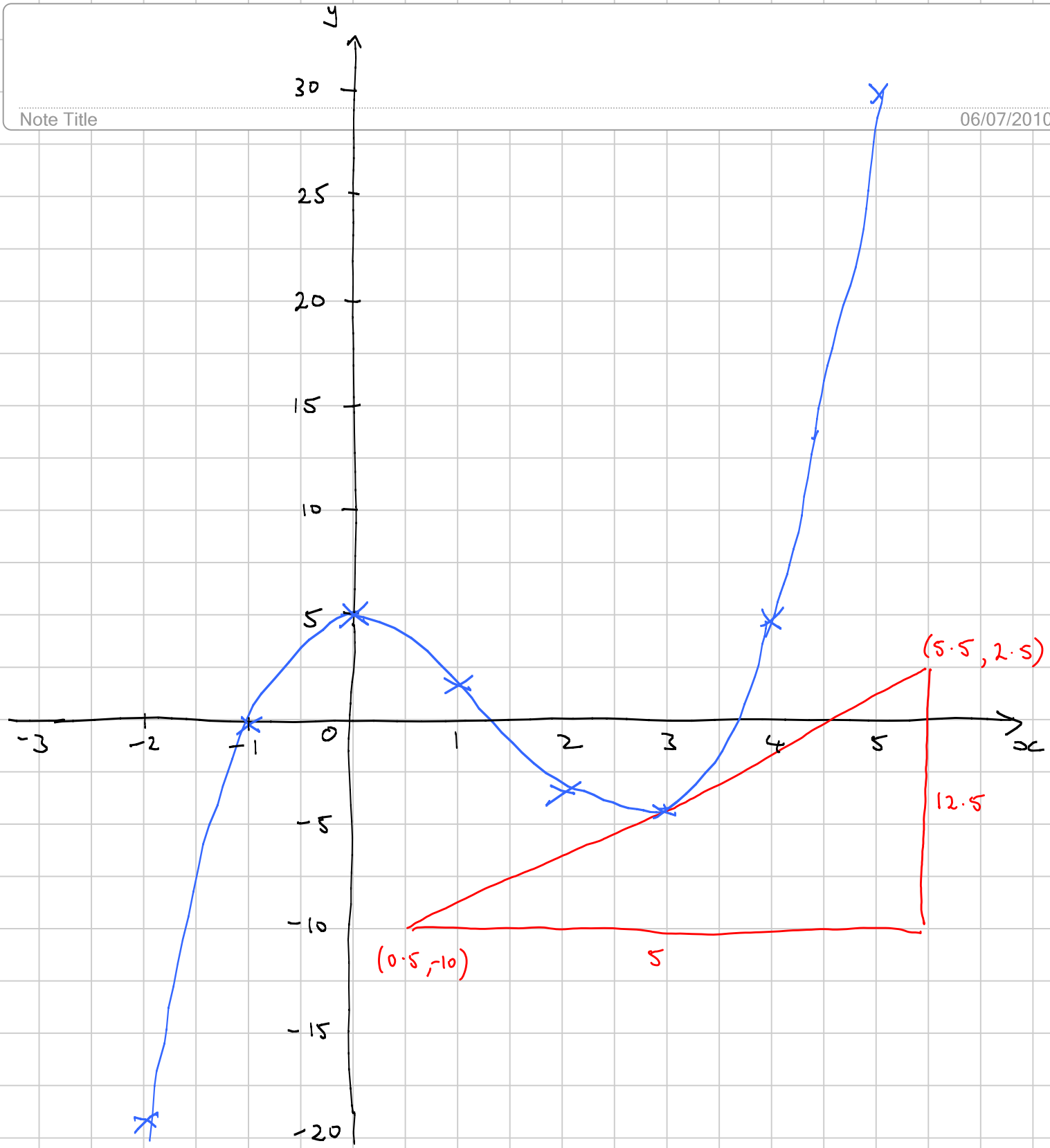


Note Title 08/07/2010

Gradient of a Curve

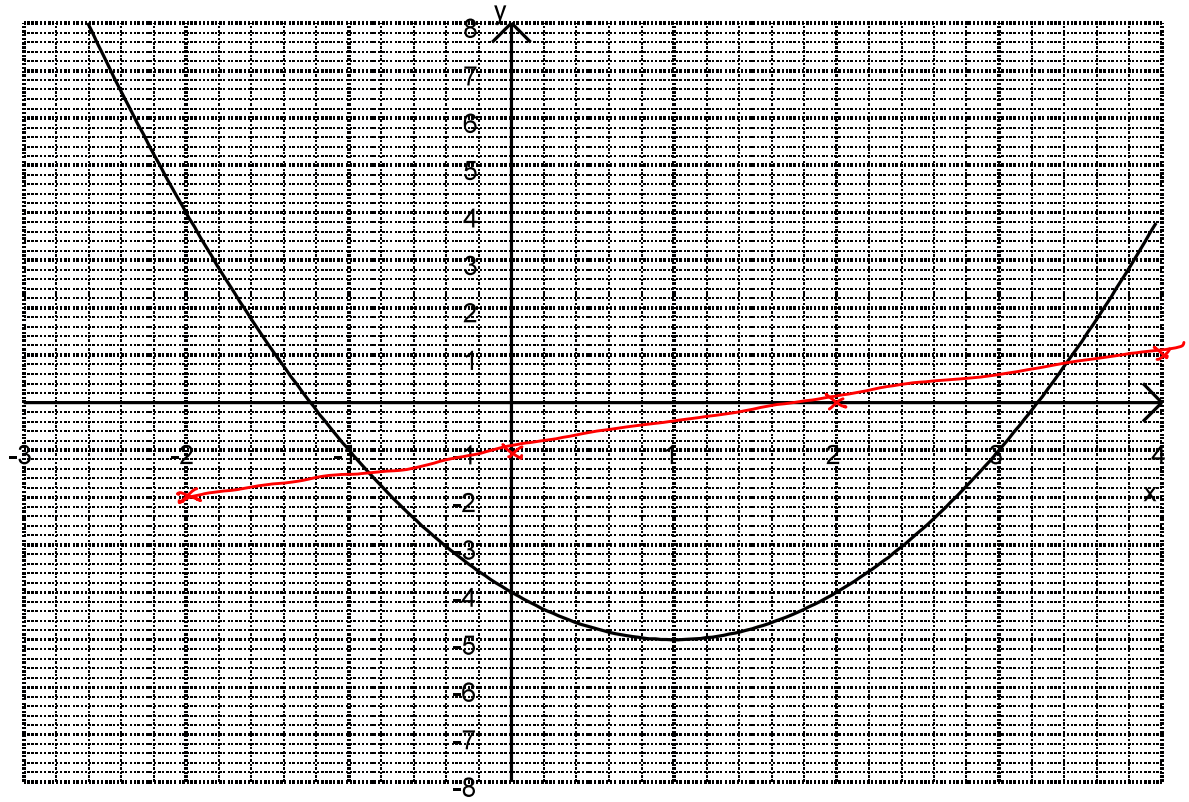
- The gradient of a curve is DIFFERENT at each point on the curve.
- To find the gradient at a certain point, we draw a TANGENT to the curve at that point, and then find the gradient of the tangent in the usual way ($\frac{\text{up}}{\text{across}}$).

Example Find the gradient of the curve drawn above at the point $(3, -4)$.

- Draw a tangent at $(3, -4)$
- Gradient $= \frac{12.5}{5} = 2.5$

Solving Equations Using Graphs

Example The graph of $y = x^2 - 2x - 4$ is shown below. Use it to solve the following equations.



(a) $x^2 - 2x - 4 = 0$

(This is where $y = 0$ on the graph ie/ where the graph crosses the x-axis)

$x = 3.2$ or $x = -1.2$

(b) $x^2 - 2x - 4 = 3$

(Draw a line across at $y = 3$.)

$x = -1.8$ or $x = 3.8$

(c) $x^2 - 2x - 4 = -6$

(A line across at $y = -6$ does not cross the curve)

There are no solutions

(d) $x^2 - 2x - 4 = \frac{1}{2}x - 1$

(Draw the line $y = \frac{1}{2}x - 1$ $\begin{array}{c|ccc} x & -2 & 0 & 2 \\ \hline y & -2 & -1 & 0 \end{array}$)

$x = -0.9$ or $x = 3.4$