

No  
warm  
up

HW TALLY



TURNITIN.COM INFO

IB math Studies at Sheldon

19419618 ← ID

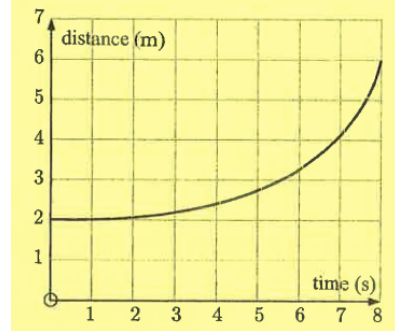
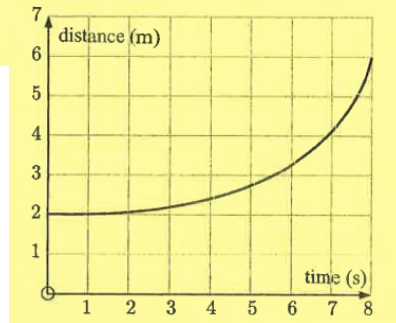
LSRL4U ← Key

Questions on HW ?

**EXERCISE 20A.2**

1 For the travel graph given alongside, estimate the average speed:

- a in the first 4 seconds
- b in the last 4 seconds
- c in the 8 second interval.

**EXERCISE 20A.2**

1 a  $0.1 \text{ ms}^{-1}$

b  $0.9 \text{ ms}^{-1}$

c  $0.5 \text{ ms}^{-1}$

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

p. 513  
4e

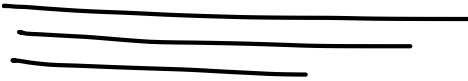
$$y = \frac{x^2 - 4}{x^2}$$

find gradient  
at  $x = 4$

$$y = \frac{x^2}{x^2} - \frac{4}{x^2} = 1 - x^{-2}$$

$$\frac{dy}{dx} =$$

# NOTES



Review Question:

If  $f(x) = x^3 - 2x$  find  $f(-2)$  and  $f'(-2)$  and interpret each.

Check on calculator

$$f(-2) = (-2)^3 - 2(-2) = -4$$

$(-2, -4)$   
point on graph

gradient function  $f'(x) = 3x^2 - 2$

gradient at  $x=-2$   $f'(-2) = 3(-2)^2 - 2 = 10$

$$f(-2) = (-2)^3 - 2(-2) = -4 \quad \therefore (-2, -4) \text{ is the point of tangency on the curve}$$

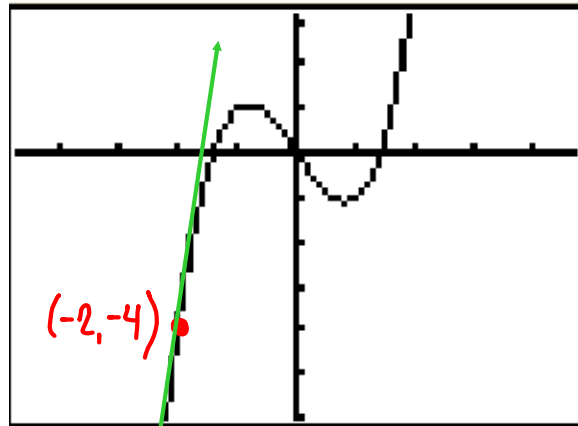
$$\text{gradient function } f'(x) = 3x^2 - 2$$

$$\text{gradient at } x=-2 \quad f'(-2) = 3(-2)^2 - 2 = 10$$

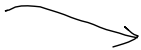
**Interpretation:** 10 is the slope (gradient) of the tangent at the point of tangency  $(-2, -4)$

or  
10 is the instantaneous rate of change at  
at  $x = -2$

```
Plot1 Plot2 Plot3
Y1 = X^3 - 2X
Y2 =
```

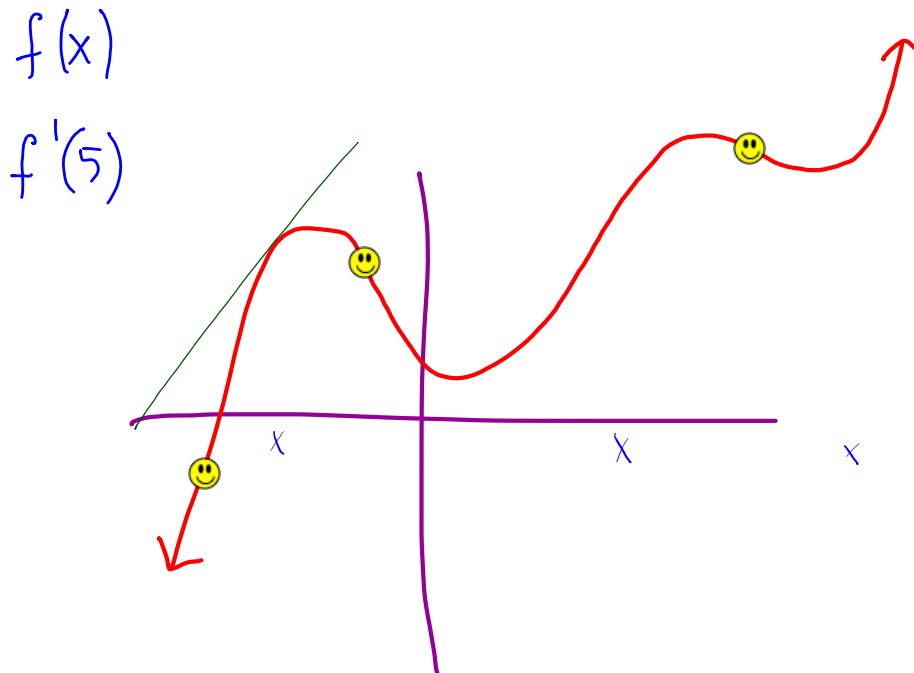


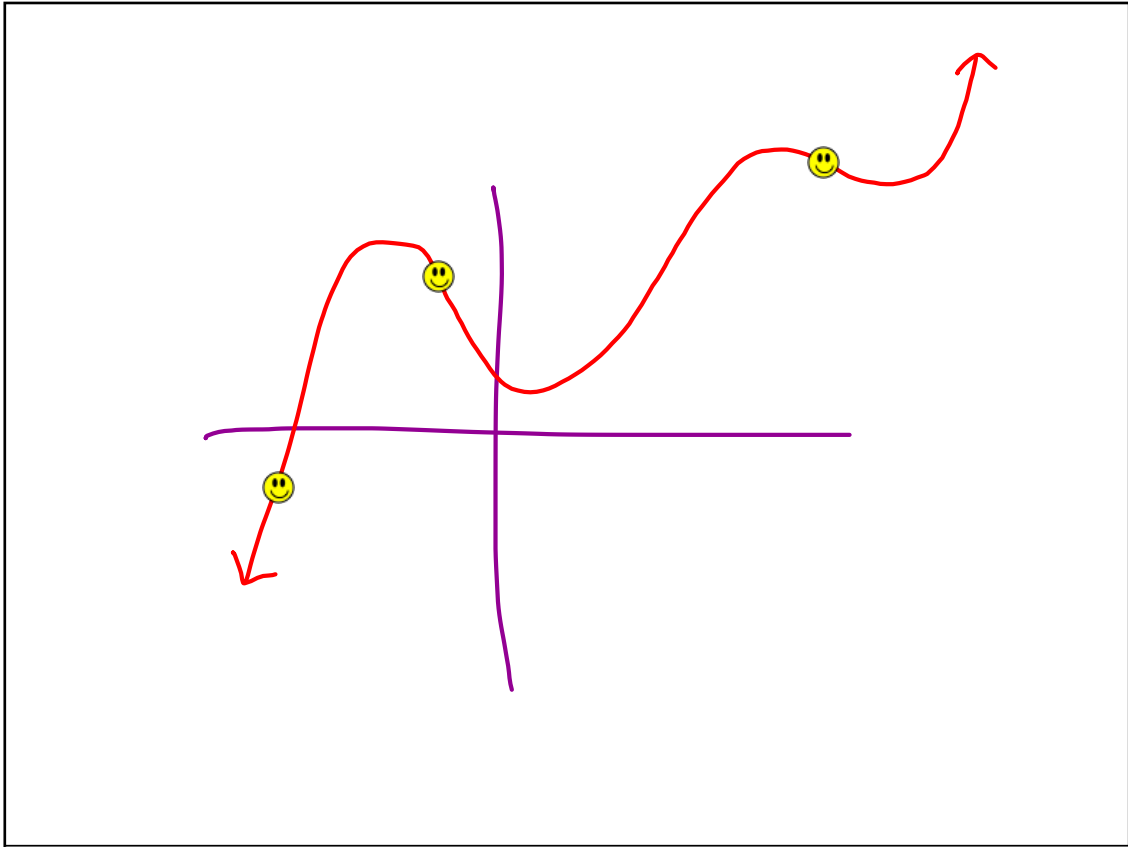
## Calculus Day 3 Objectives

1. Find points on curves that have specific gradients. 

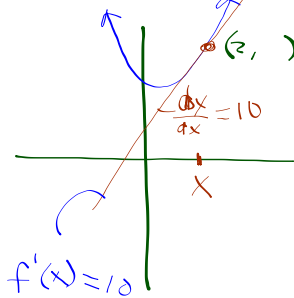
2. Find the equation of a tangent line at a specific points on a graph.

Need Notes 3.0



**Example A**

At what point on the graph of  $y = 3x^2 - 2x + 6$  does the tangent have a gradient of 10



$$f'(x) = 6x - 2$$

$$\text{set } 6x - 2 = 10$$

$$6x = 12$$

$$x = 2$$

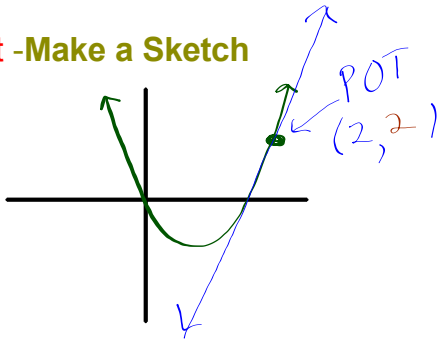
$$f(2) = 3(2)^2 - 2(2) + 6$$

$$(2, 14) \checkmark$$

**Example 1**

Find the equation of the tangent (line) to  $f(x) = 2x^2 - 3x$  at  $x = 2$

1st - Make a Sketch



2nd - Find the point of tangency on the original curve

$$(2, 2) \quad f(2) = 2(2)^2 - 3(2) = 2$$

4th - Using your point & slope, write the equation

point/slope  $y - y_1 = m(x - x_1)$

$$y - 2 = 5(x - 2)$$

convert  $y = mx + b$

$$y = 5x - 8$$

3rd - Find the gradient of the tangent at  $x = 2$

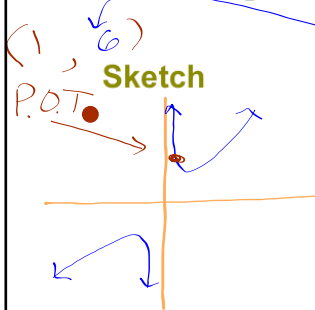
$$f'(x) = 4x - 3$$

$$f'(2) = 4(2) - 3 = 5$$

5th - Check using GDC

**Example 2**

Find the equation of the tangent to  $f(x) = 5x^{-1} + x$  at  $x = 1$



Gradient at point of tangency

$$f'(x) = (5)(-1)x^{-2} + 1$$

$$f'(1) = -\frac{5}{(1)^2} + 1 = -4$$

Point of tangency

$$f(1) = \frac{5}{1} + 1 = 6$$

Equation

$$y - 6 = -4(x - 1)$$

$$y - 6 = -4x + 4$$

$$y = -4x + 10$$



Your calculator can "draw" tangent anywhere you wish.

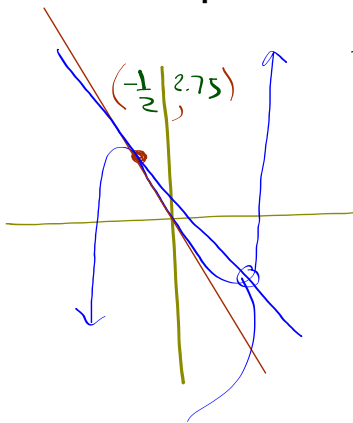
At the same time, the equation will be given.

which is a great way to check your answer.

### Example 3

Find the equation of the tangent to  $f(x) = 2x^3 - 4x + 1$  at  $x = -\frac{1}{2}$

and find the point at which this tangent meets the curve again.



The other point  
is  $(1, -1)$

$$f'(x) = 6x^2 - 4$$

$$f'(-\frac{1}{2}) = 6(-\frac{1}{2})^2 - 4$$

$$= -2.5$$

$$y - 2.75 = -2.5(x - (-\frac{1}{2}))$$

$$y - 2.75 = -2.5x - 1.25$$

$$+ 2.75$$

$$y = -2.5x + 1.50$$

## Brain Break

- Take an LQ while I pass your last Test back

(you'll need a ruler of)  
Some kind

Assignment

## Calculus Packet:

page. 574..... 5

page 575..... 10, 12, 14

page 578..... 1de, 2b