

This worksheet will assist you with your group to recreate your teacher explanation with some changes



### Activity 1: Find the derivative of $f(x) = \cos x$

You have learned about the derivative of  $f(x) = \sin x$ . Now discuss with your friend about the derivative of  $f(x) = \cos x$ . Let's start with following definition

The Derivative is defined as follows:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

to help you working on this activity, please ponder following questions:

which one below that is useful to work on the derivative of  $\cos x$ ? (Click on the correct answer)

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

In term of evaluate the limit in the definition, which in the below useful to work on the derivative of  $\cos x$ ? (Click on the correct answer)

$$\lim_{h \rightarrow 0} \frac{\cos h - 1}{h} = 0$$

$$\lim_{h \rightarrow 0} \frac{\sin h}{h} = 1$$

Both are useful

In case you have done with the activity, which one below is your conclusion about the derivative of  $f(x) = \cos x$

$$f'(x) = \sin x$$

$$f'(x) = -\sin x$$

$$f(x) = -\cos x$$

### Activity 2: Some Basic Problems

Based on your conclusion in Activity 1. Please work on the following problems

1. If  $f(x) = \cos x$  what is  $f'\left(\frac{\pi}{2}\right) =$
2. What is the gradient of line  $g$  that tangent  $f(x) = \cos x$  at point  $\left(\frac{\pi}{2}, 0\right)$ ?
3. Which on in the following represent the equation of line  $g$  in problem number 2?

$$y = -x + \frac{\pi}{2}$$

$$y = x - \frac{\pi}{2}$$

$$y = \frac{\pi}{2}x - 1$$

### Activity 3: Chain Rule Problems

#### CHAIN RULE

The chain rule states that the derivative of  $f(g(x))$  is

$$f'(g(x)) \cdot g'(x)$$

Draw arrow to match following!

1.  $f(x) = 5\cos(5x + 11)$
2.  $f(x) = \cos(2x^3 - 15)$
3.  $f(x) = 6\cos^4 x$

- A.  $f'(x) = -24 \sin^3 x \cos x$
- B.  $f'(x) = -24 \sin^3 x$
- C.  $f(x) = -5 \sin(5x + 11)$
- D.  $f'(x) = -25 \sin(5x + 11)$
- E.  $f'(x) = -6x^2 \sin(2x^3 - 15)$
- F.  $f'(x) = 24\cos^3 x$