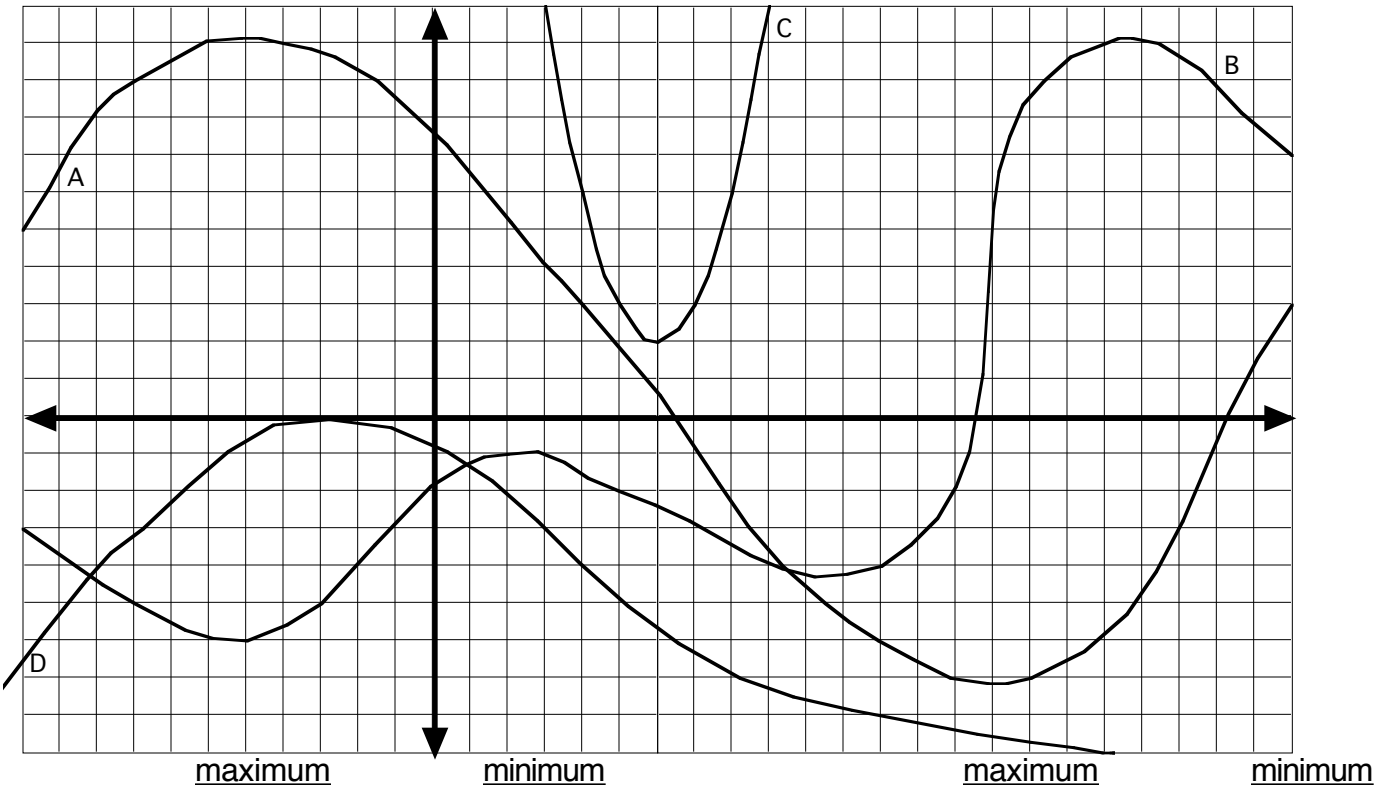
**Name:** _____ **TC**

## Classwork 40

1. Use the graph to find the x value that gives the **maximum** (highest value) and **minimum** (lowest value) of each function over the interval.




Function A

Function B

Function C

Function D

2. Find (give the x value(s) ) where the derivative is **zero** for each function.

Function A:

Function B:

Function C:

Function D:

3. What is the relationship between the derivative and the maxima and minima?

4. a) Write the general equation for a parabola.

b) What's the formula for the x- coordinate of the vertex of a parabola?

c) How could you find the vertex of a parabola using calculus? (Hint: What would the derivative have to be?)

d) Explain using (c) why there is only one "extremum" (a maximum **or** a minimum) for a parabola. (In other words, why does it have only one "hump"?)

5. a) The general form for a cubic function is $y= ax^3 + bx^2 + cx + d$. Find its derivative.

b) How many "humps" (extrema) could a cubic (3rd degree) function have?

6. a) Find the extrema of $y = x^3 - 4x^2 + 3x + 1$

b) Sketch a graph of the function **and** its derivative on the same axes to demonstrate your answer.

7. Two numbers add up to 100. Maximize their product.

8. a) You have 200 feet of fencing to fence in a playground. What should the dimensions be in order to maximize the area?

b) What shape would the playground be?

Practice Problems

1. Find the maxima and minima of $y = 4x^3 - 2x + 6$

2. Two numbers add to 40. What is the maximum product?

3. Two numbers add to C. What is the maximum product? Prove it.