

Name \_\_\_\_\_ Date \_\_\_\_\_

/12 K&U

/8 APP

**MCB4U Assignment Extreme Values (Unit 5)**

/5 COM

/8 TIPS

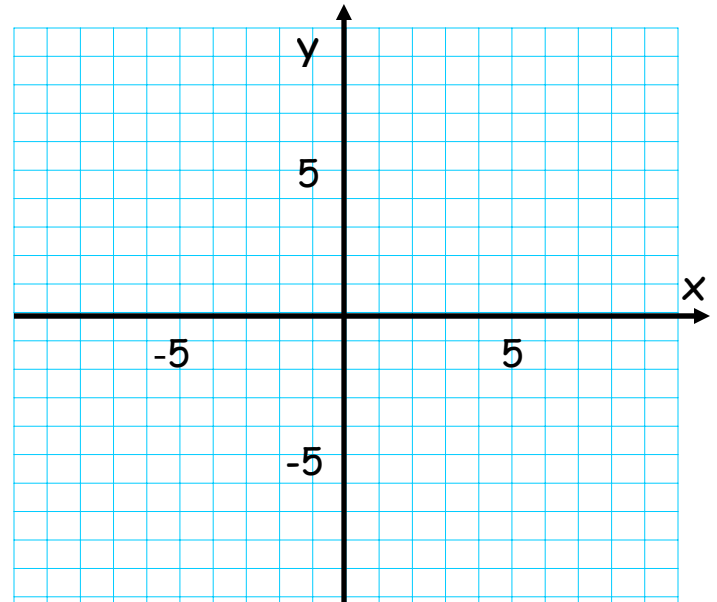
**Part 1:** Do each of the following, answering in the space provided. [3 Marks K&U]

1. An interval on a graph where the second derivative is negative is called (\_\_\_\_\_)  
A. concave up                      B. a critical point                      C. concave down  
D. an inflection point              E. none of these
2. The horizontal asymptote(s) of  $f(x) = \frac{2x^2 - 7x - 15}{(x+1)(x-3)}$  is (are) (\_\_\_\_\_)  
A.  $x = -1, 3$     B.  $x = \frac{3}{2}, 5, -1, 3$     C.  $x = 1, 3$     D.  $x = -\frac{3}{2}, -5, 1, -3$     E.  $y = 2$
3. If the first derivative is zero where  $x = a$ , and the first derivative changes sign from positive to negative where  $x = a$ , then there exists \_\_\_\_\_ where  $x = a$ . (\_\_\_\_\_)  
A. a local maximum                      B. an inflection point                      C. a vertical asymptote  
D. a local minimum                      E. none of these

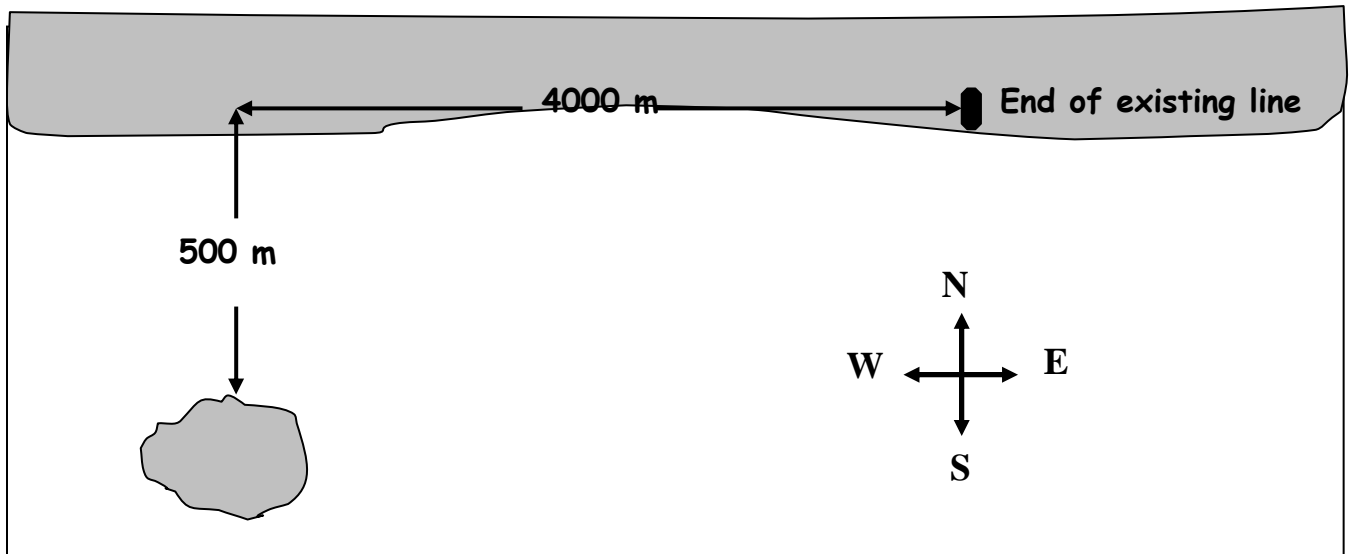
**Part 2:** Do each of the following, answering in the space provided and showing all work. 5 of the communications marks are overall throughout the test.

1. Use the derivative to find the critical points and intervals of increase and decrease for  $f(x) = 4x^3 - 27x + 10$ . [3 MARKS K&U]
2. Find the absolute minimum and maximum values of  $f(x) = 2x^3 - 9x^2 - 60x + 82$  on the interval  $-5 \leq x \leq 10$ . [3 MARKS K&U]
3. Find the points of inflection for  $f(x) = \frac{2 + x - x^2}{(x-1)^2}$  and determine where the graph is concave up and concave down. [3 MARKS K&U]

4. Sketch the graph of  $f(x) = \frac{4x^3 + 2}{x^2}$ . Use local maximum and minimums, intercepts, asymptotes, concavity and the second derivative test to aid your sketch. **[8 MARKS App]**



5. The Ignace Hydro - Electric Company needs to run a power line from the shore of a lake to an island that is 500 m away from the shoreline. The closest power line ends 4 km along the shore from the point on the shore that is closest to the island (see the diagram below).



The company knows from recent jobs that it costs \$15/m to lay the power line underwater and \$10/m along the shore. Use Calculus to determine where the company should install the power line to minimize the cost? **[4 MARKS TIPS]**

6. A cylindrical can is to have a volume of 355 mL. Assuming the top and bottom are twice as expensive as the side material, use the Calculus to find the most economical dimensions for this can? **[4 MARKS TIPS]**