

Uncommon  
Schools | Change History.

## **AP Calculus AB**

### **Q3 Interim Assessment**

**April 2016**

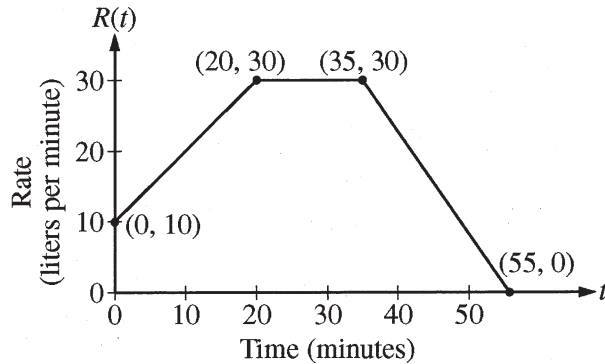
## **Section II – Part A (30 Minutes)**

### **Calculators Allowed**

Student Name: \_\_\_\_\_

School: \_\_\_\_\_

Teacher: \_\_\_\_\_



1. At time  $t = 0$  minutes, a tank contains 100 liters of water. The piecewise-linear graph above shows the rate  $R(t)$ , in liters per minute, at which water is pumped into the tank during a 55-minute period.
- (a) Find  $R'(45)$ . Using appropriate units, explain the meaning of your answer in the context of this problem.

- (b) How many liters of water have been pumped into the tank from time  $t = 0$  to time  $t = 55$  minutes? Show the work that leads to your answer.

1

1

1

1

1

1

1

1

1

1

- (c) At time  $t = 10$  minutes, water begins draining from the tank at a rate modeled by the function  $D$ , where  $D(t) = 10e^{(\sin t)/10}$  liters per minute. Water continues to drain at this rate until time  $t = 55$  minutes. How many liters of water are in the tank at time  $t = 55$  minutes?

- 
- (d) Using the functions  $R$  and  $D$ , determine whether the amount of water in the tank is increasing or decreasing at time  $t = 45$  minutes. Justify your answer.

Do not write beyond this border.

Do not write beyond this border.

2

2

2

2

2

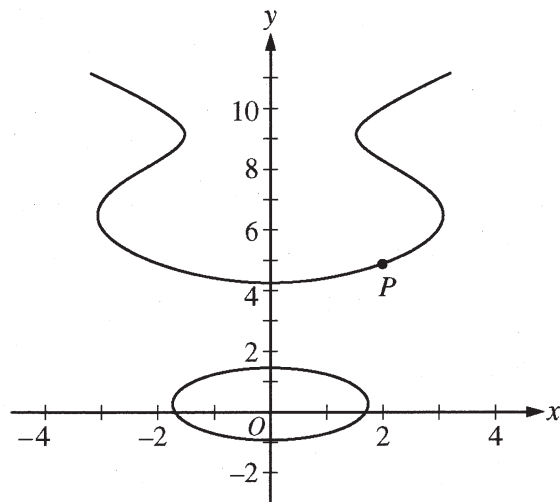
2

2

2

2

2



2. The graph of the equation  $x^2 = -2 + y + 5 \cos y$  is shown above for  $y \leq 11$ . It is known that  $\frac{dy}{dx} = \frac{2x}{1 - 5 \sin y}$ .

The  $x$ -coordinate of point  $P$  shown on the graph is 2.

- (a) Write an equation for the line tangent to the graph at point  $P$ .

Do not write beyond this border.

Do not write beyond this border.

2

2

2

2

2

2

2

2

2

2

- (b) For  $y \leq 11$ , find the  $y$ -coordinate of each point on the graph where the line tangent to the graph at that point is vertical.

- 
- (c) Find the average value of the  $x$ -coordinates of the points on the graph in the first quadrant between  $y = 5$  and  $y = 9$ .

Do not write beyond this border.

Do not write beyond this border.