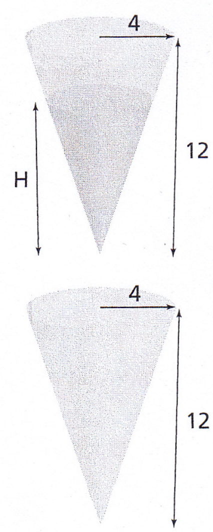
Name: ______________________________ Date: _______________ Row: _____ Period: ____

PRACTICE TEST 3 FRQ:
PRACTICE TEST 3-1, PRACTICE TEST 3-2, PRACTICE TEST 3-3

Part A
Time: 45 minutes
Number of Problems: 3

You may use a calculator for any problem in this section.

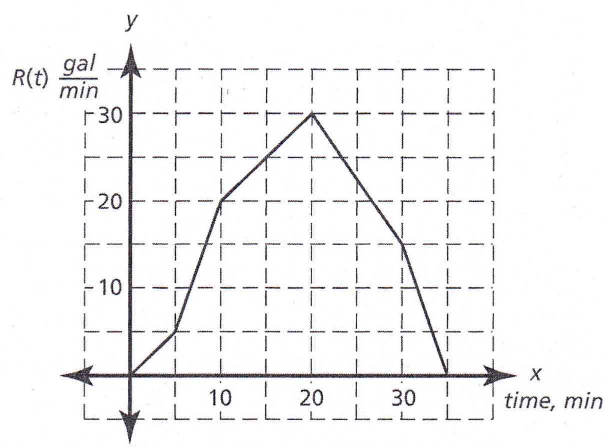
1. The velocity of a particle moving along the x-axis is given by $v(t)=\frac{e^{t-1}}{2t^2+1}-t^2$ for $0\le t\le 12$. The position of the particle $x(t)$ is 3 when t is 2.
   a. During what interval is the particle moving to the left? Explain your reasoning.
   b. What is the position of the particle when it is farthest to the left?
   c. At what time in the interval $5\le t\le 10$ is the instantaneous velocity equal to the average velocity?
   d. How far did the particle travel on $0\le t\le 12$?



2. A solution is draining through a conical filter into an identical conical container as shown in the diagram to the right. The solution drips from the upper filter into the lower container at a rate of π cm³/sec $\left(V_{cone}=\frac{\pi}{3}r^2h\right)$.
   a. How fast is the level in the upper filter dropping when the solution level in the upper filter is at 6 cm?
   b. If the conical filter is initially full, what is the level of the solution in the lower level when the solution level in the upper filter is at 6 cm and how fast is the level in the lower filter rising?
   c. How fast is the surface area of the solution in the lower filter increasing when the volume in the upper filter equals the volume in the lower container?

3. Water is draining out of a tank at a variable rate as given by the chart and graph below.

t	$R(t)$ gal/min
0	0
5	5
10	20
20	30
30	15
35	0



   a. Approximate the volume of water that has leaked from the tank for $0\le t\le 35$ using a Riemann sum with a right-hand end point for the five unequal intervals indicated by the data in the chart.
   b. Interpret the meaning of $\frac{1}{20}\int_{10}^{30}R(t)\,dt$ and find its value with the appropriate units using the data from part a.
   c. Use the data from the table to find $R'(25)$. Show the computations that lead to your answer.
   d. If the rate of the leak is modeled by $Q(t)=16.78\sin(0.15x-1.25)+14.6$, at what time is the rate of the leak increasing the fastest?