Today's Plan:

Learning Target (standard): I will solve real-world rates of change application problems. I will describe the motion of a particle.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make neccessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuarcy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Worksheet p.117 #1-9

$1) v(t) = 3t^2 - 18t + 24$

$a(t) = 6t - 18$

$2) v(t) = 2\cos 2t - \sin t$

$a(t) = -4\sin 2t - \cos t$

$3) t = 3$

$4) t = \pi, 3\pi$

$5) d = 69$

$6) d = 48$

$7) v(t) = 0; a(t) = 0$

$8) t = \dfrac{-8 + \sqrt{70}}{3}$

$9) v(t) \neq 0$ does not change direction

$x(t) = \sin\left(\frac{t}{2}\right)$, $0 < t < 4\pi$ ($\frac{t}{2} = \frac{1}{2}t$)

$x'(t) = v(t)$

$v(t) = \frac{1}{2}\cos\left(\frac{1}{2}t\right)$ $v'(t) = a(t)$

$0 = \frac{1}{2}\cos\left(\frac{1}{2}t\right)$ $a(t) = -\frac{1}{4}\sin\left(\frac{1}{2}t\right)$

not 0 @ $t = \pi, 3\pi$

$0 = \cos\left(\frac{1}{2}t\right)$

$\frac{1}{2}t = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}$

$t = \pi, 3\pi, \cancel{5\pi}, \cancel{7\pi}$

$t = \pi, 3\pi$

An egg is frying sunny side up. If after *t* seconds, the radius of the egg is given by $r(t) = 2t^2 - 1$ cm, $0 \le t \le 5$, find the rate of change of the area with respect to time at 1 second, 2 seconds, and 4 seconds.

$A = \pi r^2$ $A'(t) = \frac{dA}{dt} = \frac{cm^2}{sec}$

$A(t) = \pi(2t^2 - 1)^2$

$A'(t) = 2\pi(2t^2 - 1)(4t)$

$A'(t) = 8\pi t(2t^2 - 1)\ \frac{cm^2}{sec}$

$A'(1) = 8\pi(1)$

$A'(1) = 8\pi\ cm^2/sec$

$A'(2) = 8\pi(2)(7)$

$A'(2) = 112\pi\ cm^2/sec$

$A'(4) = 8\pi(4)(31)$

$A'(4) = 992\pi\ cm^2/sec$

Describe the Motion:

$1) v(t) = 0$ critical #s

$a(t) = 0$ possible POIs

- change in direction

  $v(t) = 0$ and $a(t) \neq 0$

  $\therefore$ statement

2) speed

- chart with interval endpoints, critical # and POIs

  $v(t) \& a(t)$ - same signs - increasing

  $v(t) \& a(t)$ - different signs - decreasing

  $\therefore$ statement

3) direction

- 1st derivative test $v(t)$

  $v(t) < 0$ left

  $v(t) > 0$ right

  $\therefore$ statement

4) motion chart

$s(t)$

$v(t)$ — numerical values

$a(t)$

5) number line graph of position