

1. Jared throws a rock down from the roof of a building which is 100 feet tall. The initial velocity of the ball is $20 \frac{ft}{sec}$, the effect of air resistance is negligible and the effect of gravity is $-32 \frac{ft}{sec}$.

When does the ball strike the ground?

With what speed does the ball strike the ground?

2. Sierra is playing with a yo-yo. The yo-yo is moving at a velocity of

$$v(t) = -.2 \sin(4t)$$

feet per second where velocity is positive if the yo-yo is above her belt and $v(t)$ is negative if the yo-yo is below her new.

If the yo-yo is 1 foot below her knee at time $t = \pi/4$, determine if her the yo-yo is above or below her knee at time $t = 1.4$ and $t = 2.1$.

Is her yo-yo going up or down at $t = 1.4$ and $t = 2.1$?

3. Suppose the number of errors e made by a manufacturing system is proportional to the number of hours t the system has been running since reset and the data suggests that the number of errors made at time t is

$$e = 3t.$$

Find the total number of errors made by the system if it has been running for 10 hours.

Find the average number of errors made per hour.

4. Find the volume of the solid obtained by rotating the region bounded by

$$y = x^4, y = 0, x = 0, x = 2$$

about the y-axis.

5. Find the volume of the solid obtained by rotating the region bounded by

$$y = x^2 + 1, y = 0, x = 0, x = 3$$

about the x-axis.

6. Find the area bound by $y = 5x^2$ and $y = x^2 + 3$. Sketch the region.

7. Let A be the area of a circle with radius r . If $\frac{dr}{dt} = 2$, find $\frac{dA}{dt}$ when $r = 3$. Explain what this means in terms of rates of change.

8. An open box is to be made out of a 8-inch by 20-inch piece of cardboard by cutting out squares of equal size from the four corners and bending up the sides. Find the dimensions of the resulting box that has the largest volume.