

6.1 Watch Out For That Wave!

A Develop Understanding Task



<https://pixabay.com/en/photos/wave/>

Family Kingdom Amusement Park in Myrtle Beach is a family friendly carnival style attraction right on the beach in SC. It is a great place to take a break from laying on the beach. However, with its proximity to the ocean, there are certain hazards that need to be accounted for.

One such ocean hazard is a tsunami. A tsunami is a long high sea wave caused by an earthquake, ocean floor landslide, or other underwater disturbance. These waves grow higher the closer to land they travel and can cause devastating damage. Many tsunamis are caused by seismic activity which is closely monitored by the US Geological Survey. When an earthquake is recorded in the ocean, they will send out warnings to the communities in the path of potential waves. The speed of a wave during a tsunami can be calculated with the formula $s = \sqrt{9.81d}$ where s represents speed, d represents the depth of the water where the earthquake takes place, and 9.81 m/s^2 is the acceleration due to gravity.

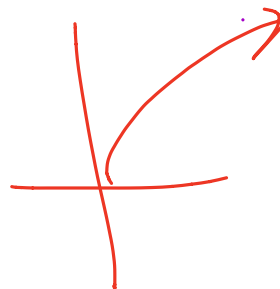
- Let's take a look at this function! Create a table and graph of this function.

x d depth	y s speed	
-2	$\sqrt{9.81d}$	
-1	$\sqrt{9.81d}$	
0	0	> +3.13
1	3.13	> +1.3
2	4.43	> +1
3	5.43	> +.83
4	6.26	

Square Root Function

$$s = \sqrt{9.81d}$$

$$\sqrt{x-1}$$



2. Describe the domain of the function. Explain.

$[0, \infty)$

Can't have negative under radical

Starts at 0 goes right forever

3. What is the range of the function? Explain.

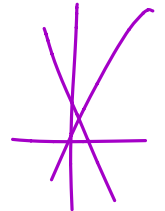
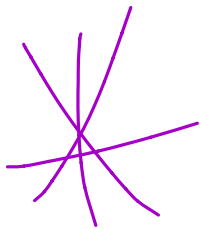
$[0, \infty)$

~~fxn~~ doesn't go under x-axis

4. Describe the rate of change of the function. How does the rate of change of this function compare to the rate of change of other functions that we have encountered?

increases at a

decreasing rate



5. In the formula, 9.8 is the acceleration due to gravity and is measured in m/s^2 . If the depth is measured in meters, what will the unit of measure be for the speed, s , that we find? Explain your thinking.

m/s

$$\frac{m}{s^2} \cdot m$$

$$\sqrt{\frac{m^2}{s^2}} \quad m/s$$

6. We can detect earthquakes even when they happen under the ocean. There are monitoring stations all over the globe. An earthquake is detected at $22^{\circ} 27' 06''$ N and $54^{\circ} 02' 47''$ W. This is off the coast of South Carolina. The ocean at that point has a depth of 5150 m, so how fast would you expect the wave to be traveling?

$$S = \sqrt{9.81d}$$

$$S = \sqrt{9.81(5150)} = 224.77 \text{ m/s}$$

Which representation of the function did you use to find the speed of the wave? Explain how you used this representation find your answer.

equation

7. If a wave is detected traveling at 185 m/s how deep was the epicenter that created it?

$$(185)^2 = (\sqrt{9.81d})^2$$

$$\frac{34225}{9.81} = \frac{9.81d}{9.81}$$

$$3488.79 \text{ m}$$

$$S = \sqrt{9.81(3488.79)}$$

Which representation of the function did you use to find the depth of the epicenter? Explain how you used this representation find your answer.

equation

$$5.7 = \sqrt{3x} + 2$$

$$(3.7)^2 = (\sqrt{3x})^2$$

$$\frac{13.69}{3} = \frac{3x}{3}$$

$$x = 4.56\bar{3}$$

$$\sqrt{3x+7} = \sqrt{2x}$$

$$3x+7 = 2x$$

$$-3x \quad -3x$$

$$7 = -x$$

$$x = -7$$

READY, SET, GO! Name _____ Period _____
 Date _____

READY

Topic: Direct Variation.

Recall that direct variation should have a constant of variation k , such that $y = kx$. Determine which of the following represent direct variation relationships. If it is a direct variation relationship, identify the constant of variation.

1. $y = 9x$

Yes $k=9$

2. $y = \frac{1}{2}x + 3$

NO

3. $y = -\frac{3}{4}x$

Yes $k = -3/4$

4. $2y = x - 6$

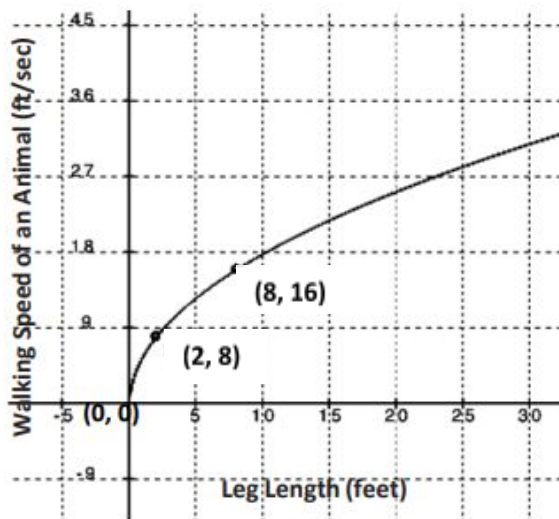
5. $3y = -7x$

6. $8x - 9y = 0$

SET

Topic: Square Root Functions in context.

The relationship between the length of one of the legs, in feet, of an animal, and its walking speed, in feet per second, can be modeled by the graph below. Use this graph to answer questions 7-10.



7. What units are involved in this problem? Define the quantities and variables you would use to model this situation.

8. What type of function does the graph represent? How can you tell?

Square Root fxn, by shape

9. Which of the following is the correct function for this graph? Explain your reasoning.

a. $l(x) = \sqrt{x + 64}$

b. $l(x) = \sqrt{32x}$

c. $l(x) = 2x^2$

10. A T-Rex's leg length is 20 feet! What would the T-Rex's walking speed be in feet per second?

GO!

Topic: Simplifying Square Roots

Simplify the following radicals.

11. $\sqrt{32}$

12. $\sqrt{18}$

13. $\sqrt{30}$

14. $\sqrt{27}$

15. $\sqrt{120}$

16. $\sqrt{300}$