



# Applied Radical Equations

(using the graphing calculator)

Name \_\_\_\_\_

1. An ocean current has been detected in a protected underwater sanctuary. The speed of the current  $S$  (in meters per second) is given by

$$S = 0.07\sqrt{d^3}, \text{ where } d \text{ is the depth in meters.}$$

- a.) Construct a table of values for depths ranging from 0 meters to 15 meters.

(Answers to 3 decimal places, please)

Depth	Speed (meters/sec)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

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Plot1 Plot2 Plot3
Y1=0.07√(X^3)
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
  
```

X	Y1
4	.56
5	.78262
6	1.0288
7	1.2964
8	1.5839
9	1.89
10	2.2136

X=10

- b.) What is the speed of the current at a depth of 9 meters?

\_\_\_\_\_

- c.) What happens to the speed of the current as the depth increases?

\_\_\_\_\_

2. When a ball is dropped from the top of a 50 foot building, it will be  $h$  feet above the ground after  $t$  seconds, where  $t = \frac{\sqrt{50-h}}{4}$ .

- a.) For this problem, instead of establishing a table, solve algebraically for  $h$  in terms of  $t$ .

- b.) How far above the ground will the object be after 1 second? \_\_\_\_\_

- c.) Graph your equation from part a. Adjust your window to see the height value at time zero.

- d.) How long will it take for the ball to hit the ground? \_\_\_\_\_

**3.** A numbered integer scale, from 0 to 12, used to represent wind speed was developed by Rear-Admiral Beaufort in 1805 to help sailors detect approaching storms. The wind scale number,  $B$ , is represented by  $B = 1.69\sqrt{s + 4.45} - 3.49$  where  $s$  is the speed of the wind in miles per hour.



- a.) Using your graphing calculator, complete the table of Beaufort values from 0 to 12 showing the corresponding approximate wind speed ranges. (Speeds represented as integers, please.) *THINK!!* A Beaufort number of 3 can be interpreted as the range of values  $2.5 \leq 3 < 3.5$ . Set delta table to 0.1

B-value	Wind speed, $s$
0	0 – 1 mph
1	
2	
3	
4	
5	
6	
7	31 – 38 mph
8	
9	
10	
11	
12	

- b. What wind speed range corresponds to a Beaufort number of 6? \_\_\_\_\_
- c.) What Beaufort number would be needed to represent a wind speed of 18 miles per hour? \_\_\_\_\_
- d.) A Beaufort number of 9 has wave heights of 28-32 feet. What is the corresponding wind speed range? \_\_\_\_\_  
\_\_\_\_\_

**4.** During a hurricane, the average wind velocity,  $v$ , measured in meters per second, is represented by  $v = 6.3\sqrt{1013 - p}$ , where  $p$  is the air pressure, measured in millibars (mb) at the center of the hurricane.



- a.) Using your graphing calculator, construct a table of values to represent air pressure and the corresponding wind velocity.
- b.) What happens to the wind velocity in a hurricane when the air pressure decreases? \_\_\_\_\_
- c.) Estimate (to nearest tenth) the wind velocity when the air pressure is 984 mb. \_\_\_\_\_
- d.) Estimate the air pressure when wind velocity is 61.7 m/s. \_\_\_\_\_
- e.) Solve algebraically for  $p$  in terms of  $v$ .