**Notes**

1. Which of the “bridges” below is likely to support the greatest weight, and which will support the least?
2. Explain the reasoning behind your answer in #1.
3. If *W* represents the safe carrying weight; *L,* the length; and *T,* the thickness, what do you expect to happen to the safe carrying weight if
	1. The length increases while the value of the thickness remains constant?
	2. The thickness increases while the value of the length remains constant?
4. Which of the following equations would best represent the type of relationship among the three variables, and WHY?

|  |  |  |  |
| --- | --- | --- | --- |
| 1.
 | 1.
 | 1.
 | 1.
 |

**Definition: Directly Proportional Power Function**

**Definition: Indirectly Proportional Power Function**

**Definition: ‘k’**

1. The area, *A*, of a circle as a function of the radius, *r,* is given by.
	1. Complete the sentence below.
* As the radius increases, the area will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	1. Identify the values of k and p.
	2. Complete the sentence with either directly or indirectly:
* The area of a circle is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ proportional to the square of the radius.
1. An astronaut’s weight in pounds, *W*, as a function of her distance, *d*, in thousands of miles, from the center of the earth is given by .
	1. Complete the sentence below.
* As the distance increases, the weight will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	1. Identify the values of k and p.
	2. Complete the sentence with either directly or indirectly:
* The weight is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ proportional to the square of the distance.
1. The number of species, *N*, on an island as a function of the area, *A*, of the island is given by .
	1. Complete the sentence below.
* As the area increases, the number of species will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	1. Identify the values of k and p.
	2. Complete the sentence with either directly or indirectly:
* The number of species is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ proportional to the cube root of the area.
1. Express each of the following relationships with an equation. Be sure to include the constant of proportionality, *k.*
	1. The natural walking speed *s* of a person or animal is directly proportional to the square root of their leg length *L.*
	2. The heat, *H*, experienced from a hiker at a campfire is indirectly proportional to square of the distance, *d*, between them.
	3. The volume of a prism is jointly proportional to its length, width and height.
2. The circulation time of a mammal (that is, the average time it takes for all the blood in the body to circulate once and return to the heart) is directly proportional to the fourth root of the body mass of the mammal.
	1. Write the general equation to describe the circulation time in seconds, *T*, as a function of the body mass in pounds, *M*.
	2. If an elephant of body mass 11,530 pounds has a circulation time of 148 seconds, find the constant of proportionality and re-write the equation using this value. Round to two decimal places.
	3. What is the circulation time of a human with body mass 150 pounds?
3. The loudness of a sound measured in decibels (dB) is indirectly proportional to the square of the distance from the source of the sound.
4. Write the general equation to describe the loudness, *L*, as a function of the distance, *d*.
5. A person who is 10 ft from a lawn mower experiences a sound level of 70dB. Using the equation you wrote in **part a**, find the constant of proportionality and write the specific equation that represents this situation.
6. Use the specific equation in **part b** to find the sound level when the person is 100 ft away.
7. Circle the functions below that are power functions.

|  |  |  |
| --- | --- | --- |
| 1.
 | 1.
 | 1.
 |
| 1.
 | 1.
 | 1.
 |
| 1.
 | 1.
 |  |

1. Which power functions from #11 are directly proportional and which functions are indirectly proportional?

**Visualizing Directly Proportional Power Functions (Part 1) – DUE NEXT CLASS!!**

Recall that




1. Simplify the following:
2. 
3. 
4. Complete the statements below:
* When a negative number is raised to an even power, the answer will be \_\_\_\_\_\_\_\_\_\_\_\_.
* When a negative number is raised to an odd power, the answer will be \_\_\_\_\_\_\_\_\_\_\_\_\_.
1. Fill in the table below and then graph the functions.

|  |  |  |
| --- | --- | --- |
| $$x$$ |  |  |
| −4 |  |  |
| −3 |  |  |
| −2 |  |  |
| −1 |  |  |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

|  |  |
| --- | --- |
|   |   |
|  |  |

1. Graph the following functions on your graphing calculator: , , and . Sketch the shape of all even powered directly proportional functions.
2. Graph the following functions on your graphing calculator: , , and . Sketch the shape of all odd powered directly proportional functions.
3. Fill in the table below and then graph the functions.

|  |  |
| --- | --- |
|  |  |
| −4 | Not possible – you can’t take a square root of a negative number |
| −3 |
| −2 |
| −1 |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 9 |  |





1. Graph the following function on your graphing calculator: , , and . **Look at the shape only in Quadrant I**. Sketch the shape of all directly proportional functions with an exponent between 0 and 1 (in Quadrant I).