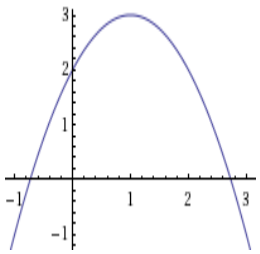
SOLUTIONS - College Math - Section 14 - Quiz 2, Fall 2010 [Shaw]

1. We must remember to use the *inverse proportion* to solve this problem. The form this will take is $\frac{a_1}{a_2} = \frac{b_1}{b_2}$. Let x be the number of raindrops to fill the jar if each measures 0.4 ml.

$$\frac{1000}{x} = \frac{0.4}{0.5}$$

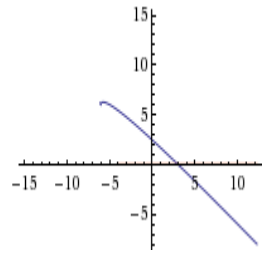
Solve this equation to get $x = 1250$ raindrops.

2. (a) $y = -x^2 + 2x + 4 - 2 = -x^2 + 2x + 2$



Solutions: $x \approx 2.73$, $x \approx -0.73$

(b) $y = \sqrt{x+6} - x$



Solution: $x = 3$

3. Let x be the number of miles that Brandt's boss travels in the limousine. Then the total charge will ome from the \$100 daily fee, in addition to the mileage fee times the number of miles traveled. We represent this via the equation:

$$150 = 100 + 0.37x$$

Solve this to get $x \approx 135.14$ miles.

4. This is a percent change problem. The new value is 500 million, and the old value is 300 million. You could solve this using one of two different versions of the same formula:

$$\%\text{ change } = \frac{500,000,000 - 300,000,000}{300,000,000} \cdot 100, \text{ or } \frac{500-300}{300} \cdot 100$$

In either case you get approximately 66.67%.

5. Again you can solve this several ways. One way is to the percent change equation, knowing that the percent change (due to tax) is positive 9.5%, and that the new value after the change is 5.00. In this case you are solving for the original value, which we'll call x:

$$\frac{5-x}{x} \cdot 100 = 9.5$$

Another way to solve is to use the same equation we used earlier for adding tax, and solving for the old value:

$$x + \frac{9.5}{100} \cdot x = 5$$

In either case, when you solve, you will find $x \approx 4.57$, so the amount Jeff must spend before tax is \$4.57.

6. Let x be the length of the new rug. Then:

$$\frac{8}{3} = \frac{x}{4.5}$$

Solve this to get $x = 12$ feet.

7. This is a percent change problem too, but notice that Donnie's bowling scores went *down*, so the percent change will be negative.

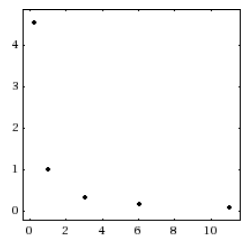
$$\% \text{ change } = \frac{231 - 235}{235} \approx -0.17 = 1.7\%$$

8. The tip percentage here is the percent change between the charged amount and the total he received. Since he worked five hours at \$65 per hour, the charges will be $\$65 \cdot 5$, or \$325. Then the tip percentage is:

$$\frac{375 - 325}{325} \approx 15.38\%$$

9. (a)

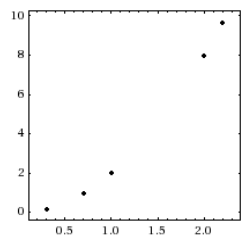
x	y
0.22	4.55
1	1.00
3	0.33
6	0.17
11	0.09



This is an inverse relationship. Solving the equation $y = \frac{k}{x}$ with the point $(1, 1)$, we get $1 = \frac{k}{1}$, so $k = 1$. Thus the relationship between the points is expressed by $y = \frac{1}{x}$.

(b)

x	y
0.3	0.18
0.7	0.98
1	2
2	8
2.2	9.68



This relationship is direct to the square. Solving the equation $y = x^2$ with the point $(1, 2)$, we get $2 = \frac{k}{1}$, so $k = 2$. Thus the relationship between the points is expressed by $y = 2x^2$.

10. Solve the equation $27 = \frac{1}{2} \cdot 3h$ for h, to get $h = 18$.

11. The key for this problem is to notice that the amount of grain that the silo can hold is a question of volume. In that case, you use the formula $V = \pi r^2 h$, and substitute in the values you know for the volume and the radius, then solve for the height.

$$9425 = \pi \cdot (10)^2 \cdot h$$

So $h = \frac{9425}{100\pi} \approx 30.00$ feet.

12. Let x be the width of the rectangle. Then, because the rectangle is 21 times as long as it is wide, the length is $21x$. Thus the area of the rectangle will be represented by the formula $A = (21x)(x)$, or $A = 21x^2$. Now using the fact that the area is 159 square feet, we solve the equation $159 = 21x^2$ for x to get $x \approx 2.75$. But we're not done yet - the problem asked for the length and width of the rectangle in terms of feet and inches. So the width is 2.75 feet, which means 2 feet plus .75 feet, or $.75 \cdot 12$ inches. Thus the width is $2'9''$. And the length is 21 times the width, which comes out to $57'9''$.

13. Finally, it was important to notice for these problems that the hypotenuse is always the side opposite the right angle.

(a) $a^2 + b^2 = c^2$
$7^2 + 12^2 = x^2$
$49 + 144 = 193 = x^2$
$x = \sqrt{193} \approx 13.89.$

(b) $a^2 + b^2 = c^2$
$x^2 + 4^2 = 5^2$
$x^2 + 16 = 25$
$x^2 = 25 - 16 = 9$
$x = \sqrt{9} = 3.$