

4. Graphing a basic exponential can be challenging because of how quickly they grow (or decay). In this exercise, we will graph one of the most basic.

$$f(x) = 2^x$$

- (a) Evaluate each of the following and state the coordinate point that occurs on the graph of $f(x)$ based on the calculation.

$$f(0) = 1 \quad f(1) = 2$$

$$f(2) = 4 \quad f(3) = 8$$

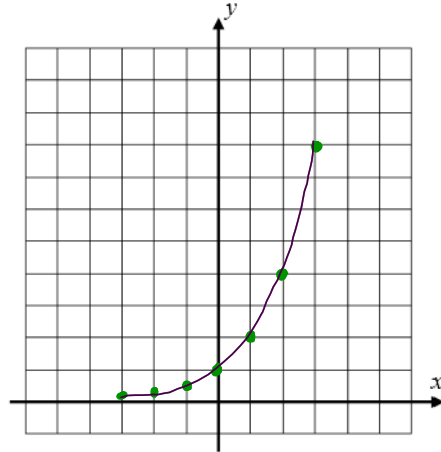
- (b) Evaluate each of the following. Remember your facts about negative exponents and give the point on the graph of $f(x)$.

$$2^x$$

$$f(-1) = 2^{-1} = \frac{1}{2}$$

$$f(-2) = \frac{1}{2^2} = \frac{1}{4}$$

$$f(-3) = \frac{1}{2^3} = \frac{1}{8}$$



- (c) Using the points you found in (a) and (b), graph this function for the domain interval $-3 \leq x \leq 3$.

5. Classify each of the following exponential functions as either increasing or decreasing and give the value of their y -intercepts.

(a) $y = 125(1.25)^x$

y -int: 125
INCREASING

(b) $y = 22\left(\frac{3}{4}\right)^x$

y -int: 22
DECREASING

(c) $y = 256\left(\frac{5}{2}\right)^x$

y -int: 256
INCREASING

6. Which of the following could be the equation of the exponential function shown graphed below? Explain your choice.

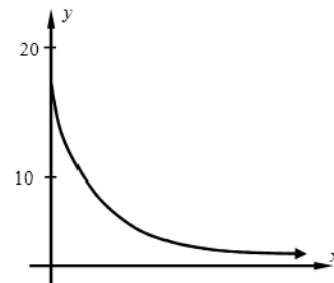
(1) $y = 15(1.25)^x$

(3) $y = 50(1.04)^x$

(2) $y = 18(0.75)^x$

(4) $y = 40(0.45)^x$

Explanation:



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PERCENT REVIEW



A percent always compares two quantities as a proportional relationship out of 100.

Exercise #1: Jonathan is getting a raise from \$12.50 per hour to \$14.75 per hour. His supervisor, Makayla, got a raise from \$22.00 per hour to \$25.30 per hour.

(a) How much in terms of dollars per hour is Jonathan's salary going up?

$$\uparrow \$2.25$$

(b) By what percent is Jonathan's salary increasing?

$$\frac{2.25}{12.50} = .18 \Rightarrow 18\%$$

(c) Who received the larger increase in salary in terms of dollars per hour?

Jonathan \rightarrow \$2.25 \uparrow
 Makayla \rightarrow \$3.30 \uparrow

(d) Who received the larger percent increase in salary?

$$\frac{3.30}{22.00} = .15 \Rightarrow 15\%$$

You can pretty much always solve percent problems by setting up proportional equations that involve 100.

Exercise #2: Gabe is buying a pair of jeans at a local store that are priced at \$45. He knows that the county he lives in has an 8% sales tax added onto the list price. If Gabe has a gift card for \$50, will it cover the cost of the jeans and the tax? Show work to justify your answer.

8% \uparrow

$$\$45 \cdot .08 = \$3.60$$

$$\begin{array}{r} 45.00 \\ + 3.60 \\ \hline \$48.60 \end{array}$$

YES!

Exercise #3: The population of deer in a forest preserve is predicted to decline by 5% this year. If the current population is 560, what population is predicted for next year? What percent of the deer will remain?

$$560 \cdot .05 = 28$$

$$\begin{array}{r} 560 \\ - 28 \\ \hline 532 \end{array}$$

Although it is convenient to solve percent problems using ratios, **it is critical** that you learn a **different method**. Some of you may have seen this before, if you've had teachers show it to you. If not, please make sure to understand what follows.

Exercise #4: Consider the following problem. Let's say that I want to leave a 15% tip on a meal that cost \$35.

- (a) Find the tip by setting up a ratio involving 100. (b) Find the tip by doing a single multiplication problem. Why is this the same as (a)?

$$\frac{x}{35} = \frac{15}{100}$$

$$x = \$5.25$$

$$\frac{100x}{100} = \frac{525}{100}$$

$$35 \times .15 = \$5.25$$

Know this important method for finding percents of totals:

FINDING PERCENTS BY MULTIPLYING

To find $p\%$ of a total, T , simply find the product: $\frac{p}{100} \cdot T$. Often $\frac{p}{100}$ is expressed as a decimal.

This "quick" way of finding percents of totals is a skill that you **must** become **fluent** with. Let's get some practice with it in the next exercise.

Exercise #5: Find each of the following. Write down the product that you use to find your answer.

- (a) 20% of 85

- (b) 12% of 200

- (c) 6% of 550

$$.2 \times 85$$

- (d) 4.5% of 120

- (e) 36% of 96

- (f) $2\frac{1}{4}\%$ of 350

Exercise #6: Which of the following calculations would find 8.5% of 250?

- (1) $(85)(250)$

- (3) $(0.85)(250)$

- (2) $(8.5)(250)$

- (4) $(0.085)(250)$

Name: _____

Date: _____

**PERCENT REVIEW
HOMEWORK**

1. Evaluate the following percent problems by setting up and solving a ratio like we did in Exercises #1 through #3 in the lesson.

(a) Find 7% of 280

(b) Find 12% of 300

(c) Find 2% of \$1250

2. Find each of the following by a single multiplication problem (like what we did in Exercise #5 from the lesson). Write down the product that you use in your calculation.

(a) Find 6% of 350

(b) Find 25% 80

(c) Find 15% of \$35.00

3. Find each of the following by a single multiplication problem (like what we did in Exercise #5 from the lesson). These are trickier than #2. If needed, take the percent and divide it by 100 on your calculator to determine what to multiply by. Write down the product that you use in your calculation. Do not round your final answers.

(a) 3.2% of 360

(b) 2.7% of 90

(c) 12.8% of 240

(d) 0.8% of 450

(e) 0.5% of 500

(f) 0.25% of 320

4. If x represents 2.8% of 270, then which of the following equation would not result in the correct value for x ?

(1) $\frac{x}{270} = \frac{2.8}{100}$

(3) $x = (0.028)(270)$

(2) $x = \frac{2.8}{100} \cdot 270$

(4) $x = (0.28)(270)$

5. Prestel currently makes \$8.50 per hour. His boss has promised him a 15% raise in his hourly earnings.
- (a) Calculate 15% of \$8.50. Why can't Prestel get exactly a 15% raise? What would his boss actually give him?
- (b) After the raise, what is Prestel's new salary? Show the calculation that leads to your answer.
6. Imani's rent increased from \$560 per month to \$600 per month. Her friend, Ariana, had her rent increase from \$825 to 875. Who had the larger percent increase in their rent? Remember to set up your ratios using the **original rent**. See Exercise #1 from the lesson if you want to see a similar problem.
7. The United States population is roughly 314 million people (314,000,000). The workforce participation rate, defined as the percent of the population working or looking for work, is 62.8%. The unemployment rate is the percent of the workforce that is looking for work, but cannot find it.
- (a) How many people are working or looking for work in the United States?
- (b) If the unemployment rate is currently 6.8%, then how many people are unemployed to the nearest hundred thousand?