

Percent Increase

You will need:

graph paper



AN ALGEBRA TUTOR'S SALARY

Bea did so well in algebra that she got a job as an algebra tutor. Her starting salary, as she had no experience, was \$10 per week.

- As Bea got more experience, her salary increased. She got a raise of \$1 per week. Copy and complete the table for the first ten weeks that Bea worked.

Weeks	Salary	Amount increase	Percent increase
0	\$10		
1	\$11	\$1	10
2	\$12	\$1	9
3	\$13	\$1	8.33

- Explain how to calculate the number in the last column.
 - Explain why the number in the last column decreases each week.
- Compare Bea's original salary with her salary for the tenth week.
 - What was the total amount of increase in her salary?
 - What percent of her original salary is this total increase? (This is the total *percent increase*.)
 - What percent of her original salary is her salary in the tenth week? (Your answer should be a number greater than 100. Why?)

Abe also got a job as an algebra tutor. He heard that Bea was getting a weekly raise of \$1. Since \$1 is 10% of \$10, Abe asked for a weekly raise of 10%. The first week Bea and Abe both got the same raise.

- Copy and complete the table for the first ten weeks that Abe worked.

Weeks	Salary	Amount increase	Percent increase
0	\$10		
1	\$11	\$1	10
2	\$12.10	\$1.10	10
3	\$13.31	\$1.21	10

- Explain how to calculate the numbers in the third column of the table above.
 - Explain why the numbers in the third column increase each week.
- Repeat problem 3 for Abe's salary.
- On the same pair of axes, make graphs of Abe's and Bea's weekly salaries as a function of weeks of experience.
- Each week's salary for Bea can be obtained from the previous week's salary by *adding* a number. Find this number and use it to write an equation that gives Bea's salary (S) as a function of weeks of experience (W).
 - Each week's salary for Abe can be obtained from the previous week's salary by *multiplying* by a number. Find this number, experimenting with your calculator if necessary, and use it to write an equation that gives Abe's salary as a function of weeks of experience.

9.  Write each equation you wrote on the graphs it belongs to.
- a. Write each equation you wrote on the graphs it belongs to.
- b. Compare the graphs. Which is straight? Which is curved?
- c. Which function describes linear growth? Which describes exponential growth?
10. Repeat the analysis you did for Abe's and Bea's salaries if Bea's raise were \$2 and Abe's raise were 20%.

EQUATIONS WITH PERCENTS

A state has 5% sales tax. If you paid \$12.60 for something, including tax, what was the price without tax? If the price without tax is x , and the increase due to tax is 0.05 of x , then

$$x + 0.05x = \$12.60.$$

11.  Remember that x can be written $1x$.
- a. Combine like terms on the left side of the equation. (Or factor out the x .)
- b. Then solve for x .
12. Solve for x .
- a. $1.2x = 240$
- b. $x + 0.4x = 18.2$
- c. $x + 0.06x = 23.85$
- d. $1.7x = 78.2$
13. Solve for x .
- a. $(1.10)(1.10)x = 67.76$
- b. $(1.10)(1.10)(1.10)x = 13.31$

The Skolar family eat out once a month. Usually they take turns figuring out the tip, also called the *gratuity*.

14. At one restaurant, they ordered food totaling \$35.95 and received a bill for the total amount they owed. The total was \$43.86, and the bill said "tax and gratuity included." Sue wrote this equation.

$$35.95 + p(35.95) = 43.86$$

- a. Explain the equation. What does p represent?
- b. Solve for p . Is your answer reasonable? Discuss.
15. Another night the Skolar family had \$23.00 to buy dinner. Assuming they'd need 25% of the cost of the dinner to cover the tax and tip, Michael wrote this equation.

$$d + 0.25d = 23.00$$

- a. Explain the equation. What does d represent?
- b. Solve for d .
16. Now assume the Skolars had \$23.00 for their meal and needed only 20% of the cost of the dinner to cover the tax and tip. How much can their actual food order be? Write and solve the equation.

EQUATIONS AND THE PRICE OF WIDGETS

17. A certain retail store sells widgets at the wholesale price, plus a 35% markup. If the wholesale price is W , what is the retail price of the widget? Express your answer as a function of W in two ways: as an addition and as a multiplication.

18. The wholesale cost of widgets went up by 8.5%. If the old wholesale price was W , express as a function of W ,
- the new wholesale price;
 - the new retail price;
 - the retail price including a 5% sales tax.
19. 💡 After the price increase in the wholesale cost a certain customer purchased a widget at the retail store for \$15.71, including tax.
- What was the wholesale price on that widget?
 - How much would the customer have saved by buying a widget before the wholesale price increase?

REVIEW SOLVING EQUATIONS

20. Solve for x .

- $\frac{3^x}{3^2} = 3^5$
- $\frac{10^{2x-5}}{10^2} = 10^5$
- $\frac{p^{x-3}}{p^2} = p^6$

REVIEW EQUATIONS AND INEQUALITIES

Use the techniques you have learned to solve these equations and inequalities. You can use trial and error, the cover-up method, tables, graphs, or the Lab Gear. Show your work.

- $5y > 2y + 57$
- $3s + 7 = 4 + 3s$
- $3(m + 4) + 3(m - 4) = 54$
- $7 + y = 7y$
- $\frac{10x + 4}{6} + 7 = -4$
- $\frac{4x}{5} = 2 - x$
- $\frac{3}{3x} = \frac{7}{4x - 2}$
- $(2p + 3)^2 = (4p - 2)(p - 8)$
- $(2p - 1)(3p + 2) = (6p - 1)(p + 1)$
- $\frac{x}{x + 1} = 2$
- 💡 $\frac{5}{x} + \frac{x}{5} = 2$