

Date \_\_\_\_\_

## Percent Problems

a. Write an equation that shows the proportional relationship between the dollar amount of electronics Lee sells,  $d$ , and the amount of money he makes in commission,  $c$ .

b. Express the constant of proportionality as a decimal.

c. Explain what the constant of proportionality means in the context of this situation.

d. If Lee wants to make \$100 in commission, what is the dollar amount of electronics he must sell?

1. A school district's property tax rate rises from 2.5% to 2.7% to cover a \$300,000 budget deficit (shortage of money). What is the value of the property in the school district to the nearest dollar? (Note: Property is assessed at 100% of its value.)
2. Jake's older brother Sam has a choice of two summer jobs. He can either work at an electronics store or at the school's bus garage. The electronics store would pay him to work 15 hours per week. He would make \$8 per hour plus a 2% commission on his electronics sales. At the school's bus garage, Sam could earn \$300 per week working 15 hours cleaning buses. Sam wants to take the job that pays him the most. How much in electronics would Sam have to sell for the job at the electronics store to be the better choice for his summer job?
3. Sarah lost her science book. Her school charges a lost book fee equal to 75% of the cost of the book. Sarah received a notice stating she owed the school \$60 for the lost book.
  - a. Write an equation to represent the proportional relationship between the school's cost for the book and the amount a student must pay for a lost book. Let  $B$  represent the school's cost of the book in dollars and  $N$  represent the student's cost in dollars.
  - b. What is the constant or proportionality? What does it mean in the context of this situation?
  - c. How much did the school pay for the book?

4. In the month of May, a certain middle school has an average daily absentee rate of 8% each school day. The absentee rate is the percent of students who are absent from school each day.
- Write an equation that shows the proportional relationship between the number of students enrolled in the middle school and the average number of students absent each day during the month of May. Let  $s$  represent the number of students enrolled in school, and let  $a$  represent the average number of students absent each day in May.
  - Use your equation to complete the table. List 5 possible values for  $s$  and  $a$ .

$s$	$a$

- Identify the constant of proportionality, and explain what it means in the context of this situation.
  - Based on the absentee rate, determine the number of students absent on average from school during the month of May if there are 350 students enrolled in the middle school.
5. The equation shown in the box below could relate to many different percent problems. Put an X next to each problem that could be represented by this equation. For any problem that does not match this equation, explain why it does not.  $\text{Quantity} = 1.05 \cdot \text{Whole}$

\_\_\_\_\_ Find the amount of an investment after 1 year with 0.5% interest paid annually.

\_\_\_\_\_ Write an equation to show the amount paid for an item including tax, if the tax rate is 5%.

\_\_\_\_\_ A proportional relationship has a constant of proportionality equal to 105%.

\_\_\_\_\_

Whole	0	100	200	300	400	500
Quantity	0	105	210	315	420	525

\_\_\_\_\_ Mr. Hendrickson sells cars and earns a 5% commission on every car he sells. Write an equation to show the relationship between the price of a car Mr. Hendrickson sold and the amount of commission he earns.

Lee sells electronics. He earns a 5% commission on each sale he makes.

- a. Write an equation that shows the proportional relationship between the dollar amount of electronics Lee sells,  $d$ , and the amount of money he makes in commission,  $c$ .

$$c = \frac{1}{20}d \text{ or } c = 0.05d$$

- b. Express the constant of proportionality as a decimal.

0.05

- c. Explain what the constant of proportionality means in the context of this situation.

*The constant of proportionality of 0.05 means that Lee would earn five cents for every dollar of electronics that he sells.*

- d. If Lee wants to make \$100 in commission, what is the dollar amount of electronics he must sell?

$$c = 0.05d$$

$$100 = 0.05d$$

$$\frac{1}{0.05}(100) = \frac{1}{0.05}(0.05)d$$

$$2,000 = d$$

*Lee must sell \$2,000 worth of electronics.*

1. A school district's property tax rate rises from 2.5% to 2.7% to cover a \$300,000 budget deficit (shortage of money). What is the value of the property in the school district to the nearest dollar? (Note: Property is assessed at 100% of its value.)

*Let  $W$  represent the worth of the property in the district, in dollars.*

$$300,000 = 0.002W$$

$$300,000\left(\frac{1}{0.002}\right) = 0.002\left(\frac{1}{0.002}\right)W$$

$$150,000,000 = W$$

*The property is worth \$150,000,000.*

2. Jake's older brother, Sam, has a choice of two summer jobs. He can either work at an electronics store or at the school's bus garage. The electronics store would pay him to work 15 hours per week. He would make \$8 per hour plus a 2% commission on his electronics sales. At the school's bus garage, Sam could earn \$300 per week working 15 hours cleaning buses. Sam wants to take the job that pays him the most. How much in electronics would Sam have to sell for the job at the electronics store to be the better choice for his summer job?

Let  $S$  represent the amount, in dollars, sold in electronics.

$$\begin{aligned} 300 &= 8(15) + 0.02(S) \\ 300 &= 120 + 0.02S \\ 180 &= 0.02S \\ 180\left(\frac{1}{0.02}\right) &= 0.02\left(\frac{1}{0.02}\right)S \\ 9,000 &= S \end{aligned}$$

Sam would have to sell more than \$9,000 in electronics for the electronics store to be the better choice.

3. Sarah lost her science book. Her school charges a lost book fee equal to 75% of the cost of the book. Sarah received a notice stating she owed the school \$60 for the lost book.
- a. Write an equation to represent the proportional relationship between the school's cost for the book and the amount a student must pay for a lost book. Let  $B$  represent the school's cost of the book in dollars and  $N$  represent the student's cost in dollars.

$$N = 0.75B$$

- b. What is the constant or proportionality? What does it mean in the context of this situation?

The constant of proportionality is  $75\% = 0.75$ . It means that for every \$1 the school spends to purchase a textbook, a student must pay \$0.75 for a lost book.

- c. How much did the school pay for the book?

$$\begin{aligned} 60 &= 0.75B \\ 60\left(\frac{1}{0.75}\right) &= 0.75\left(\frac{1}{0.75}\right)B \\ \frac{60}{0.75} &= B \\ 80 &= B \end{aligned}$$

The school paid \$80 for the science book.

4. In the month of May, a certain middle school has an average daily absentee rate of 8% each school day. The absentee rate is the percent of students who are absent from school each day.
- a. Write an equation that shows the proportional relationship between the number of students enrolled in the middle school and the average number of students absent each day during the month of May. Let  $s$  represent the number of students enrolled in school, and let  $a$  represent the average number of students absent each day in May.

$$a = 0.08s$$

- b. Use your equation to complete the table. List 5 possible values for  $s$  and  $a$ .

$s$	$a$
100	8
200	16
300	24
400	32
500	40

- c. Identify the constant of proportionality, and explain what it means in the context of this situation.

*The constant of proportionality is 0.08.  $0.08 = 8\%$ , so on average, for every 100 students enrolled in school, 8 are absent from school.*

- d. Based on the absentee rate, determine the number of students absent on average from school during the month of May if there are 350 students enrolled in the middle school.

*28 students; 350 is halfway between 300 and 400. So, I used the table of values and looked at the numbers of students absent that correspond to 300 and 400 students at the school, which are 24 and 32. Halfway between 24 and 32 is 28.*

5. The equation shown in the box below could relate to many different percent problems. Put an X next to each problem that could be represented by this equation. For any problem that does not match this equation, explain why it does not. Quantity = 1.05 · Whole

\_\_\_\_\_ Find the amount of an investment after 1 year with 0.5% interest paid annually.

*The equation should be Quantity = 1.005 · Whole.*

  X   Write an equation to show the amount paid for an item including tax, if the tax rate is 5%.

  X   A proportional relationship has a constant of proportionality equal to 105%.

<u>  X  </u>	Whole	0	100	200	300	400	500
	Quantity	0	105	210	315	420	525

\_\_\_\_\_ Mr. Hendrickson sells cars and earns a 5% commission on every car he sells. Write an equation to show the relationship between the price of a car Mr. Hendrickson sold and the amount of commission he earns.

*The equation should be Quantity = 0.05 · Whole.*