



Seventh Grade Math

This packet includes four sections that cover the major content of 7th grade math. Each section includes four pages of notes and practice for each topic. For additional support, visit KCS TV on YouTube for instructional videos that accompany each section.

The following content is included in this packet:

	Topic			
	I. Probability	II. Integers & Rational Numbers	III. Ratios & Proportional Relationships	IV. Expressions, Equations, & Inequalities
Activity 1	Experimental Probability of Simple Events	Adding Rational Numbers	Unit Rates	One-Step Equations with Rational Coefficients
Activity 2	Making Predictions with Experimental Probability	Subtracting Rational Numbers	Constant Rates of Change	Solving Two-Step Equations
Activity 3	Theoretical Probability of Simple Events	Multiplying Integers	Percent Increase and Decrease	Writing and Solving One-Step Inequalities
Activity 4	Making Predictions with Theoretical Probability	Applying Integer Operations	Applications of Percent	Solving Two-Step Inequalities

Section III
Activity 1

Unit Rates

A **rate** is a ratio that compares two *different* kinds of quantities or measurements.

3 aides for 24 students

$$\frac{3 \text{ aides}}{24 \text{ students}}$$

135 words in 3 minutes

$$\frac{135 \text{ words}}{3 \text{ minutes}}$$

7 ads per 4 pages

$$\frac{7 \text{ ads}}{4 \text{ pages}}$$

Express each comparison as a rate in ratio form.

1. 70 students per 2 teachers 2. 3 books in 2 months 3. \$52 for 4 hours of work

In a **unit rate**, the quantity in the denominator is 1.

300 miles in 6 hours

$$\frac{300 \text{ miles}}{6 \text{ hours}} = \frac{300 \div 6}{6 \div 6} = \frac{50 \text{ miles}}{1 \text{ hour}}$$

275 square feet in 25 minutes

$$\frac{275 \text{ ft}^2}{25 \text{ min}} = \frac{275 \div 25}{25 \div 25} = \frac{11 \text{ ft}^2}{1 \text{ min}}$$

Express each comparison as a unit rate. Show your work.

4. 28 patients for 2 nurses _____

5. 5 quarts for every 2 pounds _____

When one or both of the quantities being compared is a fraction, the rate is expressed as a **complex fraction**. Unit rates can be used to simplify rates containing fractions.

15 miles every $\frac{1}{2}$ hour

$$\frac{15 \text{ miles}}{\frac{1}{2} \text{ hour}} = 15 \div \frac{1}{2} = \frac{15}{1} \times \frac{2}{1} = \frac{30 \text{ miles}}{1 \text{ hour}}$$

$\frac{1}{4}$ cup for every $\frac{2}{3}$ minute

$$\frac{\frac{1}{4} \text{ c}}{\frac{2}{3} \text{ min}} = \frac{1}{4} \div \frac{2}{3} = \frac{1}{4} \times \frac{3}{2} = \frac{3}{8} \text{ c}$$

Complete to find each unit rate. Show your work.

6. 3 ounces for every $\frac{3}{4}$ cup

7. $3\frac{2}{3}$ feet per $\frac{11}{60}$ hour

Section III
Activity 2

Constant Rates of Change

A **proportion** is an equation or statement that two rates are the same.

*In 1 hour of babysitting, Rajiv makes \$8.
He makes \$16 in 2 hours, and \$24 in 3 hours.*

The same information is shown in the table below.

Time Worked (h)	1	2	3
Total Wage (\$)	8	16	24

To see if this relationship is proportional, find out if the rate of change is constant. Express each rate of change shown in the table as a fraction.

$$\frac{8}{1} = 8 \qquad \frac{16}{2} = 8 \qquad \frac{24}{3} = 8$$

The rate of change for each column is the same. Because the rate of change is constant, the relationship is *proportional*.

You can express a proportional relationship by using the equation $y = kx$, where k represents the constant rate of change between x and y .

In this example: $k = 8$. Write the equation as $y = 8x$.

The table shows the number of texts Terri received in certain periods of time.

Time (min)	1	2	3	4
Number of Texts	3	6	9	12

- Is the relationship between number of texts and time a proportional relationship? _____
- For each column of the table, write a fraction and find k , the constant of proportionality.

- Express this relationship in the form of an equation: _____
- What is the rate of change? _____

Write the equation for each table. Let x be time or weight.

5.

Time (h)	1	2	3	4
Distance (mi)	35	70	105	140

6.

Weight (lb)	3	4	5	6
Cost (\$)	21	28	35	42

Section III Activity 3

Percent Increase and Decrease

A change in a quantity is often described as a percent increase or percent decrease. To calculate a percent increase or decrease, use this equation.

$$\text{percent of change} = \frac{\text{amount of increase or decrease}}{\text{original amount}} \cdot 100$$

Find the percent of change from 28 to 42.

- First, find the amount of the change. $42 - 28 = 14$
- What is the original amount? 28
- Use the equation. $\frac{14}{28} \cdot 100 = 50\%$

An increase from 28 to 42 represents a 50% increase.

Find each percent of change.

1. 8 is increased to 22

amount of change: $22 - 8 = \underline{\hspace{2cm}}$

original amount: $\underline{\hspace{2cm}}$

$\underline{\hspace{2cm}} \cdot 100 = \underline{\hspace{2cm}}\%$

2. 90 is decreased to 81

amount of change: $90 - 81 = \underline{\hspace{2cm}}$

original amount: $\underline{\hspace{2cm}}$

$\underline{\hspace{2cm}} \cdot 100 = \underline{\hspace{2cm}}\%$

3. 125 is increased to 200

amount of change: $200 - 125 = \underline{\hspace{2cm}}$

original amount: $\underline{\hspace{2cm}}$

$\underline{\hspace{2cm}} \cdot 100 = \underline{\hspace{2cm}}\%$

4. 400 is decreased to 60

amount of change: $400 - 60 = \underline{\hspace{2cm}}$

original amount: $\underline{\hspace{2cm}}$

$\underline{\hspace{2cm}} \cdot 100 = \underline{\hspace{2cm}}\%$

5. 64 is decreased to 48

6. 140 is increased to 273

7. 30 is decreased to 6

8. 15 is increased to 21

9. 7 is increased to 21

10. 320 is decreased to 304

Section III
Activity 4

Applications of Percent

Sales tax is added to the price of an item or service. Sales tax is a percent of the purchase price. A sales tax of 6.5% means that all taxable items will have an additional 6.5% added to the total cost.

$$\text{sales tax rate} \times \text{sale price} = \text{sales tax}$$

The **total sale price** is computed by adding the sales tax to the cost of all the items purchased.

$$\text{sale price} + \text{sales tax} = \text{total sale price}$$

Find the amount of sales tax for each purchase to the nearest whole cent.

1. sale price: \$9,450

2. sale price: \$1,089

3. sale price: \$21,097

sales tax rate: 8%

sales tax rate: 6.25%

sales tax rate: 5.5%

Interest is the amount of money the bank pays to use your money, or the amount of money you pay the bank to borrow its money.

Principal is the amount of money you save or borrow from the bank.

Rate of interest is the percent rate on money you save or borrow.

Time is the number of years the money is saved or borrowed.

Answer each question.

4. You put \$800 in a savings account at 4% annual interest and leave it there for five years.

a. What is the principal? _____ b. What is the interest rate? _____

c. What is the amount of time the money will stay in the account?

Find out how much interest you would earn by using this formula:

Interest	=	Principal	×	Rate	×	Time	←	words
<i>i</i>	=	<i>p</i>	×	<i>r</i>	×	<i>t</i>	←	symbols
		\$800	×	4%	×	5		
		\$800	×	0.04	×	5	←	Change % to decimal.
		\$160					←	Multiply to solve.

5. To find out how much interest you will earn by keeping your money in a bank, what three things do you need to know?

Answer Key

Ratios & Proportional Relationships

Activity 1: Unit Rates

- $\frac{70 \text{ students}}{2 \text{ teachers}}$
- $\frac{3 \text{ books}}{2 \text{ mo}}$
- $\frac{\$52}{4 \text{ h}}$
- $\frac{28 \text{ patients}}{2 \text{ nurses}} = \frac{28 \div 2}{2 \div 2} = \frac{14 \text{ patients}}{1 \text{ nurse}}$
- $\frac{5 \text{ qt}}{2 \text{ lb}} = \frac{5 \div 2}{2 \div 2} = \frac{2.5 \text{ qt}}{1 \text{ lb}}$
- $\frac{3 \text{ oz}}{\frac{3}{4} \text{ c}} = 3 \div \frac{3}{4} = \frac{3}{1} \times \frac{4}{3} = \frac{4 \text{ oz}}{1 \text{ c}}$
- $\frac{3\frac{2}{3} \text{ ft}}{\frac{11}{60} \text{ h}} = 3\frac{2}{3} \div \frac{11}{60} = \frac{11}{3} \times \frac{60}{11} = \frac{20 \text{ ft}}{1 \text{ h}}$

Activity 2: Constant Rates of Change

- yes
- $3/1 = 3$; $6/2 = 3$; $9/3 = 3$; $12/4 = 3$
- Sample answer: $y = 3x$
- 3
- $y = 35x$
- $y = 7x$

Activity 3: Percent Increase and Decrease

- 14; 8; $14/8$; 175%
- 9; 90; $9/90$; 10%
- 75; 125; $75/125$; 60%
- 340; 400; $340/400$; 85%
- 25%
- 95%
- 80%
- 40%
- 200%
- 5%

Activity 4: Applications of Percent

- \$756
- \$68.06
- \$1,160.34
- a. \$800 b. 4% c. 5 years
- principal, rate, and time