

6th Grade

6.RP.2- Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."*

6.RP.3- Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios

b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

7th Grade

7.RP.1- Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks $1/2$ mile in each $1/4$ hour, compute the unit rate as the complex fraction $^{1/2}/_{1/4}$ miles per hour, equivalently 2 miles per hour.*

7.RP. 2- Recognize and represent proportional relationships between quantities.

a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.*

8th Grade

8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

8.F.2- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

8.F.4- Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Direct Variation Task

Procedure:

1. Give students the pre-activity. Students work individually, in silence on the pre-activity for about ten minutes. It is important that students understand they may not be able to answer everything correctly as this point. After five to ten minutes, students should set this aside.
2. Students should work in pairs. Give each pair of students one envelope with card set A (words) and B (unit rates). Students should fill in the correct units as they match the pairs. Students should also find the missing unit rates and fill them in on the blank cards.
3. As pairs finish Card set A/B, give them an envelope with card set C (tables). Students should be told to build these cards into their previous work. Students should find and fill in the missing values on the tables.
4. As pairs finish with Card set C, give them an envelope with card set D (equations). Students should be told to build these cards into their previous work. Students should write equations on the blank cards and place them with the groups which don't have an equation. (In discussion be sure that students recognize that the unit rate is the slope. Slope represents a rate of change. In this case it is a constant rate of change, which means a linear or proportional relationship.)
5. As pairs finish with card set D, distribute card set E (graphs).
6. Differentiation options:
 - a. When students get through all of the cards, ask them to show how they can identify the unit rate in each representation.
 - b. If pairs complete the cards, and do a, give them 5 blank cards to create their own situation and show each representation for it.
 - c. Some students may not get through all of the card sets- the important thing is that they begin connecting multiple representations.

During the activity, the teacher should ask questions of groups who are struggling. The teacher may also suggest that they talk to another group or look at the progress other groups are making.

7. At the end of the activity, the class should discuss and summarize some of the things they learned, patterns found, etc.
8. Finally, students return to their pre-activity and make any changes to their original work and complete it in another color pen.

These snails move very slowly. Here are their speeds.

Snail A



Time (minutes)	Distance (inches)
10	5
20	10
30	15

Snail B



This snail travels at a rate of 3 inches in 20 minutes.

Snail C



This snail travels at a unit rate of $1/15$ inches/minute.

Snail D



$D = 1/5 t$
 $D =$ Distance (in inches)
 $t =$ time (in minutes)

Use the information above to rank the snails in order from slowest to fastest. Explain how you figured this out and show all of your work.

<p>W1</p> <p>We paid \$30 for 6 sub sandwiches. Write an equation which shows the relationship between the total cost and the number of sandwiches.</p>	<p>W5</p> <p>Sarah reads every day. Every 2 days she finishes a chapter in her book. Write an equation which shows the relationship between the number of chapters read and days.</p>
<p>W2</p> <p>T-shirts are on sale for \$10 per shirt. Write an equation which shows the relationship between the total cost and the number of shirts.</p>	<p>W6</p> <p>Joe paid \$0.75 for 3 pieces of candy. Write an equation which shows the relationship between the total cost and the number of pieces of candy.</p>
<p>W3</p> <p>Casey paid \$2.25 for 3 sodas. Write an equation which shows the relationship between the total cost and the number of sodas.</p>	<p>W7</p> <p>Jill reads 3 books every month. Write an equation which shows the relationship between the number of books read and the number of months.</p>
<p>W4</p> <p>Jake earned \$8 for cleaning two rooms. Write an equation which shows the relationship between the money he earned and the number of rooms he cleaned.</p>	<p>W8</p> <p>A recipe calls for 2 cups of flour for each batch of cookies. Write an equation which shows the relationship between the number of cups of flour and batches of cookies.</p>

2

<p>R8</p> <p>The unit rate is 5 _____ per _____</p>	<p>R7</p> <p>The unit rate is 1/2 _____ per _____</p>
<p>R6</p> <p>The unit rate is 3 _____ per _____</p>	<p>R5</p> <p>The unit rate is .75 _____ per _____</p>
<p>R4</p> <p>The unit rate is 2 _____ per _____</p>	<p>R3</p> <p>The unit rate is 4 _____ per _____</p>
<p>R2</p>	<p>R1</p>

2

E8 $y = 5x$	E7 $y = 1/2 x$
E6 $y = 3x$	E5 $y = .75x$
E4 $y = 2x$	E3 $y = 4x$
E2	E1

<p>T8</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>1</td><td></td></tr><tr><td>2</td><td>10</td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td>20</td></tr></tbody></table>	x	y	1		2	10	3		4	20	<p>T4</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>0</td><td>0</td></tr><tr><td>4</td><td>2</td></tr><tr><td>8</td><td></td></tr><tr><td>12</td><td>6</td></tr></tbody></table>	x	y	0	0	4	2	8		12	6
x	y																				
1																					
2	10																				
3																					
4	20																				
x	y																				
0	0																				
4	2																				
8																					
12	6																				
<p>T7</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>0</td><td>0</td></tr><tr><td>2</td><td></td></tr><tr><td>4</td><td>12</td></tr><tr><td>6</td><td>18</td></tr></tbody></table>	x	y	0	0	2		4	12	6	18	<p>T3</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>1</td><td>.75</td></tr><tr><td>2</td><td>1.5</td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr></tbody></table>	x	y	1	.75	2	1.5	3		4	
x	y																				
0	0																				
2																					
4	12																				
6	18																				
x	y																				
1	.75																				
2	1.5																				
3																					
4																					
<p>T6</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>0</td><td></td></tr><tr><td>1</td><td>2</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>6</td></tr></tbody></table>	x	y	0		1	2	2		3	6	<p>T2</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>0</td><td></td></tr><tr><td>2</td><td>8</td></tr><tr><td>4</td><td>16</td></tr><tr><td>6</td><td></td></tr></tbody></table>	x	y	0		2	8	4	16	6	
x	y																				
0																					
1	2																				
2																					
3	6																				
x	y																				
0																					
2	8																				
4	16																				
6																					
<p>T5</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>1</td><td>10</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td>40</td></tr></tbody></table>	x	y	1	10	2		3		4	40	<p>T1</p> <table border="1"><thead><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>0</td><td></td></tr><tr><td>2</td><td>1/2</td></tr><tr><td>4</td><td>1</td></tr><tr><td>6</td><td></td></tr></tbody></table>	x	y	0		2	1/2	4	1	6	
x	y																				
1	10																				
2																					
3																					
4	40																				
x	y																				
0																					
2	1/2																				
4	1																				
6																					

