LEARNING OBJECTIVE: We will use graphs and equations to represent proportional relationships involving fractions. (G7M1L10)

CONCEPT DEVELOPMENT:

Unit Rate: A unit rate is ratio of two quantities where the second quantity is one.

Examples:

I can swim 3 miles in 1 hour. $\frac{3}{1}$ UNIT RATE.
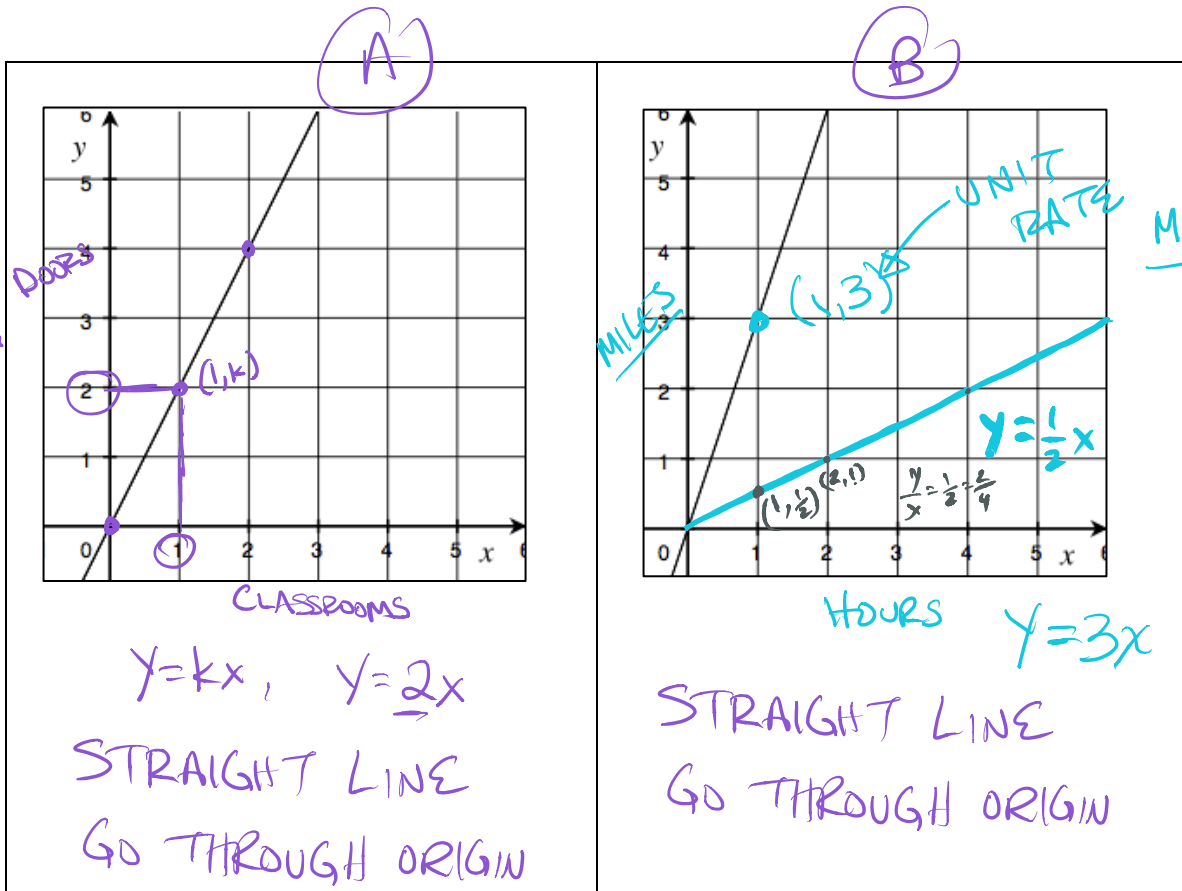
There are two doors in every classroom. $\frac{2}{1}$

UNIT RATE IS THE SAME AS THE CONSTANT OF PROPORTIONALITY:

"k"

Remember the following equations:

$$y = kx \qquad \frac{miles}{hrs.} \quad \frac{y}{x}\frac{3}{1} \quad \frac{y}{x} = k$$

Ⓐ

Ⓑ

X = classrooms
Y = doors

DOORS

(1, k)

CLASSROOMS

Y=kx,   Y=2x

STRAIGHT LINE
GO THROUGH ORIGIN

UNIT RATE

MILES

(1, 3)

$(1, \frac{1}{2})$ (2, 1)

$\frac{y}{x} = \frac{1}{2} = \frac{2}{4}$

MILES Y
HOUR X

$y = \frac{1}{2} x$

HOURS   Y=3x

STRAIGHT LINE
GO THROUGH ORIGIN

GUIDED PRACTICE:

Steps for Graphing Proportional Relationships Involving Fractions
1. Read the problem carefully and label the graph (remember x-axis is the independent variable and y-axis is the dependent variable).
2. Identify the unit rate by figuring out the ratio of the two quantities where the second quantity (x-variable) is 1. Use equation $y = kx$ to help.
3. Create a table of values and fill in different values.
4. Graph the values on the coordinate plane.
5. Interpret your answer.

I am able to drive from here to Fresno (exactly 180 miles) in 2 hours and 30 minutes. Identify the unit rate, write an equation, graph the relationship and answer the question below.

Time (in hours) X	Distance (in miles) Y
0.5	36
1	72
2	144
2.5	180
4	288
5	360

$y=kx$

$k=\dfrac{Y}{X}$

$\dfrac{180}{2.5}=\dfrac{180}{\frac{5}{2}}$

$180\div\dfrac{5}{2}=\dfrac{\cancel{180}^{36}}{1}\cdot\dfrac{2}{\cancel{5}_1}$

$k=72\text{ MPH}$

$(1,72)$
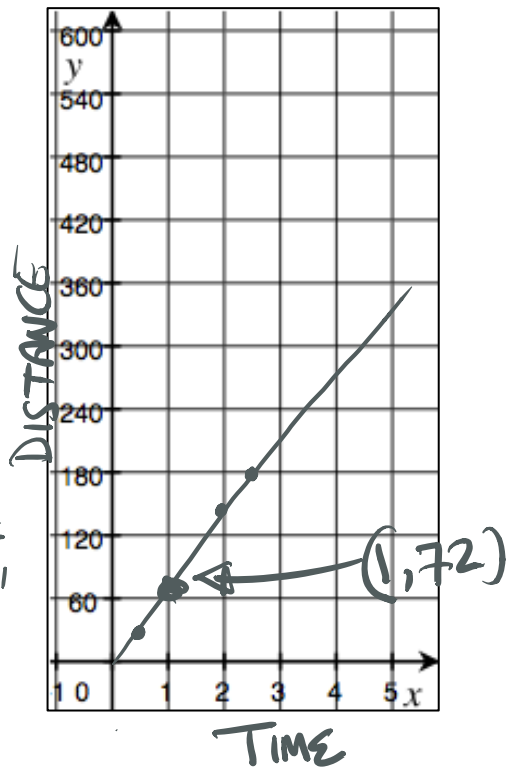
DISTANCE

TIME

What is the independent variable (x-axis)?
     TIME
What is the dependent variable (y-axis)?
     DISTANCE
What is the unit rate?
     72     $k=72$ (72 MPH)

How far could I go in $6\frac{1}{2}$ hrs.

6.5×72

How long would it take to drive all 855 miles to Seattle?

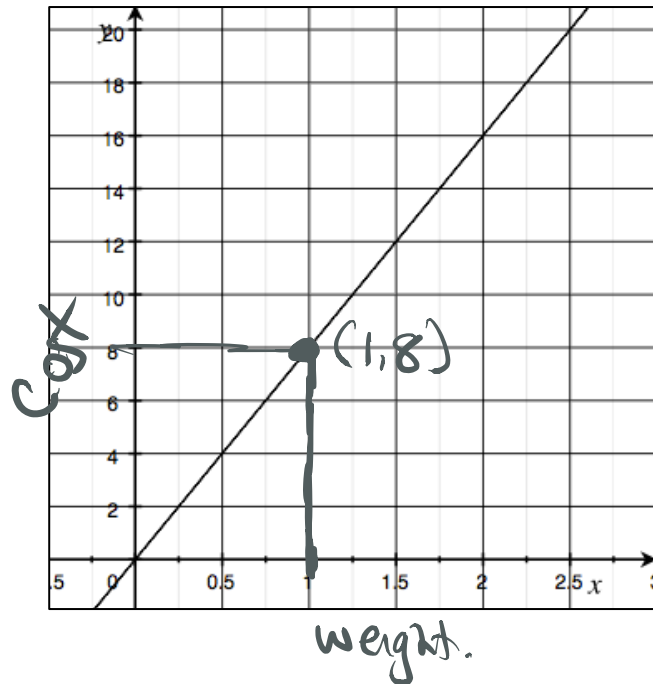$Y=72x$ $\dfrac{Y}{x}=72$

$\dfrac{855}{72}=\dfrac{72x}{72}$ 11.875 hrs

2. You're making a recipe that involves mushrooms as the main ingredient. Using the graph below, fill in the table, and answer the questions below.

Weight in pounds	Cost
0	0
$\frac{1}{4}$ $\frac{1}{2}$ ←→	$\frac{2}{4}$
1 ×8	8
$1\frac{1}{2}$ ×8	12
2 ×8	16
$2\frac{1}{4}$ ×8	18

$\frac{1}{2}$lb | $\frac{1}{2}$lb
4 | 4
$\frac{1}{2}$lb | $\frac{1}{2}$lb
4 | 4
$\frac{x}{2}$
2

(1,8)

cost

weight.

Is the relationship proportional?

YES. GRAPH GOES THROUGH ORIGIN & STRAIGHT LINE.

What is the unit rate for the cost per pound?

$k = \frac{Y}{x}$ $\$8/lb.$

$\frac{y}{x} = \frac{12}{1\frac{1}{2}} = \frac{12 \div 3}{12} = \frac{\cancel{12}^{4} \cdot 2}{1 \cdot \cancel{3}} = 8$

Write an equation that models this situation.

$y = 8x$

If you had $10 to spend on mushrooms, how many pounds could you buy?

$1\frac{1}{4}$ lb.

What would be the cost for 30 pounds for mushrooms?   30×8
                                                        $240

$1\frac{1}{2}$lbs

$\frac{1}{2}$lb=$4 | $\frac{1}{2}$lb=$4 | $\frac{1}{2}$lb=$4

$12

G7M1L10: Using Graphs and Equations to Represent Proportional Relationships Involving Fractions

4.4 lbs? NO!

3. I went to Safeway recently and bought a rib roast that was 4 lb. 4 oz. It cost $26.35. Identify the unit rate, write an equation, graph the relationship and answer the question below.

$4\frac{1}{4}$

Weight (in pounds)	Price
0	0
1	6.20
$2\frac{1}{2}$	$15.50
4 ×6.20	24.80
$4\frac{1}{4}$	$26.35
6 ×6.20	$37.20
9 ×6.20	$55.80

(9, 55.80)
6.2 → 5
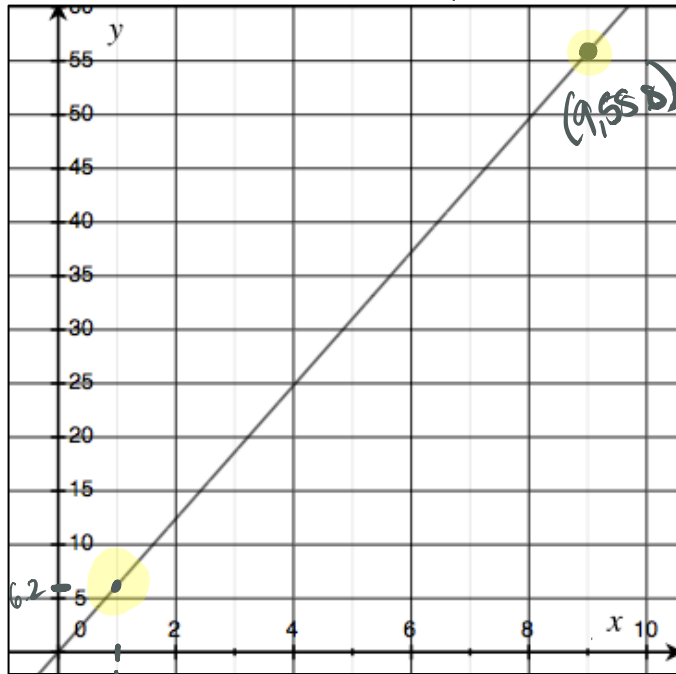
Is this relationship proportional?

Yes!

How much does each pound cost?

$$\frac{y}{x} = \frac{15.50}{2\frac{1}{2}} = \frac{15\frac{1}{2}}{2\frac{1}{2}} = \frac{\frac{31}{2}}{\frac{5}{2}} = \frac{31}{2} \div \frac{5}{2} = \left[\frac{31}{2} \cdot \frac{2}{5}\right] = \frac{31}{5} = 6\frac{1}{5} = \$6.20$$

What is the equation that models this situation?

$$y = 6.20x$$

If the rib roast above serves 4 people, how much would you pay for 7 servings of rib roast?

$$26.35 \to 4$$
$$\to 7$$

$$1\frac{3}{4} \times 26.35 = \$46.11$$

How much would a 9 pound rib roast cost?

$$55.80$$

4. At Peet's, I bought $\frac{3}{4}$ of a pound of coffee for $9.75. Identify the unit rate, write an equation, graph the relationship and answer the question below.

UNIT RATE = DOLLARS/LB.

Coffee X (in pounds)	Cost Y
0	0
$\frac{1}{2}$	6.50
$\frac{3}{4}$	$9.75
1	13.00
$1\frac{1}{2}$	$19.50
2	$26

Is this proportional?

Yes

What is the unit rate?

$\frac{y}{x} = k$ $\frac{9.75}{\frac{3}{4}} = \frac{9\frac{3}{4}}{\frac{3}{4}} = \frac{\frac{39}{4}}{\frac{3}{4}} = \frac{39}{4} \div \frac{3}{4} = \frac{39}{4} \cdot \frac{4}{3} = $ ⓵③

What does the unit rate represent in the story?

The cost of coffee for 1 pound.

How much coffee could you buy for $65?

5 pounds $65 \div 13 = 5$

How much money would you need to buy $5\frac{3}{4}$ pounds of coffee?

$74.75 $5\frac{3}{4} \times 13$

What does the ordered pair $(2, 26)$ mean in the context of the story?
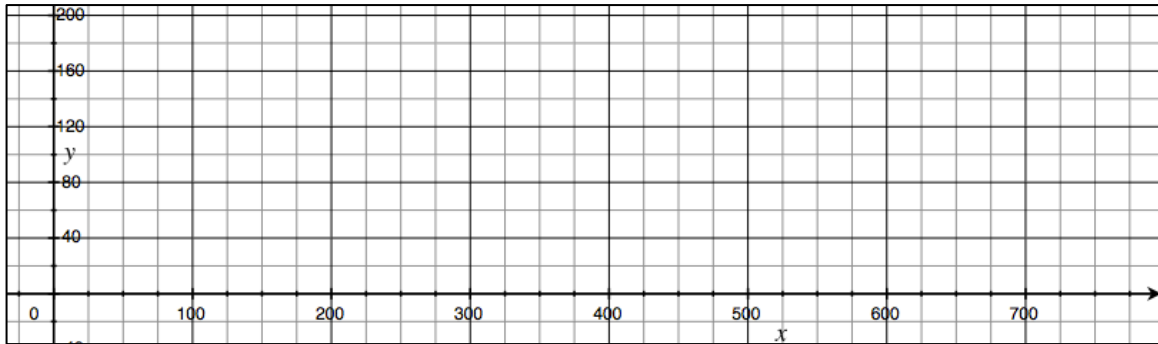
You can buy 2 lbs of coffee for $26.

5. For every $25 ticket sold at a concert, a pop star gets $5. How much money does the pop star get for every dollar in ticket sales? Identify the unit rate, write an equation, graph the relationship and answer the question below.
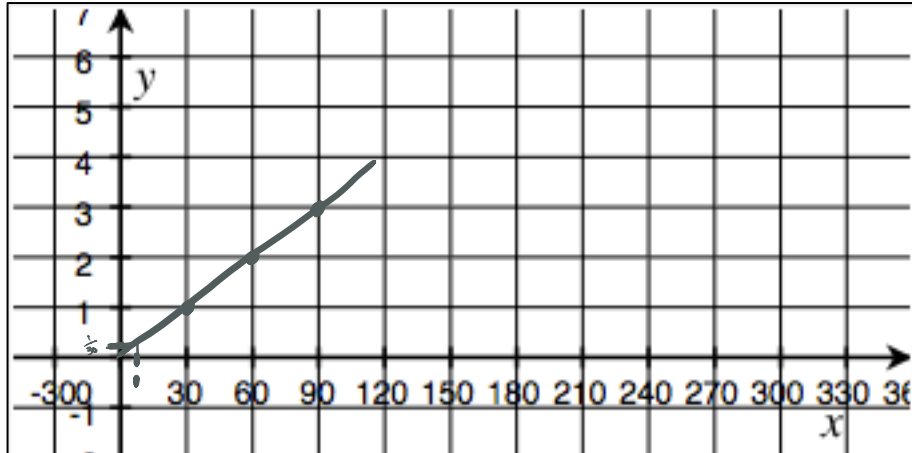

What is the unit rate?

What is the ordered pair that represents the unit rate?

How many tickets would have to be sold for the pop star to make $1500?

If the pop star made $25,000, how many tickets were sold?

Money from tickets sold	Money that pop star receives
25	5
200	
	200
175	
	7500
1	

6. A sloth will typically move 4 miles every 2 hours. How many miles does the sloth move each minute? Identify the unit rate, write an equation, graph the relationship and answer the question below.

2 MPH $\dfrac{2 \text{ Miles}}{60 \text{ min}}$ $\dfrac{1}{30}$

Minutes	Miles
	1
1	1/30
	$1\frac{1}{2}$
15	
	3
120	4

What is the unit rate?

$\dfrac{1}{30}$

What is the equation represented by the line?

$Y = \dfrac{1}{30} x$

What does the point $(240, 8)$ mean in the context of the story?
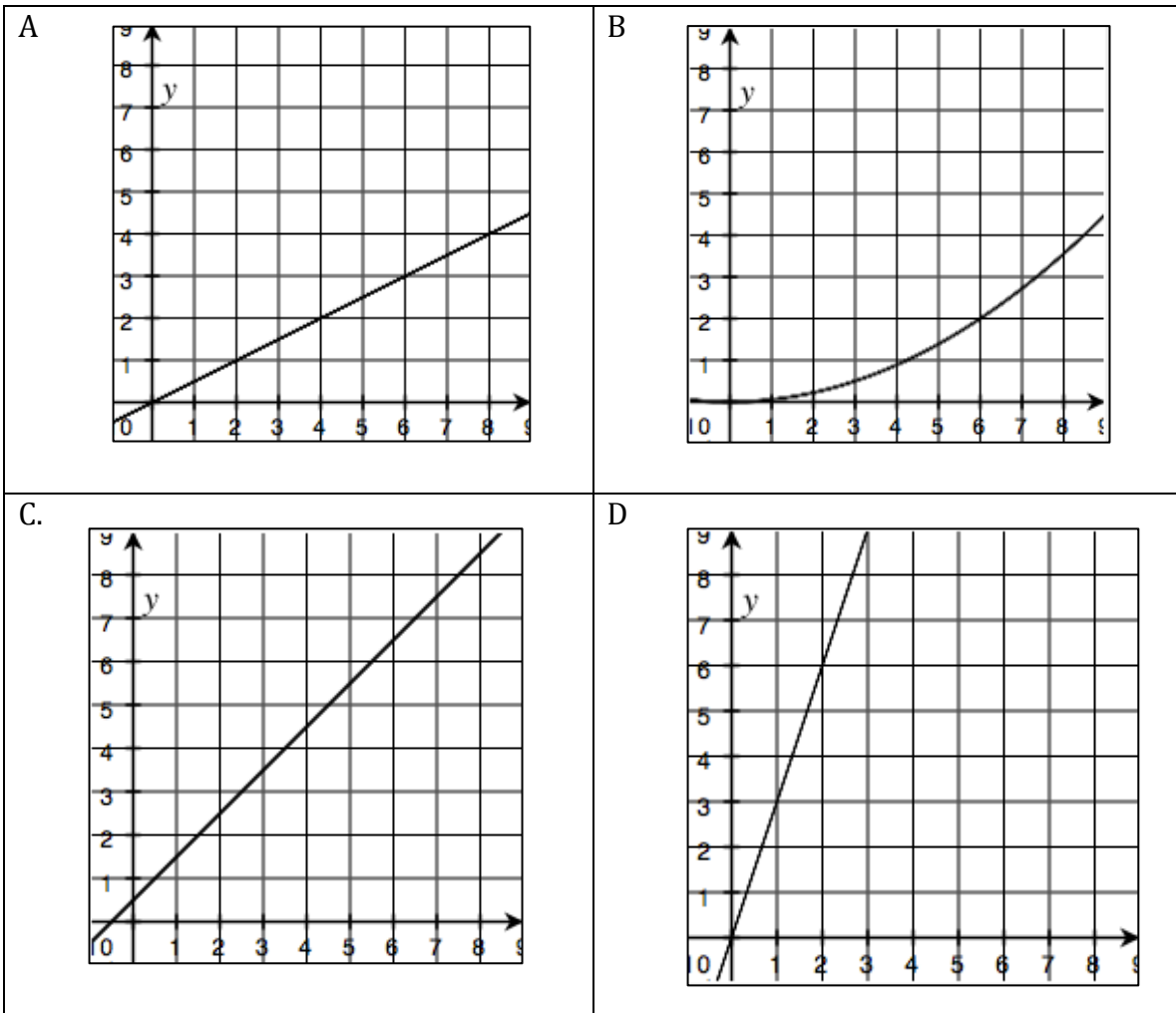

How many minutes would it take for the sloth to travel 4.5 miles?

Independent Practice:
No independent practice

Activating Prior Knowledge:
We can identify graph that represent proportions:
Which graphs are proportions? How do you know?

A

B

C.

D

CLOSURE: Exit Ticket?

Teacher Notes:
Maps to Lesson 15 in grade 7 module 1 ENY.