

Rational Number Project

Fraction Operations and Initial Decimal Ideas Lesson 20: Overview	Materials <ul style="list-style-type: none"> • Transparencies 1-8 • Student Pages A and B
Students use double number lines to multiply a whole number by a fraction. Students write a multiplication sentence that represents a cloud or number line picture.	

Teaching Actions

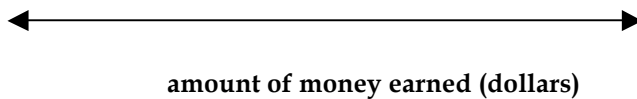
Warm Up

- A) Each tray of Gerber daisies weighs $\frac{3}{8}$ of a pound. How much do 5 trays of Gerber daisies weigh?

Use clouds to show how to find the answer.

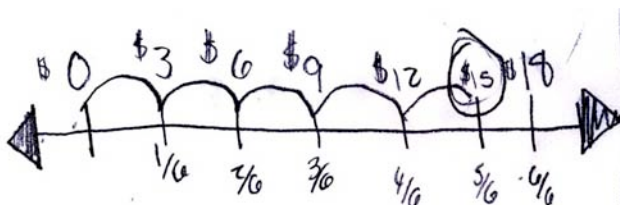
- B) India earns \$18 an hour working at the plant sale. How much will she earn if she works $\frac{5}{6}$ of an hour?

Show how to solve problem on a number line.



Large Group Introduction

- Review the two warm-up problems with the students. Look for students who made a double number line similar to one shown below:



Comments

Have students do the Warm-Up on a piece of paper. The goal of the warm up is for students to review the two different types of fraction multiplication problems they learned in the previous lessons (i.e. whole number \times fraction using clouds and fraction \times whole number using a number line).

The students seemed to solve warm-up problem A the same way using either circles or rectangles for the fraction.

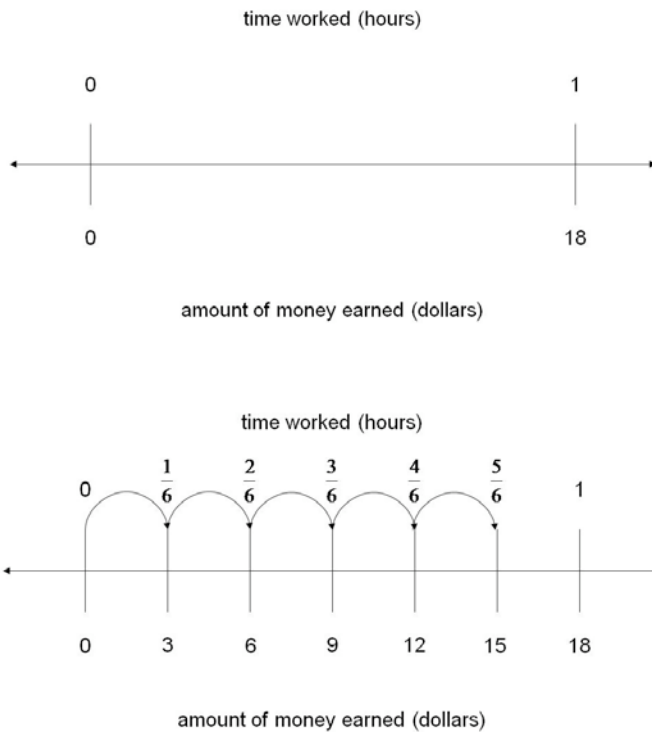
The students solved warm-up problem B in quite different but still correct ways. Please see the Teacher Notes for more explanation.

Teaching Actions

If any of your students made a double number line as above, please have them show and explain what they did.

2. Double Number Line

Model how to make a double number line using problem B from the Warm-Up if no student made one. The steps to building a double number line are shown above.



3. Ask the students to solve the problem below using a double number line. (Transparency 1).

Riley earns \$15 an hour raking leaves. How much will he earn if he works $\frac{2}{3}$ of an hour?

Comments

The number line shows the amount of money earned on the top and the number of hours on the bottom. You should encourage students to label the number line with a title and units.

Begin with a number line as shown to the left. Label the amount of money earned on the bottom. Explain how the time worked matches the amount of money earned (i.e. India earns \$18 an hour).

Partition the number line into sixths and label both the times and amounts earned as shown on the left.

Teaching Actions

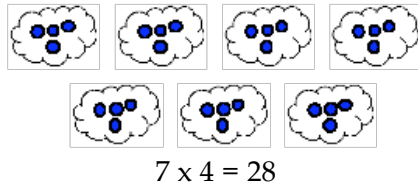
Small Group/Partner Work

- Assign Student Pages A and B.

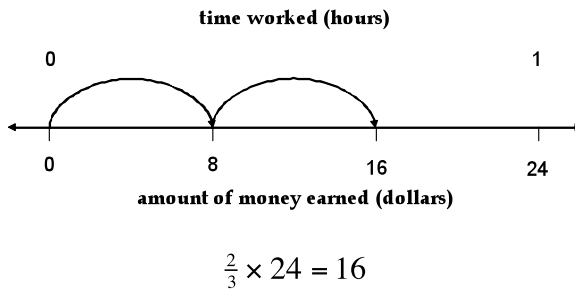
Wrap Up

- Use problems A to G on Transparencies 2 – 8 to bring closure to the last 4 lessons on multiplication. Ask students to determine the multiplication sentence that matches the picture or number line. Be sure that students explain their answers.

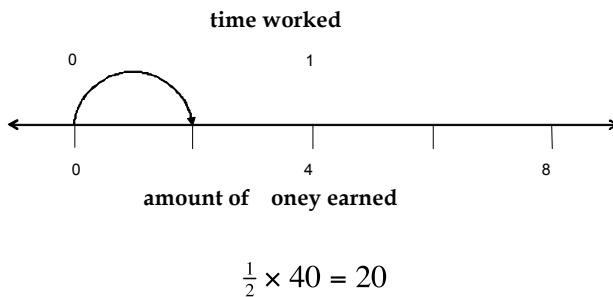
A.



B.



C.



D.

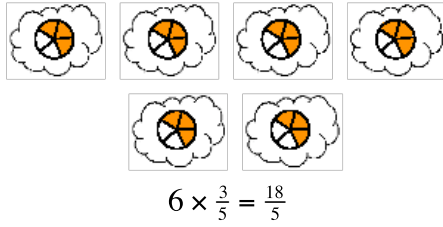
Comments

Observe students as they do the class work. What types of pictures do they draw for problems 5 – 10?

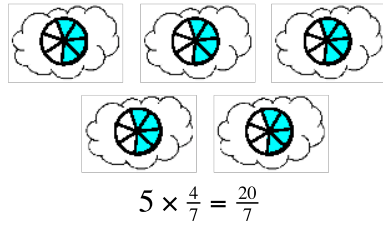
This closing recaps all the different types of multiplication problems in the past 4 lessons. These problems can be done quickly but make sure to have the students explain how they determined their answers.

Teaching Actions

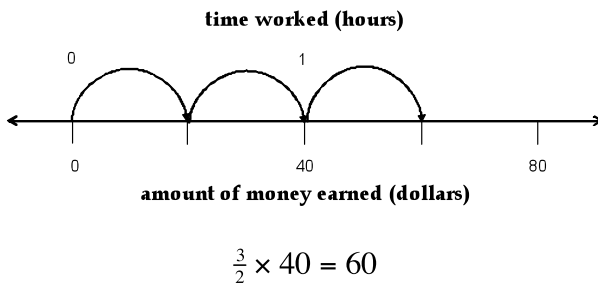
Comments



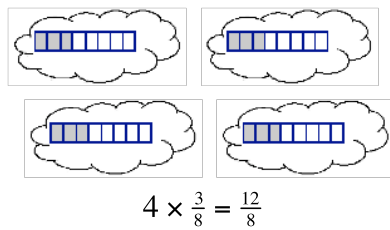
E.



F.



G.

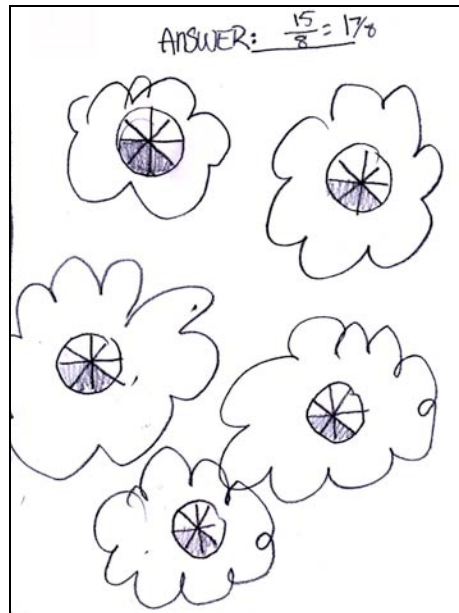


Translations:

- Real-world to picture to verbal
- Real-world to picture to written symbol
- Picture to written symbol
- Symbol to picture

Additional Notes to the Teacher
Lesson 20

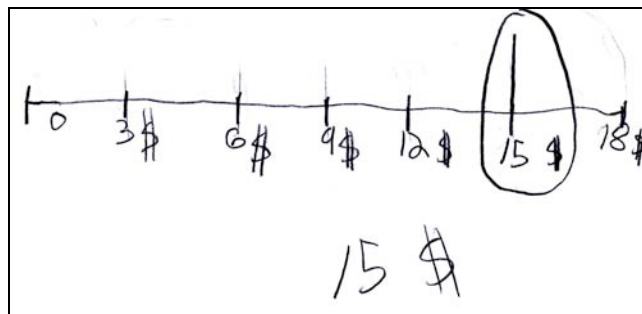
Most students drew pictures to solve Warm-Up problem A similar to the one shown below. The only differences were in the way that the three-eighths is represented. Most students used circles but a few drew rectangles.



Sample answer for Warm-Up question A

There were several ways that students correctly showed how to solve Warm-Up problem B on the number line. These differences are important to notice and should help you as you teach this lesson.

The number line shown below is typical of what many students did and is the method that was emphasized in the previous lesson. Make sure that students label the units on the number line.

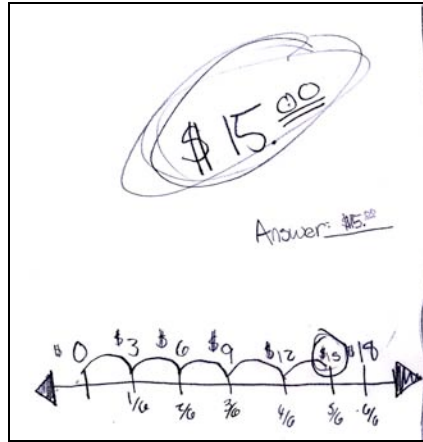


Sample answer for Warm-Up question B

The student drew the number line and labeled the end tick marks 0 and 18. She used the number line to help her partition the \$18 into sixths and then determined that five-sixths of \$18

is \$15. This student shows the five-sixths of the \$18 on the number line but does not specifically label these fraction amounts on her number line.

We found that several students naturally made double number lines as shown below.



Double number line for Warm-Up question B

This student labeled the number line with dollars on top but labeled the fractional amounts underneath. These fractional amounts show the amount of time in hours that India works and the amounts she would earn. Although no students who did this labeled the fraction amounts as hours worked they were able to explain what they represented. You should encourage the students to label both parts of the number line. The student above also did not label the 0 that represents working 0 hours. Many of the students we worked with forgot to label the 0 on the number line. You should encourage your students to label 0 on the number line when they use them.

**Riley earns \$15 an hour raking leaves.
How much will he earn if he works $\frac{2}{3}$ of
an hour?**

Show how to do it on a double number line.

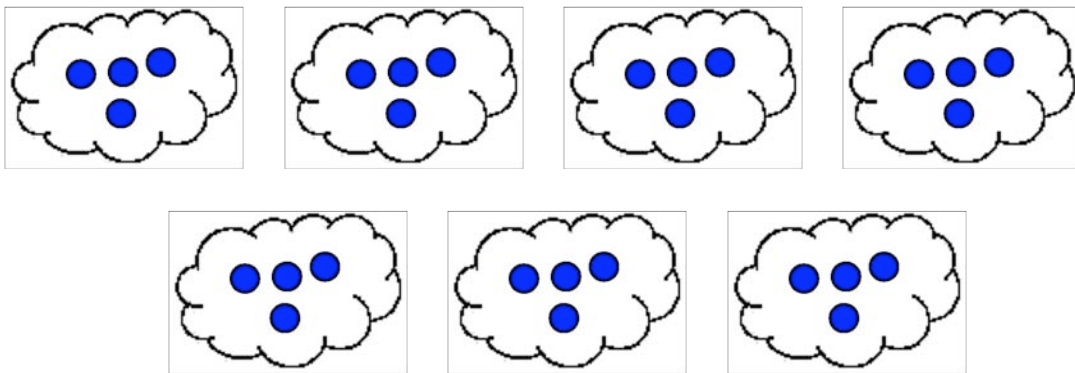
time worked (hours)



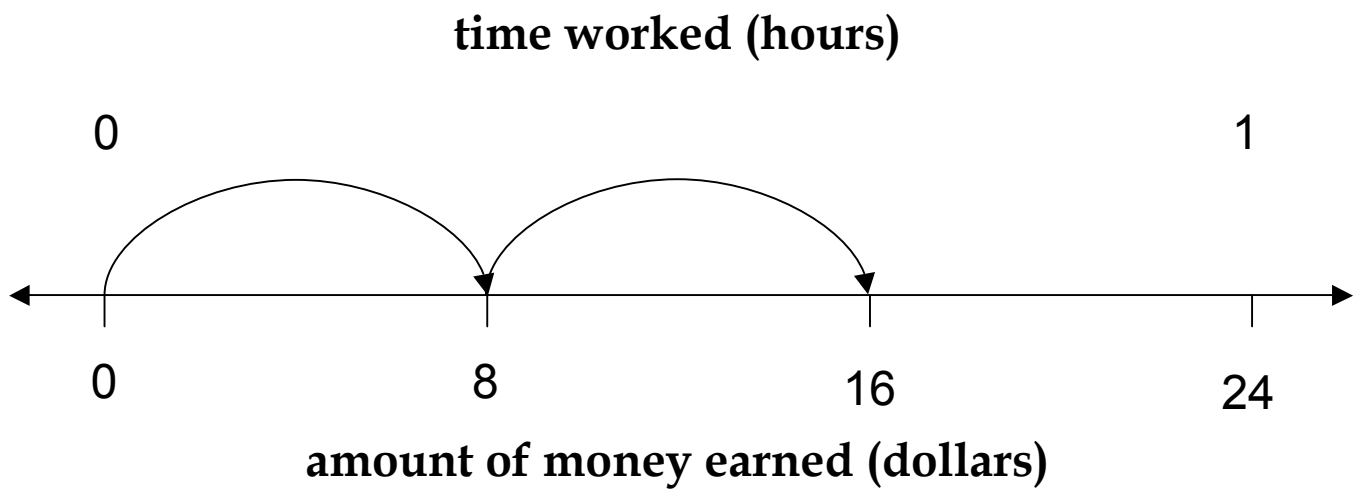
amount of money earned (dollars)

What is the multiplication sentence represented in each picture?

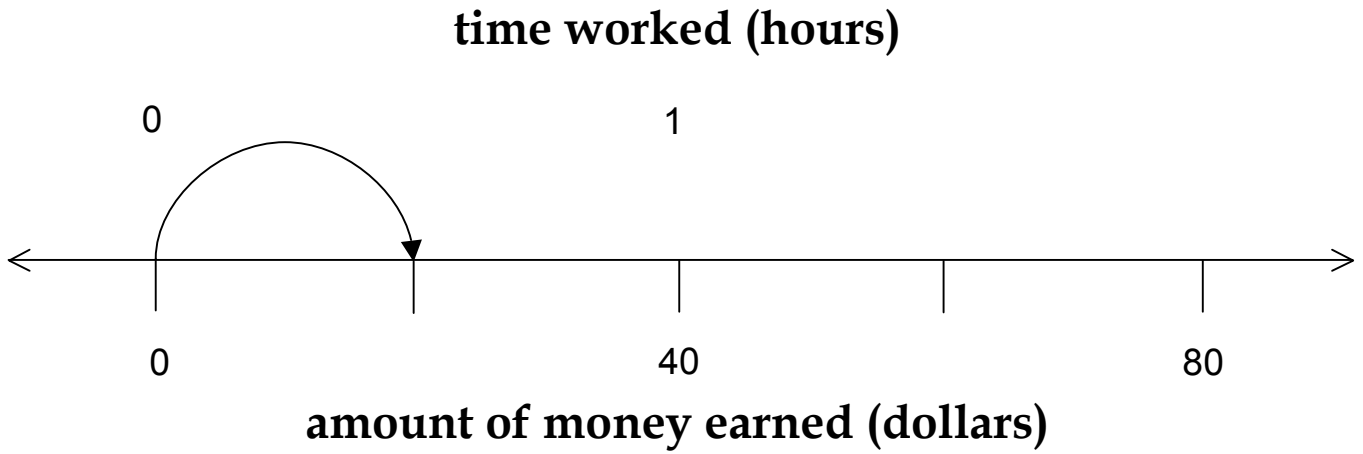
A. Unit: ●



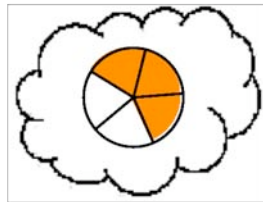
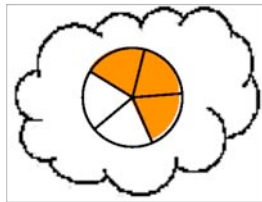
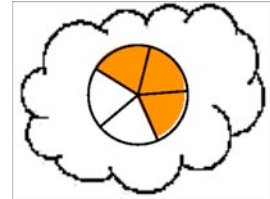
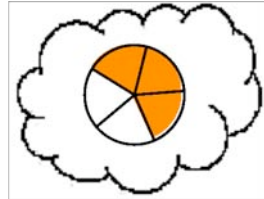
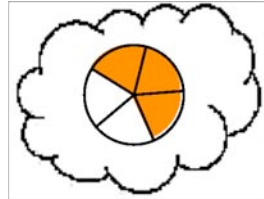
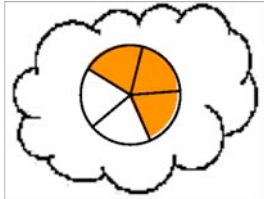
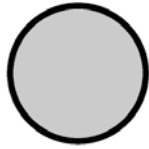
B. Unit: \$24 an hour



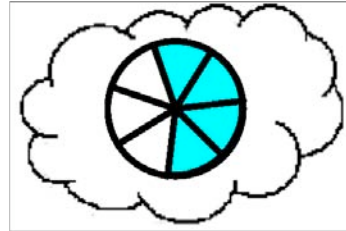
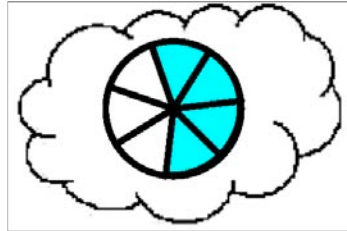
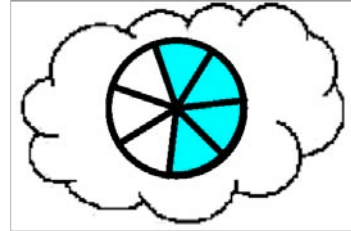
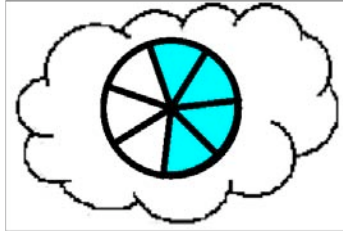
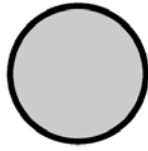
C.Unit: \$40 an hour



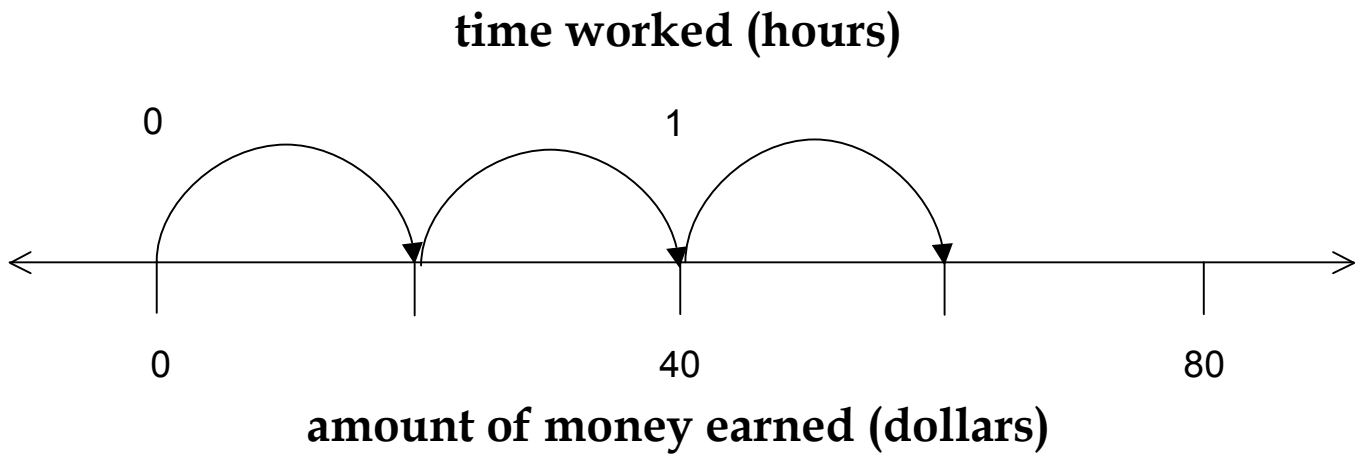
D. Unit:



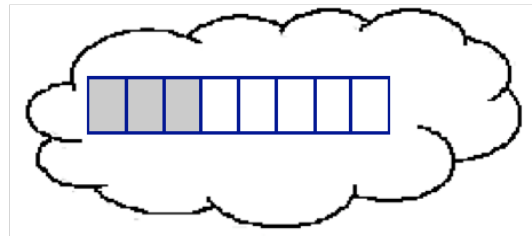
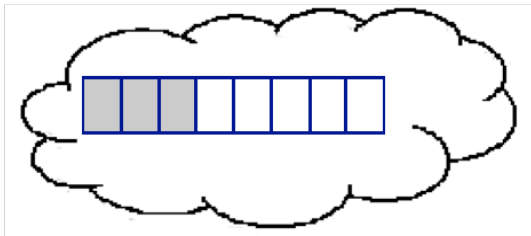
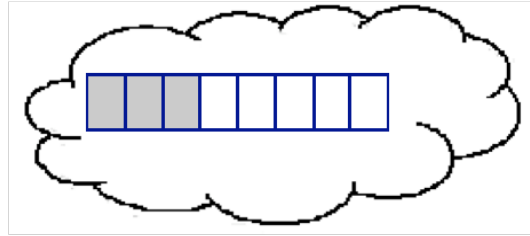
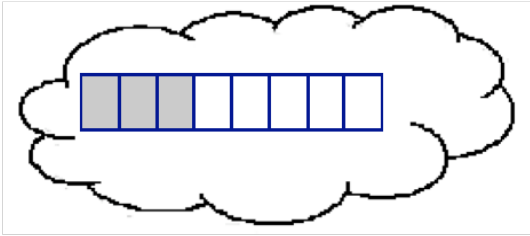
E. Unit:



F. Unit: \$40 an hour



G. Unit:

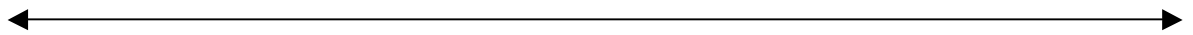


A) Each tray of Gerber daisies weigh $\frac{3}{8}$ of a pound. How much do 5 trays of Gerber daisies weigh?

Use clouds to show how to find the answer.

B) India earns \$18 an hour working at the plant sale. How much will she earn if she works $\frac{5}{6}$ of an hour?

Show how to do it on number line.

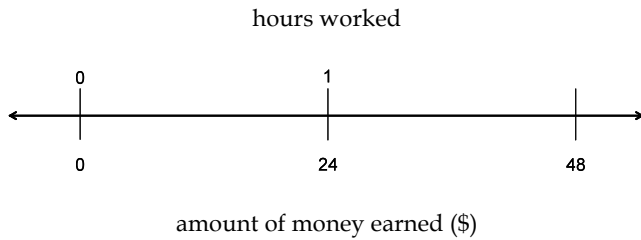


amount of money earned (dollars)

Multiplying Fractions on Number Lines

Use a double number line and write a multiplication sentence to answer each of the questions below.

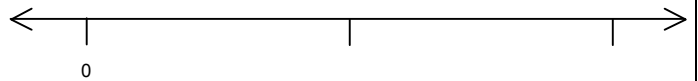
1. Maddie earns \$24 an hour. How much will she make if she works $\frac{3}{8}$ of an hour?



Multiplication Sentence:

$$\begin{array}{c} \underline{\hspace{2cm}} \\ \text{\# of} \\ \text{hours} \\ \text{worked} \end{array} \times \begin{array}{c} \underline{\hspace{2cm}} \\ \text{amount} \\ \text{earned} \\ \text{per hour} \end{array} = \begin{array}{c} \underline{\hspace{2cm}} \\ \text{amount} \\ \text{of money} \\ \text{earned} \end{array}$$

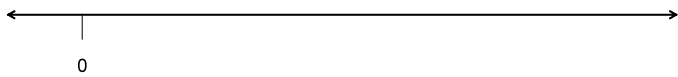
2. Rachael earns \$8 an hour selling popcorn? How much will she earn if she works $\frac{3}{4}$ of an hour?



Multiplication Sentence:

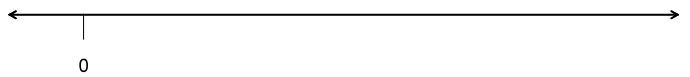
$$\begin{array}{c} \underline{\hspace{2cm}} \\ \text{\# of} \\ \text{hours} \\ \text{worked} \end{array} \times \begin{array}{c} \underline{\hspace{2cm}} \\ \text{amount} \\ \text{earned} \\ \text{per hour} \end{array} = \begin{array}{c} \underline{\hspace{2cm}} \\ \text{amount} \\ \text{of money} \\ \text{earned} \end{array}$$

3. There are 24 students that went camping. $\frac{5}{6}$ of the students are girls. How many girls went camping?



Multiplication Sentence:

4. Andrew earns \$40 an hour building Legos. How much will he earn if he works $\frac{7}{4}$ hours?



Multiplication Sentence:

Solve each problem by drawing a picture or a number line.

5.

$$\frac{1}{2} \times 26 =$$

6.

$$\frac{3}{8} \times 16 =$$

7. Shadow ate $\frac{4}{4}$ of a brownie. A whole brownie has 120 calories. How many calories did Shadow eat?

8. There are 6 adults in this classroom. Matt wants to give $\frac{5}{8}$ of a doughnut to each adult. How many doughnuts will he need?

9. Leah buys 36 flowers at the plant sale. She plants $\frac{2}{9}$ of the flowers in the front yard. How many flowers does she plant in the front yard?

10. Lew wants to sell $\frac{3}{4}$ of his baseball card collection on E-bay. If he has 224 baseball cards in his collection, how many cards will he be selling?

Post Lesson Reflection

Lesson _____

1) Number of class periods allocated to this lesson: _____

2) Student Pages used: _____

3) Adaptations made to lesson: (For example: added extra examples, eliminated certain problems, changed fractions used)

4) Adaptations made on Student Pages:

5) To improve the lesson I suggest: