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# Equivalent Ratios and Tables

Unit 1 Lesson 3

Math 6

### Students will be able to:

Write equivalent ratios.

Determine the unknown terms in equivalent ratios and tables.

Plot equivalent ratios in a coordinate plane.

# Equivalent Ratios and Tables

## Key Vocabulary:

Ratio

Equivalent Ratio

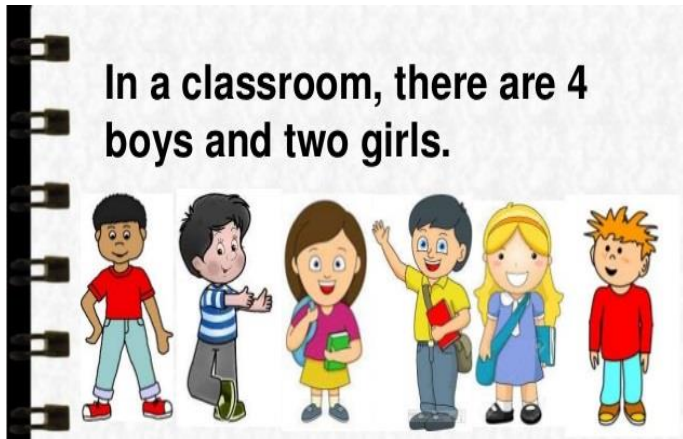
Ratio Table

Scale Up/Down

Coordinate Plane

## Equivalent Ratios

Remember that a ratio is a comparison of two quantities and each ratio can be written in another way.



This shows a comparison between the number of boys to the number of girls, expressed as 4:2.

But 4:2 can also be written as 2:1.

**4:2** and **2:1** are **EQUIVALENT RATIOS**

## Equivalent Ratios and Tables

How do we write equivalent ratios?

Equivalent ratios can be determined by **SCALING UP** or **SCALING DOWN** a ratio.

# SCALING UP A RATIO

We scale up a ratio by a scale factor, which means multiplying each term of the ratio by a given scale factor.

## Equivalent Ratios and Tables

Example: Give 3 equivalent ratios for 2:3.

$$2 \times 2 : 3 \times 2$$

$$4 : 6$$

2:3 is scaled up to  
4:6 by a scale  
factor of **2**

$$2:3 = 4:6$$

$$2 \times 3 : 3 \times 3$$

$$6 : 9$$

2:3 is scaled up to  
6:9 by a scale  
factor of **3**

$$2:3 = 6:9$$

$$2 \times 4 : 3 \times 4$$

$$8 : 12$$

2:3 is scaled up to  
8:12 by a scale  
factor of **4**

$$2:3 = 8:12$$

2:3, 4:6, 6:9 and 8:12 are ALL equivalent ratios!

### Sample Problem 1:

Which among the following is an equivalent ratio of 3:5? Give all possible answers.

a. 6:15

b. 9:10

c. 6:10

d. 12:20

e. 45:75



# SCALING DOWN A RATIO

We scale down a ratio by a scale factor, which means dividing each term of the ratio by a given scale factor.

## Equivalent Ratios and Tables

Example: Give 3 equivalent ratios for 24:48.

$$24 \div 2 : 48 \div 2$$

$$12 : 24$$

2:3 is scale down  
to 12:24 by a scale  
factor of **2**

$$24:48 = 12:24$$

$$24 \div 12 : 48 \div 12$$

$$2 : 4$$

24:48 is scaled  
down to 2:4 by a  
scale factor of

**12**

$$24:48 = 2:4$$

$$24 \div 24 : 48 \div 24$$

$$1 : 2$$

24:48 is scaled  
down to 1:2 by a  
scale factor of

**24**

$$24:48 = 1:2$$

24:48, 12:24, 2:4 and 1:2 are ALL equivalent ratios!

### Sample Problem 2:

Which among the following is an equivalent ratio of  $36:18$ ? Give all possible answers.

a.  $1:2$

b.  $4:2$

c.  $2:1$

d.  $12:6$

e.  $6:12$

But there is another way!!!

To determine equivalent ratios, you need to follow these steps.

- Step 1:** Express the ratios in fraction form.
- Step 2:** Express the fractions in lowest term.
- Step 3:** If the fractions in lowest term are equal, then the ratios are equivalent.

## Equivalent Ratios and Tables

Example: Are 2:3, 4:6, 6:9 and 8:12 equivalent fractions?

Step 1:  $\frac{2}{3}$ ,  $\frac{4}{6}$ ,  $\frac{6}{9}$  and  $\frac{8}{12}$

Step 2:  $\frac{2}{3}$ ,  $\frac{2}{3}$ ,  $\frac{2}{3}$  and  $\frac{2}{3}$

Step 3: Therefore, 2:3, 4:6, 6:9 and 8:12 are equivalent ratios.

## Sample Problem 3:

Show that the following ratios 6:10, 12:20 and 15:25 are equivalent ratios.

Solution:

Step 1:  $\frac{6}{10}$ ,  $\frac{12}{20}$  and  $\frac{15}{25}$

Step 2:  $\frac{3}{5}$ ,  $\frac{3}{5}$  and  $\frac{3}{5}$

Step 3: Therefore, 6:10, 12:20 and 15:25 are equivalent ratios.

# Finding the Unknown Term in Equivalent Ratios

Example: Find the unknown term in the equivalent ratios 12:16 and 6:x

# Equivalent Ratios and Tables

## Method 1:

Step 1: Express the equivalent ratios as fractions.

$$\frac{12}{16} = \frac{6}{x}$$

Step 2: Cross multiply

$$12x = 96$$

Step 3: Solve for the unknown

$$\frac{12x}{12} = \frac{96}{12}$$

$$x = 8$$



# Equivalent Ratios and Tables

## Method 2:

Step 1: Equate the equivalent ratios

$$12:16 = 6:x$$

Step 2: Multiply the inner terms and the outer terms.

$$12 : 16 = 6 : x$$

Here, **16** and **6** are the inner terms and **12** and **x** are the outer terms.

$$(12)(x) = (16)(6)$$

$$12x = 96$$

$$\frac{12x}{12} = \frac{96}{12}$$

$$x = 8$$

### Sample Problem 4:

The ratio of boys to girls in a photography club is 3:4, If there are 12 boys, how many girls are there?

Solution:

$$3:4 = 12:x$$

$$3x = 48$$

$$\frac{3x}{3} = \frac{48}{3}$$

$$x = 16$$

Therefore, there are 16 girls in the photography club

# Table of Equivalent Ratios

Equivalent ratio tables are tables that show the relationship of two values. Each and every ratio in the table is exactly the same as the all the others. The values in an equivalent ratio has either been **scaled up** or **scaled down**.

## Table of Equivalent Ratios

Meters	Centimeters
1	100
2	200
3	300
4	400
5	500
6	600

1:100

1:100

1:100

1:100

1:100

1:100

The table of equivalent ratios is used to solve problems involving ratios with ease.

## Equivalent Ratios and Tables

### Sample Problem 5:

Mark can type 30 words per minute. Complete the table of equivalent ratios and answer the questions that follow.

Minutes	Number of Words
1	30
2	60
3	90
4	120
5	150
6	180
7	210
8	240

## Equivalent Ratios and Tables

a. How many words can Mark type in 5 minutes?

Solution: 150 words

b. How long can Mark type 210 words?

Solution: 7 minutes

# Equivalent Ratios and Tables

## Finding the Missing Values in a Ratio Table

The process in finding the missing terms in a ratio table is the same as finding equivalent ratios.

**Example:** Find the missing values.

3	4
6	x
12	16
y	20
18	24

To solve for x

$$\frac{3}{4} = \frac{6}{x}$$

$$3x = 24$$

$$x = 8$$

To solve for y

$$\frac{12}{16} = \frac{y}{20}$$

$$16y = 240$$

$$y = 15$$

### Ratios on Coordinate Plane

The pairs of values in the table of equivalent ratio can be plotted in a coordinate plane. The graph should be a straight line.

#### Example:

Plot the table of equivalent ratios in a coordinate plane.



## Equivalent Ratios and Tables

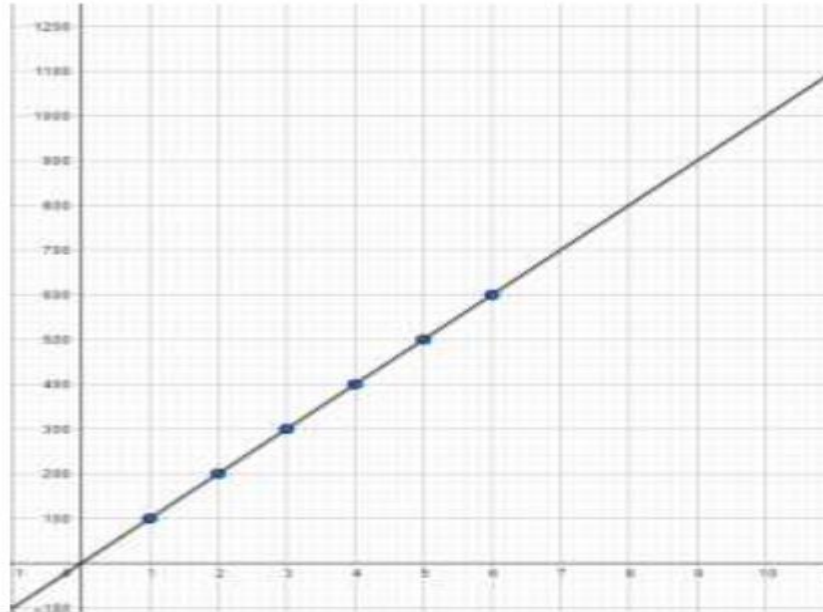
Step 1: Write the pairs of values in the table as coordinates.

Meter/s	Centimeters
1	100
2	200
3	300
4	400
5	500
6	600

x	y	(x,y)
1	100	(1, 100)
2	200	(2, 200)
3	300	(3, 300)
4	400	(4, 400)
5	500	(5, 500)
6	600	(6, 600)

## Equivalent Ratios and Tables

Step 2: Plot the points and connect so you could scale up or scale down the values.



## Sample Problem 6:

Make a table of equivalent ratio for 1:5 and plot the points in a coordinate plane.

Solution:

1:5	
1	5
2	10
3	15
4	20
5	25

x	y	(x,y)
1	5	(1, 5)
2	10	(2, 10)
3	15	(3, 15)
4	20	(4, 20)
5	25	(5, 25)

## Sample Problem 6:

Make a table of equivalent ratio for 1:5 and plot the points in a coordinate plane.

