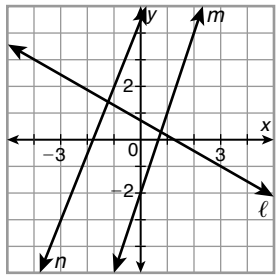
Name _____ Date _____ Class _____

LESSON 7-1

Practice B

Ratio and Proportion

Use the graph for Exercises 1–3. Write a ratio expressing the slope of each line.



1. ℓ _____

2. m _____

3. n _____

4. The ratio of the angle measures in a quadrilateral is 1 : 4 : 5 : 6. Find each angle measure. _____

5. The ratio of the side lengths in a rectangle is 5 : 2 : 5 : 2, and its area is 90 square feet. Find the side lengths. _____

For part of her homework, Celia measured the angles and the lengths of the sides of two triangles. She wrote down the ratios for angle measures and side lengths. Two of the ratios were 4 : 7 : 8 and 3 : 8 : 13.

6. When Celia got to school the next day, she couldn't remember which ratio was for angles and which was for sides. Tell which must be the ratio of the lengths of the sides. Explain your answer.

_____

_____

_____

_____

7. Find the measures of the angles of one of Celia's triangles. _____

Solve each proportion.

8. $\frac{28}{p} = \frac{42}{3}$

$p =$ _____

9. $\frac{28}{24} = \frac{q}{102}$

$q =$ _____

10. $\frac{3}{4.5} = \frac{7}{r}$

$r =$ _____

11. $\frac{9}{s} = \frac{s}{25}$

$s =$ _____

12. $\frac{50}{2t + 4} = \frac{2t + 4}{2}$

$t =$ _____

13. $\frac{u + 3}{8} = \frac{5}{u - 3}$

$u =$ _____

14. Given that $12a = 20b$, find the ratio of a to b in simplest form. _____

15. Given that $34x = 51y$, find the ratio $x : y$ in simplest form. _____

LESSON 7-1

Practice A

Ratio and Proportion

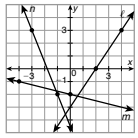
Fill in the blanks to complete each definition.

1. A proportion is an equation stating that two ratios are equal.
2. In a proportion, if $\frac{a}{b} = \frac{c}{d}$ and b and $d \neq 0$, then $ad = bc$. The products ad and bc are called the cross products.
3. A ratio compares two numbers by division.

In Exercises 4–6, write two additional forms of each ratio.

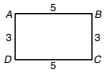
4. $\frac{3}{5}$ 3 to 5; 3 : 5
5. 4 to 3 $\frac{4}{3}$; 4 : 3
6. 2 : 7 $\frac{2}{7}$; 2 to 7

The slope of a line is the ratio $\frac{\text{rise}}{\text{run}}$. Use the graph for Exercises 7–9. Write a ratio expressing the slope of each line.



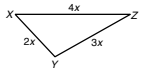
7. ℓ $\frac{3}{2}$
8. m $-\frac{1}{4}$
9. n $-\frac{5}{2}$

10. $ABCD$ is a rectangle with side lengths as shown in the figure. Write the ratio of the side lengths in the form $a : b : a : b$.



3 : 5 : 3 : 5 or 5 : 3 : 5: 3

11. XYZ is a triangle with side lengths in the ratio 2 : 3 : 4. The perimeter of XYZ is 27 yards. Find the length of the shortest side.



6 yd

Use cross products to solve each proportion.

12. $\frac{a}{8} = \frac{10}{16}$ $a =$ 5
13. $\frac{9}{b} = \frac{3}{2}$ $b =$ 6
14. $\frac{1}{10} = \frac{c}{100}$ $c =$ 10

Given that $\frac{a}{b} = \frac{c}{d}$ and none of the variables equals 0, fill in the blanks in Exercises 15–17 to make equivalent statements.

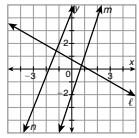
15. $ad =$ bc
16. $\frac{a}{c} =$ $\frac{b}{d}$
17. $\frac{b}{a} =$ $\frac{d}{c}$
18. Given that $7x = 4y$, find the ratio $\frac{x}{y} : \frac{x}{y} =$ $\frac{4}{7}$

LESSON 7-1

Practice B

Ratio and Proportion

Use the graph for Exercises 1–3. Write a ratio expressing the slope of each line.



1. ℓ $-\frac{4}{7}$
2. m $\frac{3}{1}$
3. n $\frac{5}{2}$

4. The ratio of the angle measures in a quadrilateral is 1 : 4 : 5 : 6. Find each angle measure. 22.5°; 90°; 112.5°; 135°
5. The ratio of the side lengths in a rectangle is 5 : 2 : 5 : 2, and its area is 90 square feet. Find the side lengths. 15 ft; 6 ft

For part of her homework, Celia measured the angles and the lengths of the sides of two triangles. She wrote down the ratios for angle measures and side lengths. Two of the ratios were 4 : 7 : 8 and 3 : 8 : 13.

6. When Celia got to school the next day, she couldn't remember which ratio was for angles and which was for sides. Tell which must be the ratio of the lengths of the sides. Explain your answer.

4 : 7 : 8 must be the ratio of the lengths of the sides. The Triangle Inequality Theorem states that no side of a triangle can be longer than the sum of the lengths of the other two sides. If the ratio of the side lengths was 3 : 8 : 13, one side would be longer than the sum of the other two sides.

7. Find the measures of the angles of one of Celia's triangles. 22.5°; 60°; 97.5°

Solve each proportion.

8. $\frac{28}{p} = \frac{42}{3}$ $p =$ 2
9. $\frac{28}{24} = \frac{q}{102}$ $q =$ 119
10. $\frac{3}{4.5} = \frac{7}{r}$ $r =$ 10.5
11. $\frac{9}{s} = \frac{s}{25}$ $s =$ ± 15
12. $\frac{50}{2t+4} = \frac{2t+4}{2}$ $t =$ 3, −7
13. $\frac{u+3}{8} = \frac{5}{u-3}$ $u =$ ± 7
14. Given that $12a = 20b$, find the ratio of a to b in simplest form. 5 to 3
15. Given that $34x = 51y$, find the ratio $x:y$ in simplest form. 3 : 2

LESSON 7-1

Practice C

Ratio and Proportion

For Exercises 1–6, classify the polygon based on the information provided.

1. The ratio of the side lengths of a triangle is 13 : 13 : 13. equilateral triangle
2. The ratio of the side lengths of a quadrilateral is 7 : 7 : 15 : 15. kite
3. The ratio of the side lengths of a quadrilateral is 4 : 4 : 4 : 4. rhombus
4. The ratio of the angle measures in a triangle is 11 : 11 :12. isosceles triangle
5. The ratio of the angle measures in a quadrilateral is 3 : 6 : 3 : 6. parallelogram
6. The ratio of the angle measures in a quadrilateral is 2 : 2 : 2 : 2. rectangle

Two rectangles have the same shape but different sizes. They both have side lengths in the ratio 2 : 3. The ratio of the lengths of the rectangles is 3 : 1. Use this information for Exercises 7–11.

7. The larger rectangle has a perimeter of 90 miles. Find the perimeter of the smaller rectangle. 30 miles
8. Compare the perimeters of the two rectangles. The perimeters have a 3 : 1 ratio.
9. Find the area of each rectangle. 486 square miles; 54 square miles
10. Compare the areas of the two rectangles. The areas have a 9 : 1 ratio.
11. If the lengths of the rectangles had a ratio of 5 : 2, tell what the ratio of the perimeters and the ratio of the areas would be.

The ratio of the perimeters would be 5 : 2. The ratio of the areas would be 25 : 4.

12. Given that $8x = 13y$, tell which number, x or y, is greater. Explain your answer.

Possible answer: It is not possible to say whether x or y is greater. If x and y are both positive numbers, then x is the greater number. But if x and y are both negative, then y is the greater number.

An engineer makes model cars so that an 8-foot-long car will have a 3-inch-long model. Use this information for Exercises 13 and 14.

13. Convert feet to inches and write in simplest form the model : car ratio that the engineer uses. Use this ratio to find the height of the model of a 5-foot-tall car. 1 : 32; 1.875 inches
14. Write the model : car ratio again, but without converting feet to inches. Use this ratio to find the height of the model of a 5-foot-tall car. 3 : 8; 1.875 inches

LESSON 7-1

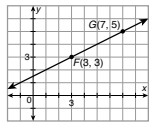
Reteach

Ratio and Proportion

A **ratio** is a comparison of two numbers by division. Ratios can be written in various forms.

Ratios comparing x and y			Ratios comparing 3 and 2		
x to y	$x : y$	$\frac{x}{y}$, where $y \neq 0$	3 to 2	3 : 2	$\frac{3}{2}$

Slope is a ratio that compares the rise, or change in y, to the run, or change in x.



$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$ Definition of slope

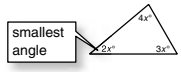
$$= \frac{5-3}{7-3}$$ Substitution

$$= \frac{2}{4} \text{ or } \frac{1}{2}$$ Simplify.

A ratio can involve more than two numbers.

The ratio of the angle measures in a triangle is 2 : 3 : 4. What is the measure of the smallest angle?

Let the angle measures be $2x°$, $3x°$, and $4x°$.



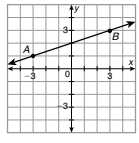
$2x + 3x + 4x = 180$ Triangle Sum Theorem

$9x = 180$ Simplify.

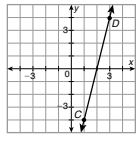
$x = 20$ Divide both sides by 9.

The smallest angle measures $2x°$. So $2x = 2(20) = 40°$.

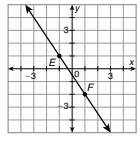
Write a ratio expressing the slope of each line.

1. 

$\frac{1}{3}$

2. 

$\frac{4}{1}$

3. 

$-\frac{3}{2}$

4. The ratio of the side lengths of a triangle is 2 : 4 : 5, and the perimeter is 55 cm. What is the length of the shortest side? 10 cm
5. The ratio of the angle measures in a triangle is 7 : 13 : 16. What is the measure of the largest angle? 80°