CHAPTER 5 STUDY GUIDE (RATIONAL NUMBERS)

Answer Key

5.1 Forms of Rational Numbers examples on pages 180-184 *(see Chapter 5.1 notes)*

$$\frac{Numerator\ (N\ for\ North)}{Denominator\ (D\ for\ Down)}$$

- **Tips:** Rational Number = is any number that can be written in the form **a/b** where ***a*** and ***b*** are integers and **b ≠ 0**
- **Tips:** Lowest Term = to reduce a fraction to it's lowest terms (also called simplified), to do this find the GCF of the numerator and denominator
- **Tips:** Proper Fraction = is when the numerator (top) is less than its denominator (bottom)
- **Tips:** Improper Fraction = if the numerator (top) is greater than or equal to the denominator (bottom)
- **Tips:** Mixed Number = is the sum of a whole number and a fraction

Reduce each fraction to its lowest term.

1. $\frac{21}{35} = \frac{3}{5}$

2. $\frac{27}{63} = \frac{3}{7}$

Rename each mixed number as an improper fraction.

3. $2\frac{2}{7} = \frac{16}{7}$

4. $-8\frac{2}{3} = \frac{-26}{3}$

Rename each improper fraction as a mixed number.

5. $-\frac{34}{4} = -8\frac{2}{4} = -8\frac{1}{2}$

6. $\frac{47}{5} = 9\frac{2}{5}$

Evaluate the following and express as a mixed number, when x = 3 and y = –6.

7. $-\frac{119}{x} = -\frac{119}{3} = -39\frac{2}{3}$

8. $\frac{x-35}{y} = \frac{3-35}{-6} = \frac{-32}{-6} = 5\frac{2}{6} = 5\frac{1}{3}$

5.2 Comparing Rational Numbers examples on pages 186-190 *(see Chapter 5.2 notes)*

- **Tips:** Equivalent Fractions = are fractions representing the same value which can be reduced to the same fraction (lowest term / simplified)
- **Tips:** Creating Equivalent Fractions = to create an equivalent fraction, you can multiply the numerator and denominator by the same number
- **Tips:** Comparing Two Fractions = to compare two fractions, you must create a common denominator (use the LCM of the two denominators)
- **Tips:** Cross Multiplication = is multiplying the numerator of the first fraction by the denominator of the second fraction (a • d), then multiplying the denominator of the first fraction by the numerator of the second fraction (b • c) **Example:** $\frac{a}{b} \times \frac{c}{d}$

Use cross multiplication to compare the following fractions and use >, <, or =.

9. $\frac{12}{15} \square \frac{3}{5}$

$\frac{12}{15}$ $\frac{3}{5}\frac{(3)}{(3)}$

$\frac{12}{15} > \frac{9}{15}$

10. $\frac{2}{3} \square \frac{27}{40}$

$2(40)$ $3(27)$

$80 < 81$

11. $\frac{11}{15} \square \frac{132}{180}$

$11(180)$ $15(132)$

$1980 = 1980$

12. $\frac{13}{19} \square \frac{7}{11}$

$13(11)$ $19(7)$

$143 > 133$

5.3 Decimal Equivalents examples on pages 194-196 *(see Chapter 5.3 notes)*

- **Tips:** Terminating Decimals = a terminating decimal is a decimal that ends and has a limited number of digits
- **Tips:** Repeating Decimals = a decimal number where certain digits repeat forever, which is expressed as a line over the repeating numbers

Convert the following fractions to decimals.

13. $-\frac{5}{8}$

$8\overline{)5.00}$ → 0.625

-48

20

-16

40

-0.625

14. $\frac{53}{20}$

$20\overline{)53.00}$ → 2.65

-40

130

-120

100

2.65

15. $\frac{5}{6}$

$6\overline{)5.0000}$ → $0.8\overline{3}$

-48

20

-18

20

$.8\overline{3}$

Convert the following decimals to fractions or mixed numbers in lowest terms.

16. $.125$

$\frac{125}{1000} = \frac{1}{8}$

GCF = 125

17. -5.68

$-5\frac{68}{100}$

$-5\frac{17}{25}$

GCF = 4

18. $-.55$

$\frac{-55}{100}$

$\frac{-11}{20}$

5.4 Ratio and Rate examples on pages 198-200 *(see Chapter 5.4 notes)*

- **Tips:** Ratio = is a comparison of two numbers usually written as a fraction. Example: object #1 (numerator) TO object #2 (denominator)
- **Tips:** Anything after the word "**TO**" is on the bottom (denominator)
- **Tips:** Rate = is a ratio comparing two different types of measurements
- **Tips:** Unit Rate = is a ratio with the number 1 in the denominator

During a push-up contest Mr. Fite, Mr. Wright, and Mr. Auman did 13, 7, 4 one-handed push-ups. Find the ratios of the one-handed push-ups and express in lowest terms using the word "to."

19. Fite to Auman

$\frac{13}{4}$ 13 to 4

20. Auman to Wright

$\frac{4}{7}$ 4 to 7

21. Wright to Fite

$\frac{7}{13}$ 7 to 13

22. Fite to Auman and Wright

$\frac{13}{4+7} = \frac{13}{11}$ 13 to 11

23. Auman to Fite and Wright

$\frac{4}{13+7} = \frac{4}{20} = \frac{1}{5}$ 1 to 5

24. Wright to Auman and Fite

$\frac{7}{4+13} = \frac{7}{17}$ 7 to 17

Find the unit rate.

25. Paid $450 for 30 hours of work.

$\frac{\$450 \text{ dollars}}{30 \text{ hours}} =$ $15 dollars/hour

26. Paid $14 for 4 lbs of ham.

$\frac{\$14 \text{ dollars}}{4 \text{ lbs}} =$ $3.50 dollars/lbs

27. Drove 770 miles on 25 gallons.

$\frac{770 \text{ miles}}{25 \text{ gallons}} =$ 30.8 miles/gallon

5.5 Proportions examples on pages 202-205 *(see Chapter 5.5 notes)*

- **Tips:** Proportion = when you compare two ratios with the same value
- **Tips:** to setup a proportion, you must compare the same items in the numerator and you must compare the same items in the denominator

Solve the following proportions.

28. $\frac{5}{9} = \frac{x}{27}$

$5(27) = 9(x)$

$\frac{135}{9} = \frac{9x}{9}$

$15 = x$ x = 15

29. $\frac{8}{m} = \frac{12}{9}$

$8(9) = m(12)$

$\frac{72}{12} = \frac{12m}{12}$

$6 = m$ m = 6

30. $\frac{8}{15} = \frac{72}{n}$

$8(n) = 15(72)$

$\frac{8n}{8} = \frac{1080}{8}$

n = 135

Create a proportion from each word problem and solve.

31. Mr. Iwanaga went to the store and noticed a sale where he could buy 3 oranges for $0.97, how many oranges can he buy with $24.25.

$\frac{\text{cost}}{\text{oranges}}$ $\frac{.97}{3} = \frac{24.25}{x}$

$\frac{.97}{3} = \frac{24.25}{x}$

$.97(x) = 3(24.25)$

$\frac{.97x}{.97} = \frac{72.75}{.97}$

$.97 \overline{)72.75}$ → 75.

-679

485

-485

0

$97 \times 7 = 679$

$97 \times 5 = 485$

75 oranges

32. Mrs. Hicks loves to go on road trips around the United States. If she can travel 108 miles from Tulsa to Oklahoma City in 2 hours, how long will it take her to travel 1242 miles to Gettysburg?

$\frac{\text{miles}}{\text{hour}}$ $\frac{108}{2} = \frac{1242}{x}$

$108(x) = 2(1242)$

$\frac{108x}{108} = \frac{2484}{108}$

$108 \overline{)2484}$ → 23

-216

324

-324

0

$108 \times 3 = 324$

23 oranges

Constructed Response Questions:

33. Create a ratio and rate word problem using three characters. Explain each step as you solve the problem.

See above examples 19 - 24

34. Create a proportions word problem. Explain each step as you solve the problem.

See above examples 31 - 32