Rational Numbers
Dividing Rational Numbers
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Lesson Plan

I. Topic: Dividing Rational Numbers

II. Goals and Objectives:
A. The students will understand the difference between multiplying and dividing rational numbers.
B. The students will divide rational numbers.
C. The students will find, solve, and simplify algebraic expressions involving rational numbers.

III. Massachusetts Learning Standards:

1. CM.2.1
Concepts (number sense, algebraic and geometric thinking, measurement, data analysis and probability)

2. AL.2.2
Problem-solving skills (explore, plan, solve, verify.)

3. PA.3.3
Perform calculations with and without technology in life situations

4. PA.4.1
Simplify expressions using the order of operations.

5. PA.4.2
Identify numbers and relationship among numbers

6. PA.5.1
Use and evaluate expressions involving variables

IV. Materials:
A. Whiteboard with dry-erase markers (Blackboard with chalk could also be used.)
B. Ruler
C. Pencils
D. Dividing Integers Worksheets (Practice Worksheet, Quiz Worksheet)

V. Presentation Outline:
A. Introduction: "Dividing Rational Numbers"
Definitions

B. Find the quotient of each rational number
Examples

C. Simplify the algebraic expressions
Examples

D. Evaluate the algebraic expressions
Examples

VI. Presentation:
A. Presentation Notes
B. Power Point Presentation

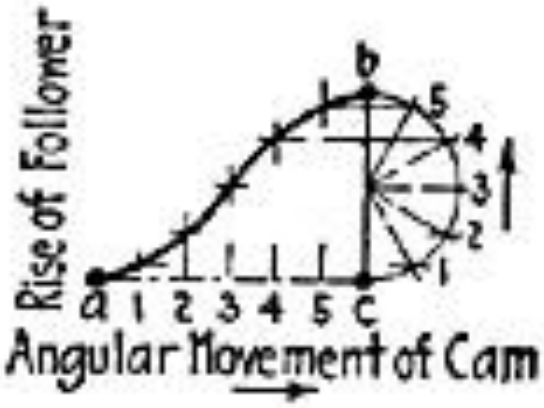
VII. Independent Practice: Dividing Rational Numbers Worksheet
A. Class work: #2 - 44 Even

B. Homework: #1 - 45 odds

C. Due in two days. Allow for the day in between the date assigned and the date due for questions and concerns about the assignments. Also allow students to complete the class work assignment as homework if they were not able to complete in class.

VIII. Topic Assessment: Dividing Rational Numbers Quiz
A. Answer questions from homework.

B. 15-question quiz: 20 – 25 minutes



Rational Numbers

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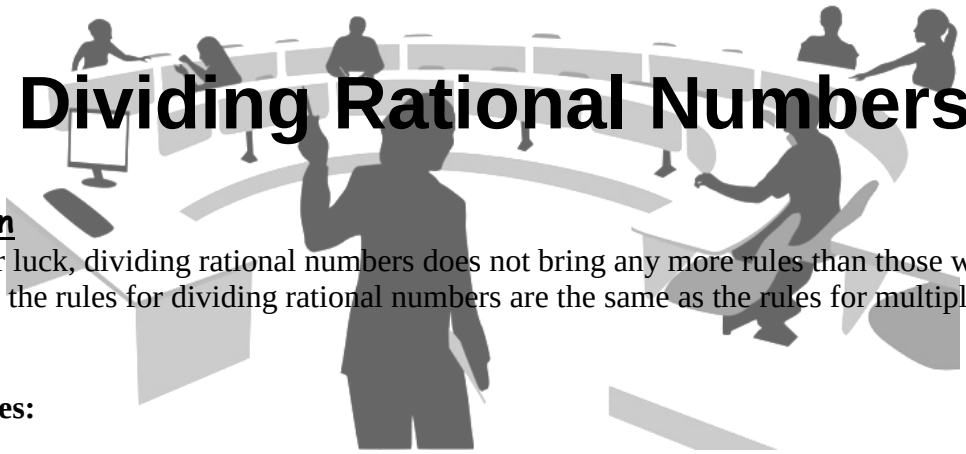

Dividing Rational Numbers

Introduction

To our luck, dividing rational numbers does not bring any more rules than those we already know. In fact, the rules for dividing rational numbers are the same as the rules for multiplying rational numbers.

Dividing Rules:

I. A positive divided by a positive is a positive.
Positive ÷ Positive = Positive: 12 ÷ 3 = 4

II. A negative divided by a negative is a positive.
Negative ÷ Negative = Positive: (-12) ÷ (-3) = 4

III. A positive divided by a negative is a negative.
Positive ÷ Negative = Negative: 12 ÷ (-3) = -4

IV. A negative divided by a positive is a negative.
Negative ÷ Positive = Negative: (-12) ÷ 3 = -4

Dividing Integers

Just as we did with multiplication, when we divide two rational numbers, such as integers, our result is dependent on the value of each of the numbers.

Rule 1:	**The quotient of a positive integer and a positive integer is a positive integer.**
Rule 2:	**The quotient of a negative integer and a negative integer is a positive integer.**
Rule 3:	**The quotient of a positive integer and a negative integer is a negative integer.**
Rule 4:	**The quotient of a negative integer and a positive integer is a negative integer.**

Let's look at the following examples of division of integers and place the rule which allow us to get the answer received.

Example 1: Find the quotient of each pair of integers.

Dividing Integers		
Integers	**Quotient**	**Rule Used**
$^{+}24 \div {}^{+}12 =$	$^{+}2$	Rule 1
$^{+}24 \div {}^{-}12 =$	$^{-}2$	Rule 3
$^{-}24 \div {}^{+}12 =$	$^{-}2$	Rule 4
$^{-}24 \div {}^{-}12 =$	$^{+}2$	Rule 2

Example 2: Find the quotient of each pair of integers.

Dividing Integers		
Integers	**Quotient**	**Rule Used**
$^{+}27 \div {}^{+}3 =$	$^{+}9$	Rule 1
$^{+}27 \div {}^{-}3 =$	$^{-}9$	Rule 3
$^{-}27 \div {}^{+}3 =$	$^{-}9$	Rule 4
$^{-}27 \div {}^{-}3 =$	$^{+}9$	Rule 2

Example 3: Find the quotient of each pair of integers.

Dividing Integers		
Integers	**Quotient**	**Rule Used**
$^{+}99 \div {}^{+}11 =$	$^{+}9$	Rule 1
$^{+}80 \div {}^{-}16 =$	$^{-}5$	Rule 3
$^{-}72 \div {}^{+}12 =$	$^{-}6$	Rule 4
$^{-}91 \div {}^{-}13 =$	$^{+}7$	Rule 2

Summary: The quotient of a positive integer and a negative integer is a negative integer, and the quotient of two negative integers or two positive integers is a positive integer.

Dividing Rational Numbers
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Student Practice Worksheet

Name_____Date_____Grade_____

Answer the following questions about dividing rational numbers.

Find the quotient of each rational number.

1. $245.66 \div (-14.2)$
2. $-\frac{2}{5} \div \frac{1}{4}$
3. $-60 \div (-5)$
4. $\frac{-108}{18}$
5. $-112.23 \div 8.7$
6. $-\frac{3}{8} \div (-\frac{1}{3})$
7. $\frac{-63}{9}$
8. $\frac{36}{-6}$
9. $\frac{-42}{-7}$
10. $-\frac{2}{3} \div 6$
11. $-36 \div (-4)$
12. $-24 \div 6$
13. $75 \div (-15)$
14. $-\frac{5}{6} \div (-20)$
15. $-8 \div (-\frac{9}{14})$
16. $\frac{\frac{3}{4}}{-6}$
17. $\frac{6}{-\frac{2}{9}}$
18. $\frac{-7}{\frac{2}{5}}$
19. $-323 \div (-17)$
20. $-5 \div \frac{3}{7}$
21. $-\frac{7}{4} \div (-8)$

Simplify the algebraic expressions.

22. $\frac{2(1-5)}{17+(-13)}$
23. $\frac{24-6a}{3}$
24. $\frac{-39b+65}{13}$

(Student Worksheet Continued)

25. $\frac{-144x}{12}$

26. $\frac{-54z}{-9}$

27. $\frac{56a}{-8}$

28. $\frac{5x + 25}{5}$

29. $\frac{18t + 12r}{-3}$

30. $\frac{5a - 10}{-5}$

31. $\frac{18x + 12}{-6}$

32. $\frac{-4c + (-16d)}{4}$

33. $\frac{8k - 12h}{-4}$

34. $\frac{2a + 8}{4}$

35. $\frac{8x + 42y}{6}$

36. $\frac{-12h + (-18g)}{3}$

Evaluate the algebraic expression if m = -8, n = 6.5, p = 3.2, and q = -5.4. Round to the nearest hundredth.

37. $\frac{mn}{p}$

38. $\frac{np}{m}$

39. $mq \div np$

40. $pq \div mn$

41. $\frac{n + p}{m}$

42. $\frac{m + p}{q}$

43. $\frac{m - 2n}{-n + q}$

44. $\frac{p - 3q}{-q - m}$

45. $\frac{-2q + (-4nm)}{-4p + m}$

Dividing Integers
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Student Practice Worksheet
Answer Key

Name_____ Date_____ Grade_____

Answer the following questions about dividing rational numbers.
Find the quotient of each rational number.

1. $245.66 \div (-14.2)$ -17.3

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

3. $-60 \div (-5)$ 12

4. $\frac{-108}{18}$ -6

5. $-112.23 \div 8.7$ -12.9

6. $-\frac{3}{8} \div (-\frac{1}{3})$ $\frac{9}{8}$

7. $\frac{-63}{9}$ -7

8. $\frac{36}{-6}$ -6

9. $\frac{-42}{-7}$ 6

10. $-\frac{2}{3} \div 6$ $-\frac{1}{9}$

11. $-36 \div (-4)$ 9

12. $-24 \div 6$ -4

13. $75 \div (-15)$ -5

14. $-\frac{5}{6} \div (-20)$ $-\frac{1}{24}$

15. $-8 \div (-\frac{9}{14})$ $\frac{112}{9}$

16. $\frac{\frac{3}{4}}{-6}$ $-\frac{1}{8}$

17. $\frac{6}{-\frac{2}{9}}$ -27

18. $\frac{-7}{\frac{2}{5}}$ $-\frac{35}{2}$

19. $-323 \div (-17)$ 19

20. $-5 \div \frac{3}{7}$ $-\frac{35}{3}$

21. $-\frac{7}{4} \div (-8)$ $\frac{7}{32}$

Simplify the algebraic expressions.

22. $\frac{2(1-5)}{17+(-13)}$ -2

23. $\frac{24-6a}{3}$ 8 – 2a

24. $\frac{-39b+65}{13}$ -3b + 5

(Student Worksheet Continued – Answer Key)

25. $\frac{-144x}{12}$ -12x

26. $\frac{-54z}{-9}$ 6z

27. $\frac{56a}{-8}$ -7a

28. $\frac{5x+25}{5}$ x + 5

29. $\frac{18t+12r}{-3}$ -6t – 4r

30. $\frac{5a-10}{-5}$ -a + 2

31. $\frac{18x+12}{-6}$ -3x – 2

32. $\frac{-4c+(-16d)}{4}$ -c – 4d

33. $\frac{8k-12h}{-4}$ -2k + 3h

34. $\frac{2a+8}{4}$ $\frac{1}{2}a + 2$

35. $\frac{8x+42y}{6}$ $\frac{2}{3}x + 7y$

36. $\frac{-12h+(-18g)}{3}$ -4h – 6g

Evaluate the algebraic expression if m = -8, n = 6.5, p = 3.2, and q = -5.4. Round to the nearest hundredth.

37. $\frac{mn}{p}$ -16.25

38. $\frac{np}{m}$ -2.6

39. $mq \div np$ 2.08

40. $pq \div mn$ 0.33

41. $\frac{n+p}{m}$ -1.21

42. $\frac{m+p}{q}$ 0.89

43. $\frac{m-2n}{-n+q}$ 1.76

44. $\frac{p-3q}{-q-m}$ 1.45

45. $\frac{-2q+(-4nm)}{-4p+m}$ 16.8

Diving Integers
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Student Practice Worksheet
Rubric

Criteria					
	4	3	2	1	0
Mechanics	No math errors	No major math errors or serious flaws in reasoning	May be some serious math error or flaws in reasoning	Major math errors or serious flaws in reasoning	Blank answers

Quiz Grading Rubric:

Problem	Total points of Correct Answer		Problem	Total points of Correct Answer	
1.			24.		
2.			25.		
3.			26.		
4.			27.		
5.			28.		
6.			29.		
7.			30.		
8.			31.		
9.			32.		
10.			33.		
11.			34.		
12.			35.		
13.			36.		
14.			37.		
15.			38.		
16.			39.		
17.			40.		
18.			41.		
19.			42.		
20.			43.		
21.			44.		
22.			45.		
23.					

Dividing Integers
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Quiz

Name_____Date_____Grade_____

Answer the following questions about dividing rational numbers.

Find the quotient of each rational number.

1. $-7 \div \frac{3}{5}$

2. $\frac{16}{36} \div \frac{24}{60}$

3. $-98.44 \div (-4.6)$

4. $-\frac{1}{3} \div 4$

5. $-\frac{24}{56} \div \frac{31}{63}$

Simplify the algebraic expressions.

6. $\frac{81c}{9}$

7. $\frac{7h + 35}{-7}$

8. $\frac{40a - 50b}{2}$

9. $\frac{42c - 18d}{3}$

10. $\frac{-8f + (-16g)}{8}$

Evaluate the algebraic expression if a = 3, b = -4.5, and c = 7.5. Round to the nearest hundredth.

11. $\frac{2ab}{-ac}$

12. $\frac{cb}{4a}$

13. $-\frac{a}{b} \div \frac{a}{c}$

14. $\frac{a - c}{b}$

15. $bc \div ac$

Dividing Integers
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Quiz
Answer Key

Name_____Date_____Grade_____

Answer the following questions about dividing rational numbers.

Find the quotient of each rational number.

1. $-7 \div \frac{3}{5}$

$-\frac{35}{3}$

2. $\frac{16}{36} \div \frac{24}{60}$

$\frac{10}{9}$

3. $-98.44 \div (-4.6)$

21.4

4. $-\frac{1}{3} \div 4$

$-\frac{1}{12}$

5. $-\frac{24}{56} \div \frac{31}{63}$

$-\frac{27}{31}$

Simplify the algebraic expressions.

6. $\frac{81c}{9}$

9c

7. $\frac{7h + 35}{-7}$

-h – 5

8. $\frac{40a - 50b}{2}$

20a – 25b

9. $\frac{42c - 18d}{3}$

14c – 6d

10. $\frac{-8f + (-16g)}{8}$

-f – 2g

Evaluate the algebraic expression if a = 3, b = -4.5, and c = 7.5. Round to the nearest hundredth.

11. $\frac{2ab}{-ac}$

1.2

12. $\frac{cb}{4a}$

-2.81

13. $-\frac{a}{b} \div \frac{a}{c}$

1.67

14. $\frac{a - c}{b}$ 1

15. $bc \div ac$ -1.5

Dividing Integers
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Quiz
Rubric

Criteria					
	4	3	2	1	0
Mechanics	No math errors	No major math errors or serious flaws in reasoning	May be some serious math error or flaws in reasoning	Major math errors or serious flaws in reasoning	Blank answers

Quiz Grading Rubric:

Problem	Total points of Correct Answer		Problem	Total points of Correct Answer	
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.					