

1.5 Notes: Simplifying Rational Expressions

Lesson Objective: To Add, Subtract, ~~Multiply and Divide~~ Rationals

VOCABULARY

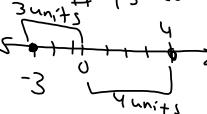
Rational number: Any number that can be written as a fraction.

Integer: Whole #'s and their opposites.
... -3, -2, -1, 0, 1, 2, 3, ...

Opposite value:
(additive inverse) The opposite of a number just means to multiply that # by -1 .

Ex: The opposite of 7 is -7 .
The opposite of -10 is 10 .

Absolute value:
The distance a # is away from 0.

Ex: $|4| = 4$ 
 $| -3 | = 3$

Reciprocal:
(multiplicative inverse)

* Absolute values are always positive.

The "flipped" version of your fraction.

Ex: $\frac{1}{2} \xrightarrow{\text{Reciprocal}} \frac{2}{1} (2)$
 $3 \rightarrow \frac{1}{3}$
 $-\frac{4}{5} \rightarrow -\frac{5}{4}$
 $-\frac{9}{10} \rightarrow -\frac{10}{9}$

ABSOLUTE VALUES

Evaluate

$$|-10| = 10$$

$$|5| = 5$$

$$|0| = 0$$

$$|-17.94| = 17.94$$

ADDING & SUBTRACTING INTEGERS

Addition:

SAME SIGN - Add their absolute values and keep common sign.

Examples: $4 + 7 = 11$

$$-6 + -12 = -18$$

DIFFERENT SIGN - Find the *difference* of their absolute values. Keep sign of larger number.

$$-9 + 4$$

$$9 - 4 = 5$$

So the answer is -5 , but the bigger # is negative,

Subtraction:

To subtract a number, add its opposite value.

$$7 + -3 = 7 - 3 = 4$$

$$-5$$

$$2 - 5 = 2 + -5 = -3$$

$$-6 - 10 = -6 + -10 = -16$$

Adding & Subtracting Rationals

Addition:

SAME SIGN - Add their absolute values and keep common sign.

DIFFERENT SIGN - Find the *difference* of their absolute values. Keep sign of larger number.

Rule

- ① Need common denominators
- ② Change all fractions into improper fractions (no more mixed #'s)

$$5\frac{2}{3} + \frac{3}{5} + \sqrt{36}$$

Common denominator = 15

$$5\frac{2}{3} + \frac{3}{5} + \frac{6}{1}$$

$$\frac{5}{5} \left(\frac{17}{3} \right) + \frac{3}{3} \left(\frac{3}{5} \right) + \frac{15}{15} \left(\frac{6}{1} \right)$$

$$\frac{85}{15} + \frac{9}{15} + \frac{90}{15} \rightarrow \text{add numerator, keep denominator same.}$$

$$\frac{184}{15} \rightarrow \text{can I reduce the fraction?}$$

NO!

Subtraction:

To subtract a number, *add* its opposite value.

Rule -

Same as above.

Ex. $\frac{1}{4} - \frac{1}{5} - \frac{2}{7}$

$$\frac{1}{4} - \frac{1}{5} - \frac{2}{7}$$

$$\frac{35}{35} \left(\frac{1}{4} \right) - \frac{28}{28} \left(\frac{1}{5} \right) - \frac{20}{20} \left(\frac{2}{7} \right)$$

Common denominator:

$$4 \cdot 5 \cdot 7 = 140$$

$$\frac{35}{140} - \frac{28}{140} - \frac{40}{140}$$

$$\frac{7}{140} - \frac{40}{140}$$

$$\frac{-33}{140}$$

Practice and Problem-Solving Exercises



Practice

Use a number line to find each sum.

See Problem 1.

10. $2 + 5$

11. $-3 + 8$

12. $4 + (-3)$

13. $1 + (-6)$

14. $-6 + 9$

15. $-4 + 7$

16. $-6 + (-8)$

17. $-9 + (-3)$

Find each sum.

See Problem 2.

18. $11 + 9$

19. $17 + (-28)$

20. $12 + (-9)$

21. $-2 + 7$

22. $-14 + (-10)$

23. $-9 + (-2)$

24. $3.2 + 1.4$

25. $5.1 + (-0.7)$

26. $-2.2 + (-3.8)$

27. $\frac{1}{2} + (-\frac{7}{2})$

28. $-\frac{2}{3} + (-\frac{3}{5})$

29. $\frac{7}{9} + (-\frac{5}{12})$

Find each difference.

See Problem 3.

30. $5 - 15$

31. $13 - 7$

32. $-19 - 7$

33. $6 - (-12)$

34. $-29 - (-11)$

35. $7 - (-5)$

36. $8.5 - 7.6$

37. $-2.5 - 17.8$

38. $-2.9 - (-7.5)$

39. $1.5 - 1.9$

40. $\frac{1}{8} - \frac{3}{4}$

41. $\frac{7}{16} - (-\frac{1}{2})$

Simplify each expression.

49. $1 - \frac{1}{2} - \frac{1}{3} - \frac{1}{4}$

50. $7 + (2^2 - 3^2)$

51. $-2.1 - [2.3 - (3.5 - (-1.9))]$

10. $2 + 5 = 7$