Chapter 2 Parent Guide

Chapter 2 Operations in Algebra

Throughout Algebra 1, students will be using real numbers, which include integers, rational numbers, and irrational numbers. Chapter 2 focuses on computing with rational numbers and builds to evaluating algebraic expressions with rational numbers.

Rational numbers include integers (positive and negative counting numbers), positive and negative fractions and decimals, and zero. Temperature, sea level, debit card statements, golf scores, and gains and losses in the stock market can all be measured with positive and negative numbers.

In Lesson 2.1, students determine the absolute value of rational numbers, which is the distance a number is from zero on a number line. They also compare and order rational numbers.

In Lessons 2.2 through 2.4, students use absolute value to add, subtract, multiply, and divide rational numbers. In Lesson 2.5, they use algebraic properties to compute numerical expressions. Finally, in Lessons 2.6 and 2.7, students evaluate algebraic expressions involving addition, subtraction, multiplication, and division of rational numbers.

Your child will use this information to solve equations in Chapter 3.

You may find the following brief activity helpful in understanding the ideas presented in this chapter. Use it to engage in an algebraic discussion with your child. This activity centers around the opening of Lesson 2.3.

PROBLEM FOR DISCUSSION (See textbook page 67)

Suppose that Mark starts with $50 in his account and uses his debit card for a $20 purchase. How much is left in the account after the debit?

1. Discuss what a debit card is.

   A debit card is like a credit card in the way it is used. The difference is that the money comes directly out of a checking or savings account. The owner of the card does not have a monthly bill as with a credit card; instead, when there is no more money in the account, usually the debit card cannot be used.

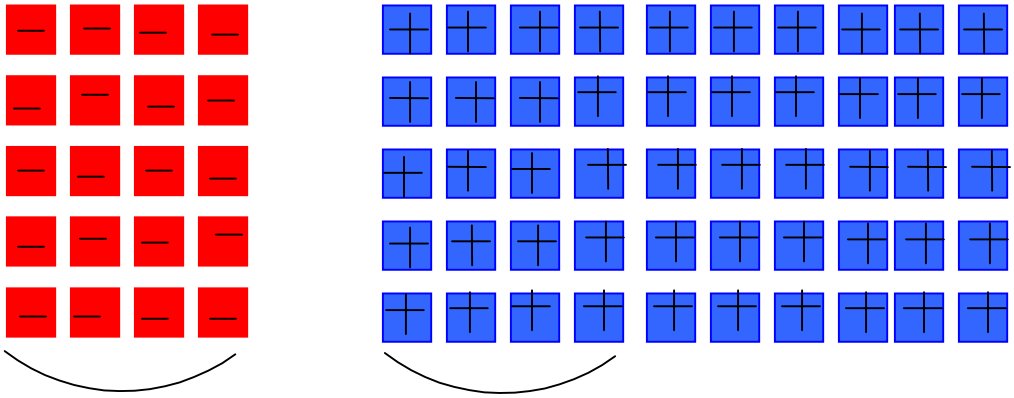
2. Discuss how algebra tiles show that adding –20 to 50 is the same as subtracting 20 from 50.

   Algebra tiles are tactile teaching devices that allow students to physically experience the addition and subtraction of integers, or positive and negative whole numbers.

   To model negative integers, negative tiles are used and when modeling positive integers, positive tiles are used. When positive and negative integers are paired together, they become neutral pairs, because they cancel each other out.

   Numerically, the number zero represents neutral pairs.

So, –20 + 50 is modeled as:



There are 20 neutral pairs. That leaves 30 positive tiles.

Therefore, –20 + 50 = 30.
This is the same as subtracting 20 from 50 because if you start with 50 tiles and take 20 away, you are left with 30 positive tiles.

3. Note that 50 – 20 = +30 and 2 – 6 = –4. How can you tell, just by looking at a subtraction problem, that your answer will be positive or negative?

You can tell if the answer to a subtraction problem is positive or negative by looking at the numbers involved.

In the problem 50 – 20 = +30, the answer is positive because 50 is the greater of the two numbers and 50 is positive.

In the problem 2 – 6 = –4, the answer is negative because 6 is greater than 4, and 6 is the negative number.

To determine if the answer to a subtraction problem is positive or negative, compare the two numbers involved and see which number is greater. The answer will contain the sign of the greatest number.

4. Compare addition and subtraction. How is subtraction like addition? How is it different?

Subtraction is like addition in that you can consider subtraction to be the same as adding the opposite of the number. Subtraction differs from addition, however, in the way it is written.
For example, 5 – 6 = 5 + (–6).

It is important to know that every "subtraction" problem can be written as an "addition" problem. Also, just because you see a plus

sign (+) or a minus sign (–) does not always mean you have to add and/or subtract. You must consider each situation separately. Every problem can be written as one of these 4 examples.

Example 1: $5 + 6 = 11$
$5 - (-6) = 11$

Example 2: $5 + (-6) = -1$
$5 - 6 = -1$

Example 1 is the sum of two positive numbers. This is the same as writing the problem as a negative number subtracted from a positive number.

Example 2 is the sum of a positive number and a negative number. This is the same as writing the subtraction of two positive numbers.

Example 3:. $-5 + (-6) = -11$
$-5 - 6 = -11$

Example 4: $-5 + 6 = 1$
$-5 - (-6) = 1$

Example 3 is the sum of two negative numbers. This is the same as a positive number being subtracted from a negative number.

Example 4 is the sum of a negative and a positive number. This is the same as a negative number subtracted from a negative number

5. What does this problem suggest about subtraction of rational numbers?
Subtracting rational numbers is the same as adding the opposite.

The following are complete worked out solutions to selected exercises in the student textbook. These solutions are provided to you so that you can help your child with their homework. Your child's classroom notes, example problems in the text, and these worked out solutions are all useful tools to help you and your child work through their assignment.

68. $57 + 32 + (-45) = 57 + 32 - 45$
$= 44$
$= \$44$ balance

Lesson 2.3

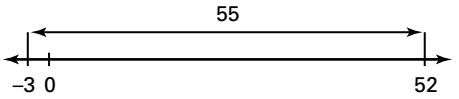
20. $-10 - 7 = -17$

25. $84.2 - (-12.5) = 84.2 + 12.5$
$= 96.7$

32. $33 - (-33) = 33 + 33$
$= 66$

54. $-z - (-y) = -(-10) - [-(-3)]$
$= 10 - (3)$
$= 10 - 3$
$= 7$

62.



$52 - (-3) = 52 + 3$
$= 55$ units

65. b. Sequence 60 45 30 15 [0] [−15] [−30]
First Differences −15 −15 −15 −15 −15 −15
To obtain the next number in the sequence, subtract 15 from the previous term.
$15 - 15 = 0, 0 - 15 = -15, -15 - 15 = -30$
The next three numbers are 0, −15, and −30.

67. To determine the final temperature, subtract the first temperature from initial temperature, then subtract the second temperature drop from the difference.
$5 - 7 - 2 = 5 - 9$
$= -4$
The final temperature was −4°F.

Lesson 2.4

22. $27 \div (-3) = -9$

32. $-2.7 \div (-0.3) = 9$

34. $(-23)(56) = -1288$

50. $-(-8)(-6) = -(8 \cdot 6)$
$= -48$

52. $\frac{-8 + 10}{-2} = \frac{2}{-2}$
$= -1$

59. $96 \div \left(-\frac{2}{3}\right) = 96 \cdot \left(-\frac{3}{2}\right)$
$= -144$

65. a. $20 + 4(20) = 20 + 80 = 100$
\$100

b. $5(10) = 50$
\$50

c. $\frac{200}{25} = 8$
8 deposits of \$25

Lesson 2.5

16. $(87 \cdot 5) \cdot 2 = 87 \cdot (5 \cdot 2)$ Associative Property
$= 87 \cdot 10$
$= 870$

24. $9 \cdot 680 = 9(600 + 80)$
$= \underline{9} \cdot 600 + \underline{9} \cdot 80$
$= \underline{5400} \cdot \underline{720}$
$= \underline{6120}$

30. $3de - 15df = 3d(e - 5f)$

37. Distributive

40.

$a = b$	Given
$a + c = a + c$	Reflexive Property of Equality
$a + c = b + c$	Substitution Property of Equality

44. $12(5 + 4.5) = 12 \cdot 5 + 12 \cdot 4.5$ or $12 \cdot 9.5 = 114$
$= 60 + 54$
$= 114$

46. $(26 + 24) + (21 + 39) + 28$
$= 50 + 60 + 28$
$= 138$
The total number of baked goods is 138.

Lesson 2.6

18. $0.3r + 4.6r = (0.3 + 4.6)r$
$= 4.9r$

24. $7d - (1 - d) = 7d - 1 + d$
$= (7d + d) - 1$
$= 8d - 1$

32. $(-7f + 2) - (6f + 3) = -7f + 2 - 6f - 3$
$= (-7f - 6f) + (2 - 3)$
$= -13f - 1$

42. $(-x - y) + (-x - y) = -x - y - x - y$
$= (-x - x) + (-y - y)$
$= -2x - 2y$

50. $(3m + 2r) + (5r - m) + (4r + 2m) + (r - 5m) = 3m + 2r + 5r - m + 4r + 2m + r - 5m$
$= (3m - m + 2m - 5m) + (2r + 5r + 4r + r)$
$= -m + 12r$

Lesson 2.7

26. $2x^2 - (4 - x^2) = 2x^2 - 4 + x^2$
$= 2x^2 + x^2 - 4$
$= 3x^2 - 4$

38. $8x^2 - 10(2 - 5x^2) = 8x^2 - 20 + 50x^2$
$= 8x^2 + 50x^2 - 20$
$= 58x^2 - 20$

46. $\frac{27x - 18}{-9} = \left(\frac{27}{-9}\right)x + \left(\frac{-18}{-9}\right)$
$= -3x + 2$

56. $V = lwh$
$= 20 \cdot 8 \cdot 7$
$= 160 \cdot 7$
$= 1120$
The volume is 1120 cm^3.

60. b. $C = 35h + 20$
$= 35(3) + 20$
$= 105 + 20$
$= 125$
The plumber would charge $125.00 for a 3-hour job.