

SPECTRUM[®]

MATH

Grade 7

CREDITS

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Spectrum[®]

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Spectrum Introduction

For more than 20 years, Spectrum® workbooks have been the solution for helping students meet and exceed learning goals. Each title in the Spectrum workbook series offers grade-appropriate instruction and reinforcement in an effective sequence for learning success.

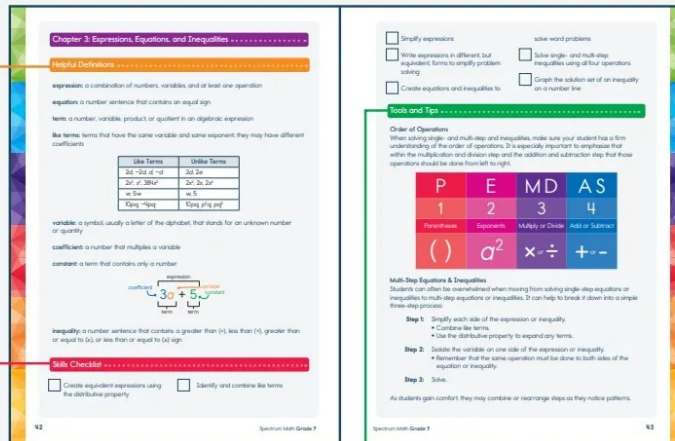
Spectrum partners with you in supporting your student's educational journey every step of the way! This book will help them navigate Grade 7 math and will give you the support you need to make sure your student learns everything they need to know. Inside you will find:

Chapter Introductions

These introductions provide useful information about the chapter. They may include:

Helpful Definitions

These terms either appear in the chapter or are important for the skills being taught.



Skills Checklist

This checklist helps ensure your student is practicing grade-level skills.

Tools and Tips

Tools and tips to support and reinforce skills are explained here.

Lessons

Name _____

Lesson 1.1 Number Properties



There are certain rules or properties of math that are always true. The commutative properties of addition and multiplication state that the order in which numbers are added or multiplied does not change the result.

$a + b = b + a$ and $a \times b = b \times a$
 $2 + 3 = 5$ and $5 = 2 + 3$

These pages begin with a definition, step-by-step instructions where needed, and examples, followed by independent practice.

Enrichment

If you were at the store purchasing items for a party with 85 guests where you planned to give each guest 7 tickets, how many tickets will you need? Explain how the distributive property can help you find the total number of tickets you need without using a calculator.

These problems appear throughout the book. They allow your student to dig deeper and apply the skill they learned in a different way than it is practiced on the page. The two types of problems will ask your student to think critically  and explain reasoning .

Pretests

Name _____

Pretest Chapter 1

Rewrite each expression using the distributive property.

These quick skill assessments serve as a starting point for the chapter. They will include the skills covered in the chapter and allow your student to gauge what they already know and what they need extra practice with.

Posttests

Name _____

Posttest Chapter 1

Rewrite each expression using the distributive property.

These end-of-chapter assessments test to see if your student gained the skills they needed from the chapter they just completed. You can compare these tests to the pretests and measure your student's growth.

Learning Checkpoints

Name _____

Learning Checkpoint Chapters 1-4

Multiply or divide. Write fractions in simplest form.

These reviews break up the book into halfway points to prepare your student for the final test.

Final Test

Compare the integers using $<$, $=$, or $>$.

23. $0 \square -1$ 24. $-44 \square -41$ 25. $-9 \square 8$ 26. $-15 \square -17$

Solve each ratio.

This test covers the skills learned in the book. Use this comprehensive test to assess what your student has learned and to identify what they still need to work on.

Answer Key

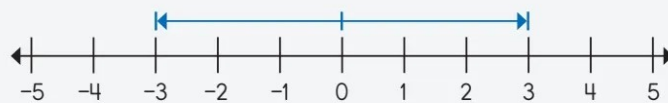
The answers to the lessons, reviews, and tests are provided in an answer key.

Chapter 1: Adding and Subtracting Rational Numbers

Helpful Definitions

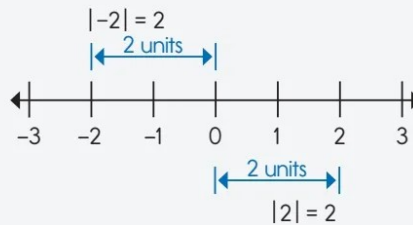
rational number: any number that can be written as a fraction; rational numbers can be positive and negative and include whole numbers, fractions with denominators other than 0, and decimals that terminate or repeat in a pattern (so, $1.333\dots$ is a rational number while π is not)

additive inverse: the opposite of a number, or the number that when added to the original number equals 0; 3 and -3 are additive inverses because $3 + -3 = 0$



3 and -3 are opposites because they are both 3 spaces from 0.

absolute value: the distance the number is from zero; it is represented by vertical lines on either side of an integer



integer: any positive or negative whole number or 0; fractions and decimals are not integers

inverse operation: an operation that undoes the action of another operation; addition and subtraction are inverse operations

Skills Checklist

- | | |
|---|--|
| <input type="checkbox"/> Identify the opposite of a number | <input type="checkbox"/> Subtract integers |
| <input type="checkbox"/> Find the absolute value of a number | <input type="checkbox"/> Use mathematical properties to fluently add and subtract integers |
| <input type="checkbox"/> Understand subtraction as an inverse operation of addition | <input type="checkbox"/> Use integers to solve real-world problems |
| <input type="checkbox"/> Add integers | |

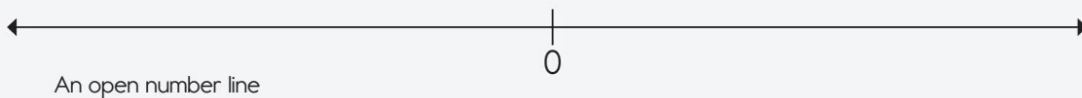
Tools and Tips

Working With Negative Numbers

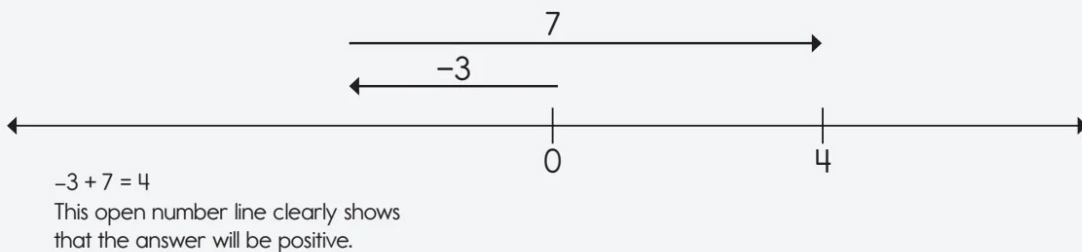
The concept of adding and subtracting negative numbers can be tricky for students. The easiest place to start is often with familiar, real-world examples of negative numbers, such as temperatures below 0, elevators moving up and down floors, or a football team moving the ball up and down the field.

It will also be helpful to use the familiar concept of number lines to work with positive and negative numbers. Number lines clearly show how adding or subtracting positive and negative numbers affects a number's position to the left (negative) or right (positive). Allow students to use number lines as long as they need to.

An open number line can be a useful tool as well. An open number line is a number line with no numbers marked, though you will want to mark 0 as a reference point. It allows students to place numbers approximately and draw arrows to the left or right to show the operation, similar to the models used on page 12 of this book.



Open number lines do not need to be exact. But make sure students are paying attention to the relative lengths of the lines they draw. For example, a line representing -3 should be about half as long as a line representing 6 or 7. It does not need to be exact, just close enough for students to see generally where the sum or difference will land on the number line.



The more students use open number lines to add and subtract integers, the more they will notice the patterns and "rules" like those in the chart on page 15. This is an important stepping stone on the way to fluent operations with integers.

Name _____

Pretest Chapter 1

Name the opposite of each number.

1. 45 _____

2. -16 _____

3. -32 _____

4. -27 _____

5. 86 _____

6. -9 _____

Find the absolute value of each integer.

7. $-|17|$ _____

8. $|-29|$ _____

9. $-|-47|$ _____

10. $|33|$ _____

11. $-|81|$ _____

12. $|1,302|$ _____

Write an equivalent expression using the additive inverse. Do not solve the problems.

13. $11 - 3 =$ _____

14. $35 - 14 =$ _____

15. $21 + (-6) =$ _____

16. $52 + (-13) =$ _____

17. $44 - 48 =$ _____

18. $76 + (-23) =$ _____

Name _____

Pretest Chapter 1

Add.

19. $12 + (-3) =$ _____ 20. $-23 + (-1) =$ _____ 21. $-14 + 18 =$ _____

22. $-43 + 26 =$ _____ 23. $-22 + 65 =$ _____ 24. $48 + (-72) =$ _____

25. $36 + (-6) + (-8) =$ _____ 26. $-75 + 15 + (-2) =$ _____

Subtract.

27. $-16 - (-5) =$ _____ 28. $26 - (-11) =$ _____ 29. $18 - (-7) =$ _____

30. $61 - 54 =$ _____ 31. $-88 - (-8) =$ _____ 32. $52 - 70 =$ _____

33. $98 - (-30) - (-7) =$ _____ 34. $-25 - 8 + (-14) =$ _____

Solve the problem.

Show your work.



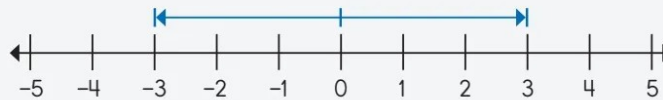
35. Two brothers are digging large holes in the sand. Caden's hole is 16 inches below the surface. Zander's hole is 21 inches below the surface. What is the difference in the depths of their holes? Write the answer as an integer.

The difference is _____ inches.

Name _____

Lesson 1.1 Understanding Absolute Value

Every number has an opposite, negative number. Opposites are two numbers that are the same distance from 0, but on opposite sides of 0.

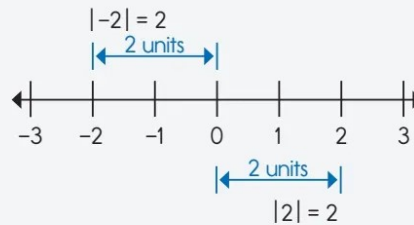


3 and -3 are opposites because they are both 3 spaces from 0.

The opposite of a number is also known as its **additive inverse**. The additive inverse of a number is a number that when added to the original number equals 0. So, 3 and -3 are additive inverses because $3 + -3 = 0$.

The **absolute value** of a number is the distance the number is from zero. It is represented by vertical lines on either side of an integer.

Because both -2 and 2 are 2 away from 0, they both have an absolute value of 2.



Name the opposite of each number.

1. 100 _____

2. -28 _____

3. -11 _____

4. -64 _____

5. 6 _____

6. -95 _____

7. -12 _____

8. -1 _____

9. 202 _____

Find the absolute value of each integer.

10. $|15|$ _____

11. $|-1|$ _____

12. $|74|$ _____

13. $|-36|$ _____

14. $|132|$ _____

15. $|-13|$ _____

Name _____

Lesson 1.2 Absolute Value and Integers

Since absolute value names a distance, it is always a positive quantity (or zero). So, whether the value inside of the absolute value bars is positive or negative, the absolute value is always positive.

$$|3| = 3$$

$$|-3| = 3$$

But, if there is a negative sign outside of the absolute value bars, it makes the final quantity negative.

$$-|3| = -3$$

$$-|-3| = -3$$

Find the absolute value of each integer.

1. $|56|$ _____

2. $|-1,761|$ _____

3. $-|27|$ _____

4. $|-6|$ _____

5. $|33|$ _____

6. $-|-414|$ _____

7. $-|81|$ _____

8. $-|-89|$ _____

9. $|-73|$ _____

10. $|54|$ _____

11. $-|75|$ _____

12. $|262|$ _____

13. $-|-91|$ _____

14. $|421|$ _____

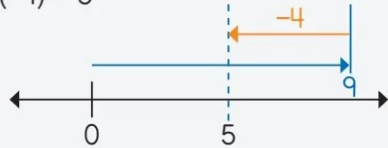
15. $-|746|$ _____

Name _____

Lesson 1.3 Subtraction as an Inverse Operation

Subtraction is the same as adding the additive inverse, or opposite, of a number to another number.

$$9 - 4 = 5$$
$$9 + (-4) = 5$$




$9 - 4$ is the same as adding -4 to 9

$$8 + (-2) = 6$$
$$8 - 2 = 6$$



$8 + (-2)$ is the same as taking 2 from 8

Use the number line to show the additive inverse of each expression. Then, write an equivalent equation using the additive inverse. Do not solve the problems.

1. $12 - 5 =$ _____ 

The number line has arrows at both ends and a vertical tick mark labeled '0'.

2. $27 - 11 =$ _____ 

The number line has arrows at both ends and a vertical tick mark labeled '0'.

3. $52 + (-8) =$ _____ 

The number line has arrows at both ends and a vertical tick mark labeled '0'.

4. $34 + (-21) =$ _____ 

The number line has arrows at both ends and a vertical tick mark labeled '0'.

5. $98 - 40 =$ _____ 

The number line has arrows at both ends and a vertical tick mark labeled '0'.

Name _____

Lesson 1.3 Subtraction as an Inverse Operation

You can rewrite an expression using the additive inverse. This can make understanding and solving problems with negative numbers simpler.

-4 is the additive inverse of 4
(4 + -4 = 0)

$7 - 4 = 7 + (-4)$ $7 - 4$ is the same as adding -4 to 7

7 is the additive inverse of -7
(-7 + 7 = 0)

$12 + (-7) = 12 - 7$ $12 + (-7)$ is the same as taking 7 from 12

Write an equivalent expression using the additive inverse. Do not solve the problems.

1. $9 - 3 =$ _____ 2. $15 - 6 =$ _____

3. $38 + (-5) =$ _____ 4. $47 + (-13) =$ _____

5. $26 - 11 =$ _____ 6. $101 + (-24) =$ _____

7. $74 - 23 =$ _____ 8. $57 - 50 =$ _____

9. $99 - 32 =$ _____ 10. $81 + (-33) =$ _____

11. $79 + (-67) =$ _____ 12. $88 - 17 =$ _____