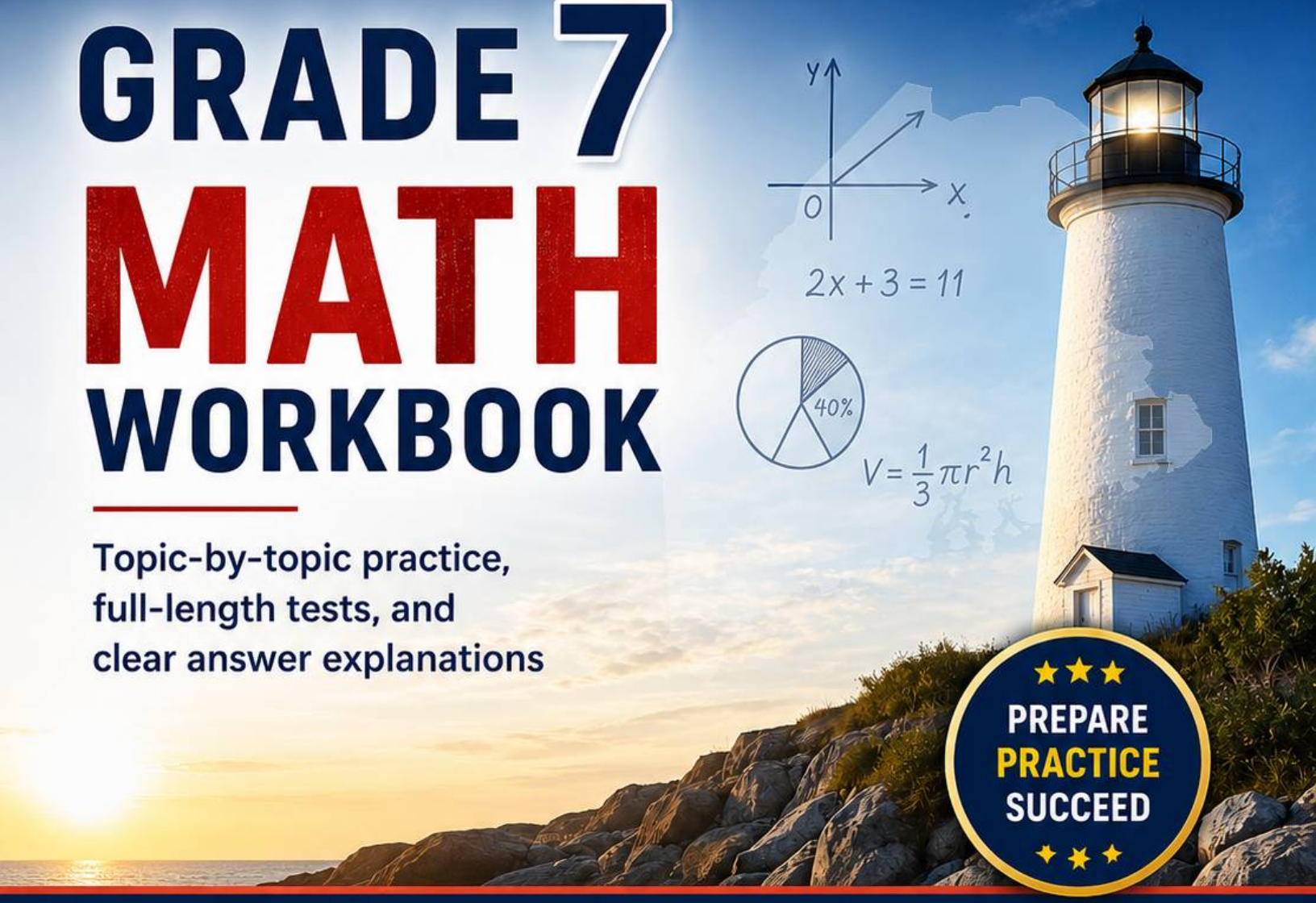
MAINE

THROUGH YEAR ASSESSMENT

GRADE 7 MATH WORKBOOK

Topic-by-topic practice, full-length tests, and clear answer explanations



TOPIC-BY-TOPIC PRACTICE
Build skills and strengthen concepts

FULL-LENGTH TESTS
Realistic practice to build confidence

CLEAR ANSWER EXPLANATIONS
Understand every step and improve

Maine Through Year Assessment

Grade 7

Math Workbook

Topic-by-topic practice, full-length tests, and clear answer explanations

7

Built for steady Grade 7 progress

Integers, ratios, percents, expressions, geometry, statistics, and probability

81 Topic Worksheets

2 Full-Length Tests

Answer Explanations



Reza Nazari

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Grade 7 expectations grouped under 7.NS.

7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram
7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers
7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers. Computations with rational numbers extend the rules for manipulating fractions to complex fractions
7.NS.A.1a	Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has a zero charge because its two constituents are oppositely charged
7.NS.A.1b	Understandp+qas the number located a distance |q| fromp, in the positive or negative direction depending on whetherqis positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts
7.NS.A.1c	Understand subtraction of rational numbers as adding the additive inverse,p-q=p+ (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world contexts
7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers
7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts
7.NS.A.2b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. Ifpandqare integers, then -(p/q) = (-p)/q=p/(-q). Interpret quotients of rational numbers by describing real-world contexts
7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers

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7.NS.A.2d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats

7.QR | Maine

Grade 7 expectations grouped under 7.QR.

7.QR.EA.2 Analyze proportional relationships and use them to solve real-world and mathematical problems

7.QR.EA.3 Apply and extend previous understandings of operations with whole numbers to rational numbers

7.RP | Maine

Grade 7 expectations grouped under 7.RP.

7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction ((1/ 2) / (1/ 4)) miles per hour, equivalently 2 miles per hour

7.RP.A.2 Recognize and represent proportional relationships between quantities

7.RP.A.3 Use proportional relationships to solve multistep ratio, rate, and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error

7.RP.A.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin

7.RP.A.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships

7.RP.A.2c Represent proportional relationships by equations. For example, if the total costtis proportional to the number n of items purchased at a constant pricep, the relationship between the total cost and the number of items can be expressed ast=pn

7.RP.A.2d Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1,r) whereris the unit rate

7.SP | Maine

Grade 7 expectations grouped under 7.SP.

7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences

7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean length of a largemouth bass in a lake by randomly sampling largemouth bass from the lake; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be

7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team and both distributions have similar variability (mean absolute deviation) of about 5 cm. The difference between the mean heights of the two teams (10 cm) is about twice the variability (5 cm mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable

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② Two hikers leave camp (position 0 on a trail). Hiker A walks 11 *mi* east (+11) and Hiker B walks 11 *mi* west (−11). Use absolute value to compare the distances each hiker traveled. Then find $|+11| - |-11|$.

Think It Through: Absolute value tells distance from zero, so direction does not matter here. Hiker A traveled $|+11| = 11$ *mi* and Hiker B traveled $|-11| = 11$ *mi*. That means they are the same distance from camp even though they walked in opposite directions. Subtracting the two distances gives $11 - 11 = 0$.

Answer: *0; both hikers traveled equal distances*

Practice Problems

Evaluate each expression.

1. $|-8| =$ _____

2. $|15| =$ _____

3. $-|-7| =$ _____

4. $|-34| =$ _____

5. $-|12| =$ _____

6. $|0| =$ _____

7. $|-23| =$ _____

8. $-|-20| =$ _____

9. $|-45| =$ _____

10. $|7| - |-7| =$ _____

11. $|-13| + |-8| =$ _____

12. $|-6| \cdot |-4| =$ _____

13. $|-3|^2 =$ _____

14. $|8 - 15| =$ _____

15. $|-100| \div |-25| =$ _____

Study Tips

- Absolute value is **always** ≥ 0. It measures distance, and distance is never negative.
- A negative sign *outside* the bars is applied **after** taking the absolute value: $-|-5| = -(5) = -5$.
- Work from the inside out: simplify what is inside $|\cdot|$ first, then evaluate the absolute value, then apply any outside operations.

Word Problems

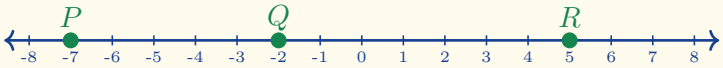
16. Two submarines depart from a dock at sea level (depth = 0). Submarine A dives to a depth of −340 feet and Submarine B dives to a depth of −180 feet. Use absolute value to

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determine which submarine is *closer* to the surface, and by exactly how many feet closer it is than the other submarine.

17. Alena's bank account balance was \$0 on Sunday. By Monday evening her balance had dropped to −\$47. By Tuesday evening it had dropped further to −\$62. Use absolute value to state her Tuesday balance as a positive amount owed. Then determine by how many dollars her balance changed between Monday evening and Tuesday evening, and express that change as an absolute value.

18. Three points P, Q, R are marked on the number line shown here. Find $|P|$, $|Q|$, and $|R|$. Then determine which point is farthest from zero, and compute $|P| + |R|$ (the total distance from zero of the two outer points).



1.3 Comparing and Ordering Integers

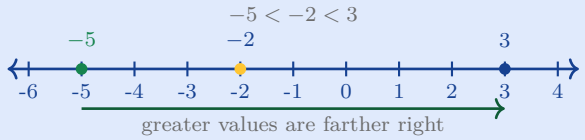
7.NS.A.1

The trick to comparing integers is to picture them on a number line. Numbers get larger as you move to the **right** and smaller as you move to the **left**. This is especially handy with negatives—for example, -3 is greater than -8 because -3 is closer to zero (farther right on the line). When a problem asks you to order integers from least to greatest, you are simply listing them in the same left-to-right order they appear on the number line. Once you have this picture in your head, symbols like $<$, $>$, and $=$ become second nature.

Key Concepts & Quick Review

Comparing: $a > b$ means a is to the **right** of b on the number line. $a < b$ means a is to the **left** of b.

Negatives rule: Among two negative integers, the one **closer to zero** is **greater**.
Ordering: list integers from least (leftmost) to greatest (rightmost).



Examples

① Compare -7 and -3. Write $<$, $>$, or $=$.

Think It Through: Put both numbers on a number line in your mind. The number -3 is closer to zero, so it sits to the right of -7. Numbers to the right are greater, and numbers to the left are smaller. Therefore $-7 < -3$.

Answer: $-7 < -3$

② Order from **least to greatest**: $4,\ -9,\ 2,\ -1,\ -6$.

Think It Through: Imagine placing all five integers on a number line. The farthest left is -9, then comes -6, then -1. After the negatives come the positives: 2 and then 4. Reading from left to right gives the order from least to greatest.

Answer: $-9 < -6 < -1 < 2 < 4$

Practice Problems

Write $<$, $>$, or $=$ in each box to make the statement true.

1. $-5 \square -2$ _____

2. $-8 \square -11$ _____

3. $7 \square -7$ _____

4. $-4 \square 0$ _____

5. $-15 \square -15$ _____

6. $-1 \square -100$ _____

7. $-9 \square 3$ _____

8. $|-6| \square 6$ _____

9. $-|-4| \square -4$ _____

10. $|-10| \square |-12|$ _____

11. $-20 \square -19$ _____

12. $0 \square -1$ _____

13. $-(-3) \square -3$ _____

14. $-|7| \square -7$ _____

15. $-25 \square -52$ _____

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