

Massachusetts

GRADE

7

MATH

WORKBOOK

$$12 \div 3 =$$



$$x + 5 =$$



Dr. A. Nazari

2026

✓ View MATH

Massachusetts MCAS Grade 7 Math Workbook

Practice Problems & Exercises with Answer Key

Dr. A. Nazari

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YOUR PRACTICE STARTS HERE

Grade 7 Math Workbook

Practice Problems • Word Problems • Complete Answer Key

This workbook is your personal training ground for Grade 7 math. Every section gives you a focused set of problems that build from straightforward to challenging. Work at your own pace, write out your steps, and check answers in the back.

Each problem you solve makes the next one easier.



9 Chapters

From proportional relationships and percents to probability — every Grade 7 standard is covered.



Progressive Difficulty

Each section builds from basic recall to multi-step challenges, so your confidence grows with every page.



Real-World Applications

Apply math to shopping, sports, science, and everyday decisions.



Complete Answer Key

Every problem has an answer in the back. Check your work, learn from mistakes, and try again.

How to Use This Workbook

Four steps to get the most from every section.

1

Preview the Concept

Each section opens with a short reminder of the key idea or formula. If something feels unfamiliar, pair this workbook with the study guide for a deeper explanation before jumping into problems.

2

Work the Problems in Order

Problems are arranged from basic to challenging. Starting with the easier ones builds confidence and warms up your thinking before the harder questions arrive.

3

Show Every Step

Write out every step on scratch paper. If you get a wrong answer, your written work helps you pinpoint exactly where things went off track — so you can fix it and learn.

4

Review and Correct

After finishing a section, flip to the Answer Key and check every problem. For each mistake, figure out why it happened. Then try a similar problem again. That's how real learning works.

Suggested Study Routine

- » **Weekdays:** Complete one section per day (about 20–30 minutes).
- » **End of week:** Review and re-do any problems you missed.
- » **Weekend:** Rest, or try a bonus challenge for fun.

 Pair It Up

This workbook focuses on practice. For full explanations, worked examples, and teaching notes, use it alongside the Grade 7 Study Guide or your classroom textbook.

 For Parents & Teachers

- » *Let students work independently first, then review mistakes together.*
- » *Keep sessions to 20–30 minutes for best focus.*
- » *Celebrate effort and progress, not just correct answers.*



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What You'll Need

Gather these supplies before you start.

Essentials

- ✓ **Pencils** — at least two sharpened pencils.
- ✓ **Eraser** — mistakes are part of learning!
- ✓ **Scratch paper** — for showing your work step

by step.

- ✓ **Ruler** — for number lines, graphs, and geometry.

Helpful Extras

- ✓ **Colored pencils** — for graphs, diagrams, and coordinate planes.

- ✓ **Calculator** — check your arithmetic after solving by hand.

- ✓ **Highlighter** — mark key formulas and vocabulary.

- ✓ **Protractor** — for angle measurement problems.

- ✓ **Notebook** — keep your work organized in one place.

💡 Study Space Tips

- Find a quiet spot with good light.
- Put your phone out of reach.
- Set a timer for 20–30 minutes, then take a short break.
- Keep a water bottle nearby.

📊 When to Use a Calculator

- Always try problems by hand first.
- Use a calculator to check your work, not to replace it.
- For multi-step problems, a calculator helps verify tricky intermediate steps.

i You don't need everything at once. Pencil, eraser, and this book are enough to start.



Math Reference Sheet

Use this page any time you need a quick refresher!

Symbol	Name	What It Means
$\frac{a}{b}$	Ratio / Fraction	Compares a to b ; also means $a \div b$.
k	Constant of Prop.	In $y = kx$, the unit rate linking two proportional quantities.
$ -5 = 5$	Absolute Value	Distance from 0 on a number line — always non-negative.
$\geq \leq$	Inequality	$\geq$ means greater than or equal to; $\leq$ is the reverse.
$3x + 7$	Expression	Numbers, variables, operations — no equals sign.
$2x - 4 = 10$	Equation	A statement that two expressions are equal.
$P(\text{event})$	Probability	A number from 0 to 1 measuring how likely an event is.

Key Formulas

- **Proportional relationship:**

$$y = kx \quad \text{where } k = \frac{y}{x}$$

- **Percent of a number:**

$$\text{part} = \text{percent} \times \text{whole}$$

- **Percent change:**

$$\frac{|\text{new} - \text{original}|}{|\text{original}|} \times 100\%$$

- **Simple interest:**

$$I = Prt$$

- **Area of a circle:**

$$A = \pi r^2$$

- **Circumference:**

$$C = 2\pi r = \pi d$$

- **Area of a triangle:**

$$A = \frac{1}{2}bh$$

- **Volume of a prism:**

$$V = B \times h \quad (B = \text{area of base})$$

- **Probability:**

$$P = \frac{\text{favorable outcomes}}{\text{total outcomes}}$$

- **Scale factor:**

$$\frac{\text{drawing length}}{\text{actual length}}$$

Rational Number Rules

- **Same signs** → add, keep the sign

$$(-3) + (-5) = -8$$

- **Different signs** → subtract, keep the sign of the larger absolute value

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

- **Subtracting** = adding the opposite

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

- **Multiply / Divide:**

Same signs → positive

Different signs → negative

Word Problem Clue Words

- **Add (+):** total, altogether, combined, sum, increase, more than

- **Subtract (−):** difference, fewer, remain, decrease, how many more

- **Multiply (×):** each, every, groups of, times, product, per, of

- **Divide (÷):** share equally, split, each group, how many groups



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Key Math Vocabulary

Words you'll see again and again in Grade 7 math.

Proportional Relationships

Ratio — A comparison of two quantities.

Proportion — An equation stating two ratios are equal.

Unit rate — A rate with a denominator of 1.

Constant of proportionality — The value k in $y = kx$.

Percents

Percent — A ratio that compares a number to 100.

Markup — The extra amount a store adds to cost.

Discount — A reduction from the original price.

Simple interest — Interest calculated on the principal only: $I = Prt$.

Percent error — How far an estimate is from the actual value, as a percent.

Rational Numbers

Integer — A whole number or its opposite (...-2, -1, 0, 1, 2 ...).

Rational number — Any number that can be written as $\frac{a}{b}$ ($b \neq 0$).

Absolute value — The distance of a number from zero on a number line.

Opposite — Two numbers the same distance from zero on opposite sides.

Additive inverse — A number and its opposite sum to 0.

Terminating decimal — A decimal that ends: 0.75.

Repeating decimal — A decimal with a repeating pattern: $0.\overline{3}$.

Expressions & Equations

Variable — A letter that represents an unknown number.

Coefficient — The number multiplied by a variable (6 in $6x$).

Constant — A fixed number with no variable (+3 in $2x + 3$).

Like terms — Terms with the same variable and exponent.

Expression — Numbers, variables, and operations (no = sign).

Equation — A statement that two expressions are equal.

Inequality — A statement that uses $<$, $>$, $\leq$, or $\geq$.

Distributive property — $a(b + c) = ab + ac$.

Geometry & Measurement

Scale drawing — A proportional representation of an object.

Scale factor — The ratio of drawing length to actual length.

Radius — The distance from the center to the edge of a circle.

Diameter — The distance across a circle through its center ($d = 2r$).

Circumference — The distance around a circle: $C = \pi d$.

Area — The space inside a flat shape, in square units.

Surface area — The total area of all faces of a 3-D shape.

Volume — The space inside a 3-D shape, in cubic units.

Cross-section — The 2-D shape you see when slicing a 3-D figure.

Complementary angles — Two angles that sum to 90° .

Supplementary angles — Two angles that sum to 180° .

Vertical angles — Opposite angles formed by intersecting lines; always equal.

Statistics

Population — The entire group you want information about.

Sample — A smaller group chosen from the population.

Random sample — A sample where every member has an equal chance of being chosen.

Mean — The average: sum of values divided by the count.

Median — The middle value when data is sorted.

MAD — Mean Absolute Deviation — average distance from the mean.

Probability

Probability — A number from 0 to 1 measuring how likely an event is.

Theoretical probability — Probability based on reasoning, not experiments.

Experimental probability — Probability based on observed data.

Sample space — The set of all possible outcomes.

Compound event — An event made of two or more simple events.

Simulation — An experiment that models a real-world situation.



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Multiplication Table

A handy reference — use it whenever you need it!

×	1	2	3	4	5	6	7	8	9	10	11
1	1	2	3	4	5	6	7	8	9	10	11
2	2	4	6	8	10	12	14	16	18	20	22
3	3	6	9	12	15	18	21	24	27	30	33
4	4	8	12	16	20	24	28	32	36	40	44
5	5	10	15	20	25	30	35	40	45	50	55
6	6	12	18	24	30	36	42	48	54	60	66
7	7	14	21	28	35	42	49	56	63	70	77
8	8	16	24	32	40	48	56	64	72	80	88
9	9	18	27	36	45	54	63	72	81	90	99
10	10	20	30	40	50	60	70	80	90	100	110
11	11	22	33	44	55	66	77	88	99	110	121

💡 How to Use This Table

To find 4×7 :

1. Find **4** in the left column (blue).
2. Find **7** in the top row (blue).
3. Follow the row and column until they meet: the answer is **28**!

 Division Tip

You can also use this table for **division**! If you know $28 \div 4 = ?$, find 28 in the 4's row. The column header gives you the answer: **7**!

PREVIEW



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My Progress Log

Track your work through every chapter.

This book belongs to: _____

Chapter	Score
1 Ratios & Proportional Relationships	_____ / _____
2 Percents in Everyday Life	_____ / _____
3 Operations with Rational Numbers	_____ / _____
4 Algebraic Expressions	_____ / _____
5 Equations and Inequalities	_____ / _____
6 Scale Drawings, Figures, & Angles	_____ / _____
7 Circles, Area, Surface Area, & Volume	_____ / _____
8 Statistics: Sampling & Populations	_____ / _____
9 Probability & Compound Events	_____ / _____

 My Goal

I want to finish _____ topics each week.

My target date to complete this workbook: _____

 Reflect on Your Learning

What topic was the hardest for you?

What strategy helped you the most?

What topic are you most proud of mastering?



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★ *Table of Contents* ★

Here's what we'll explore together!

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Let's learn and have fun!

PREVIEW



CHAPTER

1

Ratios and Proportional Relationships

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★ 1.1 Unit Rates with Fractions ★

Unit Rates with Fractions

Quick Review: Unit Rates with Fractions

A **unit rate** tells you how much of one quantity per **one unit** of another.

- To find a unit rate, **divide**: $\text{unit rate} = \frac{\text{first quantity}}{\text{second quantity}}$.
- When quantities are fractions, use **Keep-Change-Flip**: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$.

Example: A runner covers $\frac{3}{4}$ mile in $\frac{1}{2}$ hour. Unit rate = $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{3}{2} = 1\frac{1}{2}$ miles per hour.

Warm-Up

Find the Unit Rate (whole numbers)

1. 120 miles in 4 hours _____
2. \$45 for 5 shirts _____
3. 84 pages in 7 days _____
4. 60 apples in 12 bags _____
5. \$32 for 8 gallons _____
6. 200 words in 5 minutes _____



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 Computing Unit Rates with Fractions

Divide to find each unit rate. Simplify your answer.

7. A baker uses $\frac{2}{3}$ cup of flour for $\frac{1}{3}$ batch. How much flour per batch? _____
8. A hose fills $\frac{3}{4}$ of a bucket in $\frac{1}{2}$ minute. How many buckets per minute? _____
9. A train covers $\frac{5}{6}$ mile in $\frac{2}{3}$ minute. What is the speed in miles per minute? _____
10. A machine packages $\frac{4}{5}$ kg of rice in $\frac{2}{5}$ hour. How many kg per hour? _____
11. A gardener plants $\frac{7}{8}$ row in $\frac{3}{4}$ hour. How many rows per hour? _____
12. A recipe calls for $\frac{1}{3}$ cup of sugar for $\frac{5}{6}$ batch. How much sugar per batch? _____

 Who Is Faster? Which Costs Less?

Compare by finding the unit rate for each. Circle your answer.

13. Runner A covers $\frac{3}{5}$ mile in $\frac{1}{4}$ hour. Runner B covers $\frac{5}{6}$ mile in $\frac{1}{3}$ hour. Who is faster?

14. Brand X: $\frac{3}{4}$ lb of cheese for \$ $\frac{5}{2}$. Brand Y: $\frac{2}{3}$ lb for \$2. Which costs less per pound? _____
15. Pipe A fills $\frac{1}{2}$ tank in $\frac{2}{5}$ hour. Pipe B fills $\frac{3}{4}$ tank in $\frac{1}{2}$ hour. Which pipe fills faster? _____
16. Cyclist A travels $\frac{7}{10}$ mile in $\frac{1}{5}$ hour. Cyclist B travels $\frac{4}{5}$ mile in $\frac{1}{4}$ hour. Who has a greater speed?



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 True or False?

17. To find a unit rate with fractions, you multiply the two fractions.

True ☐ False ☐

18. $\frac{2}{3} \div \frac{1}{6} = 4$

True ☐ False ☐

19. If you walk $\frac{1}{2}$ mile in $\frac{1}{4}$ hour, your unit rate is $\frac{1}{8}$ mile per hour.

True ☐ False ☐

 Word Problems

20. A painter can paint $\frac{2}{5}$ of a fence in $\frac{3}{4}$ hour. At this rate, how much of the fence can the painter finish in one hour?

Answer: _____ of the fence

21. A juice machine fills $\frac{5}{6}$ of a bottle every $\frac{2}{3}$ second. How many bottles does it fill per second?

Answer: _____ bottles per second

22. Sam reads $\frac{3}{4}$ of a chapter in $\frac{1}{2}$ hour. Emma reads $\frac{2}{3}$ of a chapter in $\frac{1}{3}$ hour. Who reads faster, and by how much?

Answer: _____ chapters per hour

 Challenge!

23. A snail travels $\frac{3}{8}$ meter in $\frac{5}{6}$ hour. A turtle travels $\frac{7}{12}$ meter in $1\frac{1}{4}$ hours. Which animal has a greater speed? By how much?

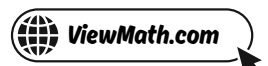
24. A factory machine A produces $\frac{5}{6}$ widget in $\frac{3}{8}$ hour. Machine B produces $1\frac{1}{3}$ widgets in $\frac{2}{3}$ hour. Which machine is more productive? _____



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Awesome work with fraction unit rates!

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CHAPTER

2

Operations with Rational Numbers

★ *What's Inside* ★

2.1 *Integers and Their Opposites* 8

★ 2.1 Integers and Their Opposites ★

Integers and Their Opposites

Quick Review: Integers and Opposites

Integers are whole numbers and their negatives: $\dots, -3, -2, -1, 0, 1, 2, 3, \dots$

- Every integer has an **opposite** — the number the same distance from 0 on the other side.
- The opposite of 7 is -7 . The opposite of -4 is 4. The opposite of 0 is 0.
- A number plus its opposite always equals 0: $a + (-a) = 0$.
- The **absolute value** $|n|$ is the distance from 0. It is always ≥ 0 .

Example: $|-9| = 9$ because -9 is 9 units from 0. $|5| = 5$ because 5 is 5 units from 0.

Warm-Up

Find the Opposite

1. What is the opposite of 6? _____
2. What is the opposite of -10 ? _____
3. What is the opposite of 0? _____
4. Find $|-14|$. _____
5. Find $|23|$. _____
6. What is $8 + (-8)$? _____



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 Opposites and Absolute Value

Write the opposite of each integer.

7. -25 _____

8. 17 _____

9. -100 _____

Find each absolute value.

10. $|-33|$ _____

11. $|0|$ _____

12. $|-71|$ _____

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

13. -5 _____ 3

14. $|-8|$ _____ $|6|$

15. -12 _____ -4

 Ordering Integers

Order each set from least to greatest.

16. $3, -7, 1, -2, 0$ _____

17. $-15, 8, -3, 12, -8$ _____

18. $-1, -10, 10, 0, -5, 5$ _____



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 True or False?

19. The absolute value of a number can be negative. True ☐ False ☐
20. -3 is farther from 0 than 2 is. True ☐ False ☐
21. Every positive integer has a negative opposite. True ☐ False ☐
22. $|-5| = |5|$ True ☐ False ☐

 Word Problems

23. A submarine is at -200 feet (below sea level). It rises 200 feet. What is its new position? Write the answer using integers.

Answer: _____ feet

24. The temperature at midnight was -8°C . During the day, the temperature changed by the opposite amount. What was the daytime temperature change, and what was the resulting temperature?

Answer: _____ $^{\circ}\text{C}$

25. Mount Everest's peak is about 8,849 meters above sea level. The Mariana Trench is about 10,994 meters below sea level. Write each elevation as an integer and find which has a greater absolute value.

Answer: _____ meters

 Challenge!

26. If $|x| = 7$, what are the possible values of x ? _____

27. If $|a| = |b|$ and $a \neq b$, what must be true about a and b ? _____



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*Excellent work with integers! You now know
opposites and absolute values like a pro!*

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- ✓ *Hundreds of practice problems*
- ✓ *Complete answer key with explanations*
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