

Colorado

GRADE

7

MATH

WORKBOOK

$$12 \div 3 =$$



$$x + 5 =$$



Dr. A. Nazari

2026

✓ View MATH

# Colorado CMAS 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

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*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  $90^\circ$ .

**Supplementary angles** — Two angles that sum to  $180^\circ$ .

**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  $4 \times 7$ :

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!*

|     |                                                    |   |
|-----|----------------------------------------------------|---|
| ★ 1 | <i>Ratios and Proportional Relationships</i> ..... | 2 |
| ★ 2 | <i>Operations with Rational Numbers</i> .....      | 7 |



*Let's learn and have fun!*

PREVIEW



CHAPTER

1

# Ratios and Proportional Relationships

## ★ What's Inside ★

|                                     |   |
|-------------------------------------|---|
| 1.1 Unit Rates with Fractions ..... | 3 |
|-------------------------------------|---|

## ★ 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?

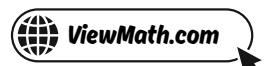
24. A factory machine A produces  $\frac{5}{6}$  widget in  $\frac{3}{8}$  hour. Machine B produces  $1\frac{1}{3}$  widgets in  $\frac{2}{3}$  hour. Which machine is more productive? \_\_\_\_\_



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*Awesome work with fraction unit rates!*

*You are becoming a unit rate expert!*

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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  $\geq 0$ .

**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  $-8^{\circ}\text{C}$ . 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  
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