

7 Massachusetts MCAS Grade 8 Math Practice Tests

Comprehensive Test Prep with Detailed Answers

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7 Practice Tests

Welcome!

*This book contains **7 full-length practice tests** designed to give you thorough preparation for your Grade 8 math assessment. Each test covers all six major topics:*

- 📖 Irrational Numbers 📖 Powers & Scientific Notation
- 📖 Linear Equations 📖 Functions
- 📖 Geometry 📖 Data & Relationships

Seven tests give you the repetition you need to master every topic. With each test, you'll get faster, more accurate, and more confident.

Repetition builds mastery. Mastery builds confidence.

“Seven tests means seven chances to improve. Focus on one topic at a time and you'll see real results!”



📖 How to Use This Book 📖

Make the most of 7 practice tests

What's Inside

- **7 Full-Length Practice Tests** — each covers all 6 chapters of Grade 8 math: irrational numbers, exponents & scientific notation, linear equations, functions, geometry, and data analysis.
- **Detailed Answer Explanations** — every question includes a step-by-step solution so you can understand the reasoning.
- **Formula Reference Sheet** — essential Grade 8 formulas and key concepts for quick review before each test.
- **Test Tracker** — log your scores across all 7 tests and monitor your improvement over time.

Your 7-Test Battle Plan

★ PHASE 1: DISCOVER (Tests 1–2)

Untimed. Find your strengths and weaknesses. Review every answer explanation.

★★ PHASE 2: BUILD (Tests 3–4)

Soft timer (70 min). Start practicing pacing and time management.

★★★ PHASE 3: SHARPEN (Tests 5–6)

Timed, strict. Speed + accuracy together. Show complete solutions.

PHASE 4: PROVE IT (Test 7)

Full test conditions: timed, quiet, no notes. Compare with Test 1.

Tip: Space tests 4–5 days apart. Use the days between to study the topics you missed.

 Types of Questions

 **Multiple Choice:** Four answer options — only one is correct. Eliminate clearly wrong options to improve your odds.

 **Short Answer & Constructed Response:** Show all your work: equations, substitutions, and simplifications. Even a partial solution can earn credit.

 **Graphing & Data:** Plot points, draw lines, interpret scatter plots. Use a ruler and label everything clearly.



Tip: With 7 tests, you have the depth to truly master every topic. Don't rush through them — quality review between tests is what drives real improvement.



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💡 Test-Taking Tips 💡

A problem-solving checklist for every question

Your Problem-Solving Checklist

- ☐ *I read the entire problem and identified what is given and what is asked.*
- ☐ *I wrote the formula or equation before substituting any numbers.*
- ☐ *I solved step by step and showed every operation.*
- ☐ *I checked my answer by plugging it back in or estimating.*
- ☐ *I re-read the question to make sure I answered exactly what was asked.*
- ☐ *I labeled my answer with correct units or notation.*

Common Mistakes in Grade 8 Math

-  **Irrational numbers:** $\sqrt{2}$ is irrational — its decimal never terminates or repeats.
-  **Scientific notation:** When multiplying, add exponents; when dividing, subtract.
-  **Parallel lines:** Alternate interior angles are equal, not supplementary.
-  **Function notation:** $f(3)$ means the output when input is 3, not $f \times 3$.
-  **Pythagorean theorem:** c is always the hypotenuse (longest side).

Smart Strategies

- Answer the questions you're most confident about first
- Underline keywords: "simplify," "solve," "graph," "explain"
- For word problems, translate sentences into equations one phrase at a time
- Draw diagrams for geometry problems even if one isn't provided
- When stuck, skip and come back — fresh eyes often see the solution

 After Each Test

- Read the full explanation for every wrong answer
- Note the topic (not just the question number) so you know what to study
- Before the next test, review those topics until you understand them
- Log your results in the Test Tracker



“ Every wrong answer is a learning opportunity. After each test, go back and understand not just **what** the right answer is, but **why** your approach didn't work. ”



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Grade 8 Formula Reference

Keep this page handy — you may use it during your practice tests!

Exponent Rules

$$a^m \cdot a^n = a^{m+n} \quad (a^m)^n = a^{mn} \quad (ab)^n = a^n \cdot b^n$$
$$\frac{a^m}{a^n} = a^{m-n} \quad a^0 = 1 \quad (a \neq 0) \quad a^{-n} = \frac{1}{a^n}$$

Lines & Linear Equations

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$

m = slope b = y -intercept

Slope-intercept: $y = mx + b$

Parallel lines: same slope

Proportional: $y = mx$

Proportional: passes through origin

Scientific Notation

$a \times 10^n$ where $1 \leq |a| < 10$

Multiply: add exponents

Divide: subtract exponents

Roots & Number Sense

Perfect squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

Perfect cubes: 1, 8, 27, 64, 125 $\sqrt{2} \approx 1.414$ $\sqrt{3} \approx 1.732$ $\pi \approx 3.14159$

Pythagorean Theorem & Distance

$a^2 + b^2 = c^2$ c = hypotenuse (longest side of a right triangle) **Distance:** $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Volume Formulas

Cylinder $V = \pi r^2 h$ **Cone** $V = \frac{1}{3} \pi r^2 h$ **Sphere** $V = \frac{4}{3} \pi r^3$

Angle Relationships

Triangle angle sum: 180°

Exterior angle = sum of two remote interior angles

Parallel lines + transversal: Alternate interior angles are equal • Co-interior angles sum to 180°

Functions

Each input $\rightarrow$ exactly one output **Vertical line test:** if any vertical line hits graph more than once $\Rightarrow$ not a function

Linear: constant rate of change ($y = mx + b$)

Nonlinear: rate of change varies

Transformations

Translation: slide

Reflection: flip

Rotation: turn

Dilation: resize

Congruent = same shape & size

Similar = same shape, proportional size



Tip: Bookmark this page! Review it before each test so these formulas become second nature.



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PRACTICE TEST

1

Practice Test 1

 10 Questions

Before You Start

- ✓ *Read each question carefully before choosing your answer.*
- ✓ *Show your work on scratch paper when you need to.*
- ✓ *Skip hard questions and come back to them later.*
- ✓ *Check your answers when you're done.*
- ✓ *Take your time — there's no rush!*

★ **You've Got This!** ★

Do your best and show what you know!



1. A number has a decimal expansion that goes on forever without ever repeating. What kind of number is it?

- (A) Integer (B) Rational
(C) Irrational (D) Whole number

2. What is $0.\overline{54}$ in simplest form?

- (A) $\frac{54}{99}$ (B) $\frac{6}{11}$
(C) $\frac{54}{100}$ (D) $\frac{27}{50}$

3. Order from least to greatest: 3.1, $\sqrt{10}$, π .

Your Answer:

4. Which is the best estimate for π^2 ?

- (A) 6.3 (B) 9.9
(C) 3.1 (D) 12.6

5. Jake claims that $\sqrt{-16} = -4$. Is he correct?

- (A) Yes, because $(-4)^2 = -16$ (B) Yes, because square roots of negative numbers are negative
(C) No, because $(-4)^2 = 16$, not -16 (D) No, because $\sqrt{-16} = -8$



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6. The diameter of a red blood cell is about 0.000007 meters. What is this in scientific notation?

(A) 7×10^{-5}

(B) 7×10^{-6}

(C) 7×10^6

(D) 70×10^{-7}

7. Add $2.8 \times 10^5 + 7.2 \times 10^5$. Write your answer in scientific notation.

Your Answer:

8. Runner A runs $y = 6x$ (miles in x hours). Runner B runs 28 miles in 4 hours. Who is faster?

(A) Runner A

(B) Runner B

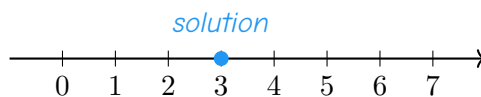
(C) They run at the same speed.

(D) Not enough information.

9. Find the slope of the line through $(-2, 5)$ and $(4, -7)$.

Your Answer:

10. The number line shows the solution to an equation.



Which equation has this solution?

(A) $2x + 1 = 5$

(B) $4x - 5 = 7$

(C) $x + 4 = 6$

(D) $5x = 20$



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★ *End of Practice Test 1* ★

Great job finishing the test!

My Score

I got _____ out of 10 questions right.

*Check your answers in the **Answer Key** at the back of the book.*

 *Review any questions you missed. That's how we learn!*

Answer Key & Explanations



Answer Key

First try each test on your own, then check your work here.



Practice Test 1 — Answer Key

- | | | | | | | | |
|------|------|----------------------------|-----|-----|-----|-------------------|-----|
| 1 C | 2 B | 3 3.1, π , $\sqrt{10}$ | 4 B | 5 C | 6 B | 7 1×10^6 | 8 B |
| 9 -2 | 10 B | | | | | | |

💡 Time to Learn! 💡

Review the explanations below, **especially for the questions you missed**.

Understanding why each answer is correct builds stronger problem-solving skills.

Tip: Circle any questions you got wrong, then read their explanation carefully.



Practice Test 1 — Detailed Explanations

1 A decimal that goes on forever without repeating is the defining characteristic of an irrational number.

2 $99x = 54$, so $x = \frac{54}{99}$. Dividing both by 9: $\frac{54}{99} = \frac{6}{11}$.



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- 3 $3.1 = 3.1$, $\pi \approx 3.14$, and $\sqrt{10} \approx 3.16$. From least to greatest: $3.1 < 3.14 < 3.16$.
- 4 $\pi \approx 3.14$, so $\pi^2 \approx 3.14 \times 3.14 = 9.8596 \approx 9.9$.
- 5 $(-4)^2 = 16$, not -16 . There is no real number whose square is -16 , so $\sqrt{-16}$ is not a real number.
- 6 Move the decimal 6 places right: $0.000007 = 7 \times 10^{-6}$.
- 7 $2.8 + 7.2 = 10$, so $10 \times 10^5 = 1 \times 10^6$.
- 8 Runner A: $k = 6$ mph. Runner B: $k = \frac{28}{4} = 7$ mph. Since $7 > 6$, Runner B is faster.
- 9 $m = \frac{-7-5}{4-(-2)} = \frac{-12}{6} = -2$.
- 10 The solution is $x = 3$. Check B: $4(3) - 5 = 12 - 5 = 7$. Correct. A gives $x = 2$, C gives $x = 2$, D gives $x = 4$.



Well done checking your answers!

Keep practicing to strengthen your skills.



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THANK YOU

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- ✓ *Hundreds of practice problems*
- ✓ *Complete answer key with explanations*
- ✓ *Colorful visuals and step-by-step examples*
- ✓ *Reference sheets and progress trackers*

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