Pre-Algebra · First Nine Weeks Study Map

Virginia 2023 Math SOL · Grades 7–8 standards
All links free & public · scan a QR to open a unit

TL;DR **Nine standards, three units.** Unit 1: exponents and powers of 10. Unit 2: the number system, from rationals to reals. Unit 3: expressions, equations, and $a^2 + b^2 = c^2$.

HOW For each card: **Learn** → **Practice** until 4 in a row are right → **Check** with the state's quick-check PDF. Stuck or want more? The purple **MathBored** row has a free textbook chapter, workbook and answer key for that skill.

KEEP IT Retest a week later, mix all three units together, and drill ★ skills by hand. ★ = no calculator allowed on the SOL test.

1 · Exponents & Power
7.NS.3 · 7.NS.1

2 · Real & Rational Numbers
7.NS.2 · 7.CE.1 · 8.NS.2 · 8.NS.1

3 · Expressions & Equations
7.PFA.2 · 7.PFA.3 · 8.MG.4

Toolbox
Diagnose · Tools · Retain · Get help

1 Unit 1 Exponents & Power

Khan unit test

7.NS.3 ★ Squares & Square Roots

√ undoes squaring. Know 1^2–20^2 cold (perfect squares to 400). √144 = 12 because 12·12 = 144.

LEARN Khan video · Math is Fun
PRACTICE Khan practice
CHECK VDOE quick check (PDF)
MATHBORED Ch 3 text · workbook · answers

7.NS.1 ★ Powers of 10 & Sci. Notation

$10^{-n} = 1/10^n$. Write $a \times 10^n$ with $1 \le a < 10$. Big number → + exponent; tiny → − exponent. Compare exponents first.

LEARN Khan: neg. exponents · Khan: sci. notation · Math is Fun
PRACTICE Powers of 10 · Sci. notation
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MATHBORED Ch 1 text · workbook · answers · endless practice

START HERE See the scale first

Watch the 9-min *Powers of Ten* film, then zoom the Scale of the Universe. Every jump is ×10: that's what the exponent counts.

WATCH Powers of Ten (Eames) · Scale of the Universe

2 Unit 2 Real & Rational Numbers

Khan unit test · Gr 8 real-numbers test

7.NS.2 ★ Compare & Order Rationals

Turn fractions, %, and decimals into decimals, then place them on a number line. Further left = smaller (−0.9 < −0.2).

LEARN Khan video · PhET number line
PRACTICE Khan practice
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MATHBORED Ch 2 text · workbook · answers

7.CE.1 Contextual Problems

Read → sketch → estimate → solve → check that the answer fits the story. Sign rules: same signs +, different signs −.

LEARN Khan word problems · IM Gr 7 Unit 5
PRACTICE Interpret ± · Multi-step
CHECK VDOE quick check (PDF)
MATHBORED Ch 4 text · workbook · answers · sign-rule drill

8.NS.2 Real Number System

Natural ⊂ Whole ⊂ Integer ⊂ Rational. Irrational = never ends, never repeats (π, √2). 0.333… repeats, so it's rational.

LEARN Khan video · Math is Fun: sets
PRACTICE Rational or not? · Classify
CHECK VDOE quick check (PDF)
MATHBORED Gr 8 Ch 1 · workbook · answers · drill

8.NS.1 Compare & Order Reals

Trap each root between perfect squares: 49 < 50 < 64, so √50 is a bit over 7 (≈7.1). Then order everything as decimals.

LEARN Khan: sort radicals · Math is Fun
PRACTICE No-calc estimate
CHECK VDOE quick check (PDF)
MATHBORED Gr 8 Ch 2 · workbook · answers

3 Unit 3 Expressions & Linear Equations

Khan unit test · Gr 8 Pythagorean test

7.PFA.2 Expressions

Distribute, then combine like terms (3x + 2x = 5x; 3x + 2 stays). Evaluate by substituting in parentheses. |…| groups like ( ).

LEARN Khan video · Like terms · Order of ops
PRACTICE Evaluate
CHECK VDOE quick check (PDF)
MATHBORED Ch 9 text · workbook · answers · like terms · distribute

7.PFA.3 Equations

Undo in reverse order: first ±, then ×/÷. Same move on both sides keeps balance. Check by plugging the answer back in.

LEARN Khan: why both sides · PhET balance
PRACTICE Two-step · Find the mistake · SolveMe puzzles
CHECK VDOE quick check (PDF)
MATHBORED Ch 10 text · workbook · answers · drill

8.MG.4 Pythagorean Theorem

$a^2 + b^2 = c^2$, where c is opposite the right angle. Learn the triples 3-4-5, 5-12-13, 8-15-17. Converse: if it fits, the triangle is right.

LEARN Khan video · Visual proofs
PRACTICE Area of squares · Find a side
CHECK VDOE quick check (PDF)
MATHBORED Gr 8 Ch 10 · workbook · answers · drill

① DIAGNOSE FIRST

- Khan 7th VA course challenge: shows which units to skip.
- Khan 8th VA challenge for 8.NS and 8.MG.4.
- All VDOE quick checks by standard.
- SOL practice items: real TestNav format.

② TOOLS TO KEEP OPEN

- Desmos VA scientific: the test's calculator.
- PhET Equality Explorer: balance-scale equations.
- Polypad: algebra tiles, square tiles for $a^2 + b^2$.
- Printables: Kuta pre-algebra · IM Gr 8 Unit 8

③ RETAIN & TEST-PREP

1. **Recall before you reread.** 3 problems cold, then check (posters).
2. **Space it:** revisit each unit 1 day, 1 week, 1 month later.
3. **Interleave:** mix units; never 20 of one type in a row.
4. **Flash 1^2–20^2, the triples, 10^{-1} to 10^{-6}** daily.

④ GET HELP · FREE

- MathBored Pre-Algebra course: self-paced, with unit test-outs.
- TutorAI: free AI tutor, no signup. Take the 40-question no-calc Pre-Algebra Check-Up, then follow its skill map.
- Full VA textbook: Gr 6–8, Algebra 1, Geometry.

Live, clickable version: math.boredgames.site/downloads/prealgebra-study-map
Standards: Virginia DOE 2023 Mathematics SOL. Resources: Khan Academy (VA SOL courses), VDOE, Math is Fun, PhET, Illustrative Math, Desmos, MathBored, TutorAI (MLN Learning).

LEARN PRACTICE CHECK MATHBORED
Checked Nov 12, 2026