

Test 1 review

Wednesday, September 23

Preparing for Friday's test

What Test 1 covers and how work is graded

Five practice rounds matched to the test skills

Common errors and a test-day checklist

TEST 1

Friday

September 25

In class, on paper

50 minutes

No formulas provided

Today's plan

Three parts, with practice in every round

1

TEST OVERVIEW

coverage → grading → pacing

5 min

2

PRACTICE ROUNDS A–E

work → compare → check

35 min

3

ERRORS AND CHECKLIST

common errors → plan for tonight

5 min

Due today

Quiz 4 (take-home test review)

3:15 PM

Keep a “needs practice” list as we work. It becomes your study plan for tonight.

Test 1 at a glance

Friday, September 25, in class

Friday, Sep 25

In class, on paper

50 minutes

Plan about three minutes per skill

Show your work

Valid progress earns partial credit

Exact answers

Fractions and radicals, not decimals

No formulas are provided on the test. Know every formula on the next slide from memory.

Coverage

- Chapter R, Chapter 1, and Chapter 2 through Section 2.5.
- From Section 3.1: the maximum height of a projectile (the vertex of a quadratic model).
- Read each direction line. “Check solutions in the original equation” is part of the task.

Formulas to memorize

No formulas are provided on the test. Write each one from memory tonight.

Midpoint

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Distance

$$d = \sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$$

Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Point-slope form

$$y - y_1 = m(x - x_1)$$

Parallel and perpendicular

$$m_1 = m_2 \quad m_1 \cdot m_2 = -1$$

Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

Maximum height

$$t = -b / (2a), \text{ then find } h(t)$$

Exponent rules

$$a^m/a^n = a^{m-n} \quad a^{-n} = 1/a^n \quad (ab)^n = a^n b^n$$

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The Test 1 skills map

Use this map to organize your review tonight

A

Algebra foundations

- Factor completely (GCF first)
- Exponent rules; positive exponents only
- Subtract rational expressions

B

Sets

- Union and intersection of intervals
- Union and intersection of finite sets

C

Equations

- Rational equations and restrictions
- Quadratic equations by factoring
- Equations with fractions

D

Coordinate geometry

- Midpoint, distance, and a line through two points
- Circle from center and radius
- Parallel and perpendicular lines

E

Quadratic model

- Maximum height of a projectile

How your work is graded

Write for a reader who needs to see your reasoning



Work earns credit

Valid progress with an error still earns partial credit. A final answer alone may not earn full credit.



Equivalent forms count

Any correct method and any equivalent exact form is accepted. Factors may appear in any order.



Restrictions matter

Write excluded values before solving. Check every candidate against the original denominators.



Answer the question asked

Maximum height is a height, not a time. A set is written as a set.

A 50-minute plan

Budget your time before you begin



Scan

Read every direction line. Start with your strongest skill.

Work

About three minutes per skill. Skip and return rather than stall.

Check

Signs, restrictions, and the requested form.

Round A: algebra foundations

6 minutes

Factor completely. Simplify using positive exponents only.

Factor completely

1. $5x^2 + 5x - 30$

2. $3x^4 - 21x^3 + 30x^2$

Simplify (all variables nonzero)

3.
$$\frac{x^{-4}y^6z^{-2}}{x^3y^{-2}z^5}$$

4.
$$\left(\frac{9xy^{-2}}{3z^3} \right)^3$$

Check: factoring is complete only when no factor can be factored again. Multiply back to verify.

Round A: solutions

GCF first, then factor the trinomial that remains

$$1. \quad 5(x^2 + x - 6) = 5(x + 3)(x - 2)$$

$$2. \quad 3x^2(x^2 - 7x + 10) = 3x^2(x - 2)(x - 5)$$

$$3. \quad x^{-4-3} y^{6+2} z^{-2-5} = x^{-7} y^8 z^{-7} = \frac{y^8}{x^7 z^7}$$

$$4. \quad \text{Inside first:} \quad \left(\frac{3x}{y^2 z^3} \right)^3 = \frac{27x^3}{y^6 z^9}$$

Watch for

- Stopping after the GCF
- Dropping the common power of x
- Reading x^{-4} as $-x^4$; it means $1/x^4$
- Forgetting to raise the coefficient: $3^3 = 27$

Round A: rational expressions

4 minutes

Perform each subtraction and simplify

$$5. \quad \frac{5}{2x} - \frac{3}{x+4}$$

$$6. \quad \frac{4}{5b} - \frac{3}{2}$$

1

Factor each
denominator

2

Build the LCD

3

Rewrite both fractions

4

Subtract the entire
numerator

5

Simplify if possible

Round A: rational expression solutions

Subtract the whole second numerator, not just its first term

5. LCD = $2x(x + 4)$

$$\frac{5(x + 4) - 3(2x)}{2x(x + 4)} = \frac{20 - x}{2x(x + 4)}$$

6. LCD = $10b$

$$\frac{8}{10b} - \frac{15b}{10b} = \frac{8 - 15b}{10b}$$

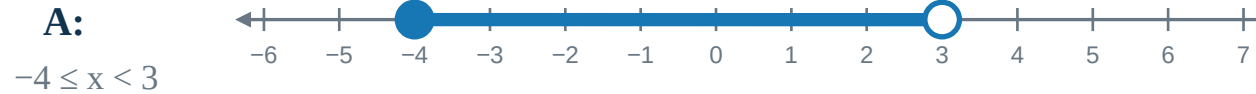
Watch for

- Subtracting denominators: $2x - (x + 4)$ is never the LCD
- Distributing only partly: $5(x + 4)$ is $5x + 20$, not $5x + 4$
- Leaving the 3 unchanged instead of writing $3 \cdot 5b = 15b$

Round B: sets

5 minutes

Write interval answers in interval notation



Find: 1. $A \cap B$ 2. $B \cup C$ 3. $A \cup C$

Finite sets

$$P = \{2, 3, 5, 7, 11\}$$

$$Q = \{1, 2, 3, 4, 5\}$$

$$R = \{3, 6, 9, 12\}$$

$$S = \{4, 6, 8\}$$

Find:

$$4. P \cup Q \quad 5. P \cap Q$$

$$6. P \cap R \quad 7. P \cap S$$

Round B: solutions

Open circle: parenthesis. Closed circle: bracket. Infinity always takes a parenthesis.

1.



$$A \cap B = (1, 3)$$

2.



$$B \cup C = (-\infty, -2] \cup (1, \infty)$$

3.



$$A \cup C = (-\infty, 3)$$

Finite sets

$$4. P \cup Q = \{1, 2, 3, 4, 5, 7, 11\}$$

$$5. P \cap Q = \{2, 3, 5\}$$

$$6. P \cap R = \{3\}$$

$$7. P \cap S = \emptyset$$

Union: every element once. Intersection: shared elements only.

Round C: equations

8 minutes

Solve for x . Check solutions in the original equation.

$$1. \quad \frac{2}{x-1} + 1 = \frac{4}{x^2-1}$$

$$2. \quad 6x^2 = 7x + 3$$

$$3. \quad \frac{1}{5}x^2 + x = \frac{12}{5}x - 2$$

$$4. \quad \frac{10}{x+3} = \frac{6}{x-1}$$

Round C: solutions to 1 and 2

A candidate that makes a denominator zero is not a solution

1. Restrictions first: $x \neq 1$, $x \neq -1$

Multiply every term by $(x - 1)(x + 1)$:

$$2(x + 1) + (x^2 - 1) = 4$$

$$x^2 + 2x - 3 = 0$$

$$(x + 3)(x - 1) = 0$$

$$x = -3 \quad (x = 1 \text{ is excluded})$$

2. Zero on one side first

$$6x^2 - 7x - 3 = 0$$

$$(3x + 1)(2x - 3) = 0$$

$$3x + 1 = 0 \quad \text{or} \quad 2x - 3 = 0$$

$$x = -1/3 \quad \text{or} \quad x = 3/2$$

Round C: solutions to 3 and 4

Clear the fractions by multiplying every term by the LCD

3. Multiply every term by 5

$$x^2 + 5x = 12x - 10$$

$$x^2 - 7x + 10 = 0$$

$$(x - 2)(x - 5) = 0$$

$$x = 2 \text{ or } x = 5$$

4. Restrictions: $x \neq -3$, $x \neq 1$

$$10(x - 1) = 6(x + 3)$$

$$10x - 10 = 6x + 18$$

$$4x = 28$$

$$x = 7 \text{ (allowed; check: } 1 = 1)$$

Round D: coordinate geometry

Give exact answers

8 minutes

Two points

$P(-2, 5)$ and $Q(6, -1)$

1. Midpoint of PQ
2. Distance PQ
3. Equation of line PQ

A circle

Center $(-3, 1)$, radius 7

4. Equation of the circle

A line and a point

$y = -2x + 7$, point $(4, -3)$

5. Parallel line through the point
6. Perpendicular line through the point

Round D: solutions for P and Q

Average for the midpoint; subtract and square for the distance

$$1. \quad M = \left(\frac{-2 + 6}{2}, \frac{5 + (-1)}{2} \right) = (2, 2)$$

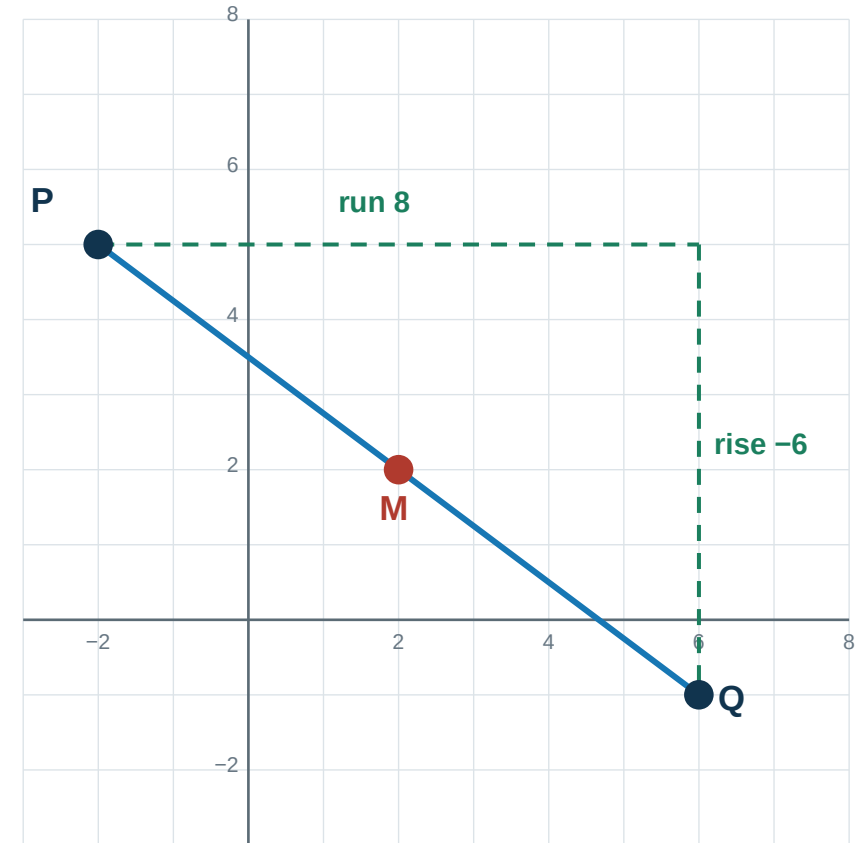
$$2. \quad d = \sqrt{((6 - (-2)))^2 + (-1 - 5)^2} = \sqrt{(8^2 + (-6)^2)} = \sqrt{100} = 10$$

$$3. \quad m = \frac{-1 - 5}{6 - (-2)} = \frac{-6}{8} = -\frac{3}{4}$$

$$y - 5 = -(3/4)(x + 2)$$

$$y = -(3/4)x + 7/2$$

Check with Q(6, -1): $-(3/4)(6) + 7/2 = -9/2 + 7/2 = -1 \quad \checkmark$



Round D: circle and line solutions

The circle equation uses r^2 ; a perpendicular slope is the negative reciprocal

4. Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

$$(x + 3)^2 + (y - 1)^2 = 49$$

- Center $(-3, 1)$ gives $x + 3$ and $y - 1$.
- Radius 7 gives $7^2 = 49$ on the right.

5 and 6. Given slope $m = -2$, point $(4, -3)$

Parallel: same slope

$$y + 3 = -2(x - 4) \rightarrow y = -2x + 5$$

Perpendicular: flip and change the sign

$$m = 1/2: y + 3 = (1/2)(x - 4) \rightarrow y = (1/2)x - 5$$

Do not keep the original intercept 7. Substitute $(4, -3)$ to check both lines.

Round E: maximum height

Section 3.1: the vertex of a quadratic model

4 minutes

A ball is thrown straight up. Its height h , in feet, after t seconds is given. Find the maximum height.

1. $h(t) = 64t - 16t^2$

2. $h(t) = -16t^2 + 96t + 6$

Two steps

1 Time of the vertex

$$t = -b / (2a)$$

2 Height at that time

$$\text{maximum} = h(t)$$

$a < 0$, so the parabola opens down and the vertex is a maximum.

Round E: solutions

The answer is a height in feet, not a time in seconds

1. $a = -16, b = 64$

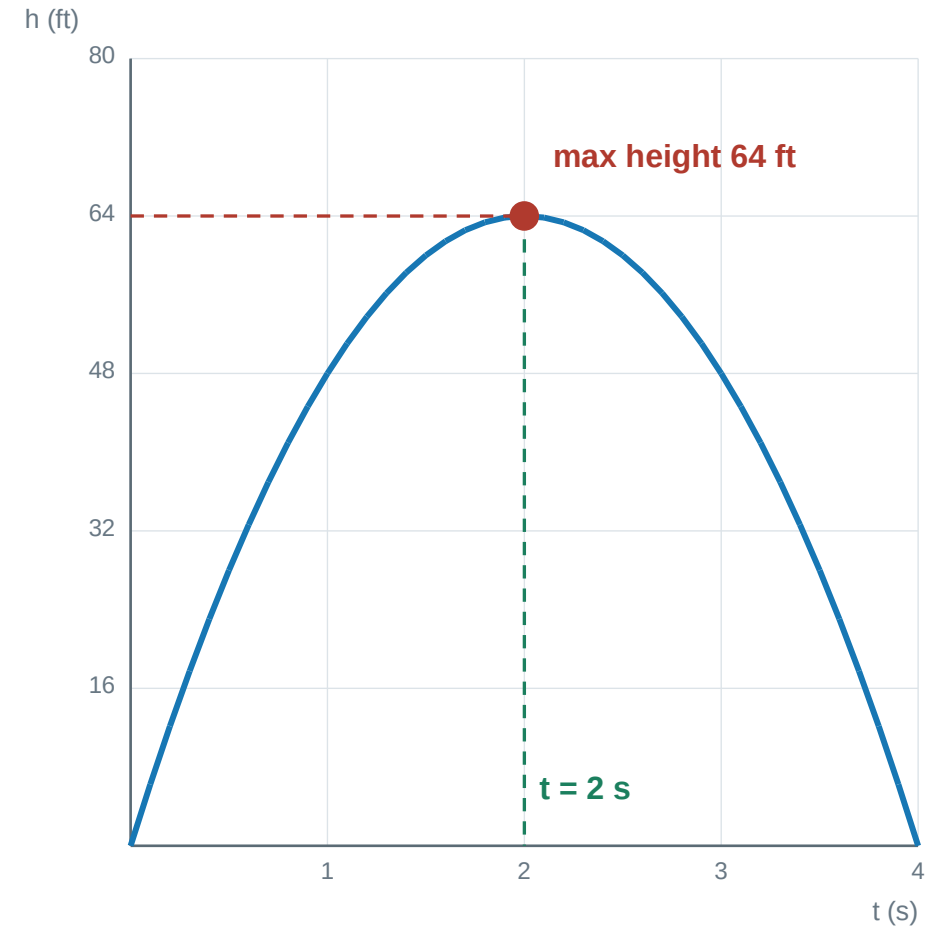
$$t = -64 / (2(-16)) = 2 \text{ s}$$

$$h(2) = 64(2) - 16(2)^2 = 128 - 64 = 64 \text{ ft}$$

2. $t = -96 / (2(-16)) = 3 \text{ s}$

$$h(3) = -16(3)^2 + 96(3) + 6 = 150 \text{ ft}$$

Stopping at $t = 2$ answers “when,” not “how high.”



Eight errors to avoid on Friday

Each one costs points on work that is otherwise correct

Factoring

Stopping after the GCF

Intervals

Including an excluded endpoint; treating a union as the overlap

Exponents

Reading a negative exponent as a negative number

Rational expressions

Subtracting denominators or only part of a numerator

Rational equations

Keeping a candidate that makes a denominator zero

Circles

Writing r instead of r^2 on the right side

Perpendicular lines

Changing the sign without taking the reciprocal

Maximum height

Reporting the time instead of the height

Before Friday

Turn today's "needs practice" list into a plan

Today

- Submit Quiz 4 by 3:15 PM.
- Circle the rounds where you made an error.

Thursday

- Rework today's problems without notes.
- Write every formula from memory, then check.
- Use Mixed practice and the Test checkpoint on the Test 1 review page.
- Bring questions to office hours.

Friday

- Arrive on time with pencils and an eraser.
- Write restrictions first; box final answers.
- Save five minutes to check.

[Test 1 review page: andrewhvolk.github.io/130Test1.html](https://andrewhvolk.github.io/130Test1.html)