

ALGEBRA I FINAL EXAM REVIEW GUIDE

1. REAL NUMBERS AND THEIR PROPERTIES

TERMINOLOGY

Unit 1

- Whole Numbers
- Integers
- Rational Numbers
- Irrational Numbers
- Real Numbers

• Absolute Value

PRACTICE

1. To which of the above set(s) do each of the following numbers belong:

a. -2

b. 5

c. $\sqrt{2}$

d. $\frac{8}{9}$

e. $|-5|$

f. $|2-10|$

2. REWRITING EQUATIONS AND FORMULAS

PRACTICE

1. Solve each of the following equations for y.

a. $6x + 3y = 9$

b. $5x - y = -3$

c. $2xy + 9y = 8$

d. $3(2x + 4y) = 12$

2. Solve each formula for the indicated variable.

a. $A = \frac{1}{2}bh$ for b

b. $F = \frac{9}{5}C + 32$ for C

c. $A = \pi r^2$ for r

d. $p = 2(l + w)$ for w

Unit 2

3. SIMPLIFYING RADICALS

TERMINOLOGY

- Radicand
- Simplest form
- Product property $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$
- Quotient property $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$
- Rationalizing the denominator

- Add/Subtract Radical Expressions
- Solve Radical Equations

Unit 11

PRACTICE

$$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

1. Simplify each of the following.

a. $\sqrt{75}$

b. $3\sqrt{25}$

c. $\sqrt{6} \cdot \sqrt{14}$

d. $\frac{3}{\sqrt{3}}$

e. $\frac{10}{\sqrt{2}}$

f. $\sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{\sqrt{4}}$

g. $\sqrt{\frac{4}{5}} = \frac{\sqrt{4}}{\sqrt{5}}$

h. $2\sqrt{7} + 4\sqrt{7}$

k. Solve $\sqrt{x-3} = 10$

4. ALGEBRAIC EXPRESSIONS

TERMINOLOGY

- Expression vs. equation
- Algebraic expression vs. numerical expression
- Order of operations
- Evaluate vs. simplify

Unit 1

EXAMPLE (using expected format)

Evaluate the expression *without* using a calculator: $56 - 12 \div 3 \cdot 2$

$$56 - 12 \div 3 \cdot 2 =$$

$$56 - 4 \cdot 2 =$$

$$56 - 8 =$$

$$\boxed{48}$$

PRACTICE

1. Evaluate each expression for the given value of x :

a. $x^3 \div 9 - 2x$ when $x = -3$ b. $\frac{(3x^2 - 5x) \div 2}{7x - 10}$ when $x = 5$

2. Evaluate each expression *without* using a calculator.

a. $16 \div (2(3^3 - 11) \div 4) + 5^2$ b. $\frac{2(5-7)^3}{\frac{1}{5}} + (15 \div 3 \cdot 2)$

3. Simplify the expression: $-3(x^2 + 2x) - 5x(2x - 3)$

5. SOLVING LINEAR EQUATIONS

TERMINOLOGY

- Linear equation

EXAMPLE (using expected format)

Solve and check:

$$6x - 13 = 22 - x$$

check:

$$6(5) - 13 = 22 - 5$$

$$7x - 13 = 22$$

$$30 - 13 = 17$$

$$7x = 35$$

$$17 = 17$$

$$x = 5$$

PRACTICE

1. Solve each equation. Check your solution. NOTE: If the equation contains fractions DO NOT change them to decimals.

a. $-3x + 14 = 11$

b. $4x - 12 = -3x + 9$

c. $\frac{1}{2}x - 8 = -3$

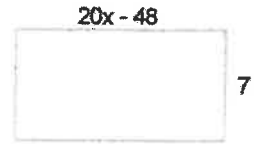
d. $6(-x - 5) = -4(x - 3) - x$

(Hint: multiply by the reciprocal)

e. $3 - (2x + 9) = 17$

f. $\frac{2}{3}x - 2 = -\frac{3}{2}x - 4$ (Hint: multiply by common denominator)

2. Find the dimensions of the rectangle given that the area is 504 sq. units.



$A = \text{base} \times \text{height}$

6. SOLVING LINEAR INEQUALITIES

TERMINOLOGY

- Inequality symbols ($<$, $>$, \leq , \geq than or equal to)

- Compound inequality $2 < x < 7$

- Multiplying/dividing by a negative number *flip the inequality*

unit 3

PRACTICE

1. Solve each of the following and graph the solution on the number line.

a. $-3x + 9 < 12$



b. $7x - 10 \geq 11$



c. $-\frac{2}{3}x - 4 \leq 8$



d. $-4 < 2x - 6 \leq 8$



e. $-3x + 5 < -1$ or $4x - 1 \leq 3$



9. FUNCTIONS

TERMINOLOGY

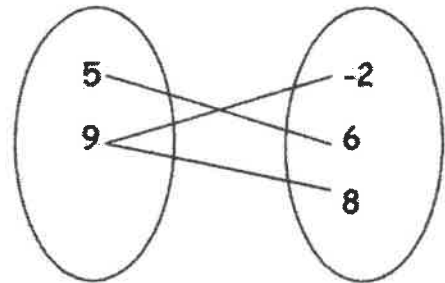
- Domain
- Range
- Function
- Function notation $f(x) =$
- Vertical line test
- Linear function
-

Unit 4

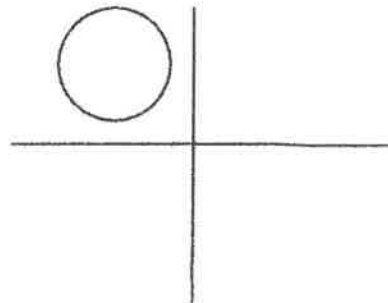
PRACTICE

1. Evaluate $f(x) = -x^2 + x - 2$ when $x = -2$
2. Evaluate $j(x) = x^3 - 2x^2$ when $x = 9$
3. Identify whether the relation $\{(2, -2), (3, 5), (3, 1), (8, 1)\}$ is a function. Explain why or why not.

4. a. Identify the domain and range.
b. Is this a function? Why or why not?



5. Using the vertical line test, explain why the graph below is or is not a function.



10. SLOPE

TERMINOLOGY

- Slope (positive, negative, zero, undefined)
- Parallel lines - Same slope
- Perpendicular lines - slopes are opposite reciprocals

PRACTICE

1. Find the slope of the lines that pass through the following pairs of points.

Identify if the line goes up/down or is horizontal/vertical.

a. $(-2, 4)$ $(4, 8)$

b. $(2, 7)$ $(2, -65)$

c. $(10, 8)$ $(1, 1)$

d. $\left(\frac{2}{3}, \frac{7}{8}\right)$ $\left(\frac{15}{17}, \frac{7}{8}\right)$

2. Determine if the lines determined below are parallel, perpendicular or neither.

a. Line A contains $(3, 5)$ and $(-7, 1)$ Line B contains $(8, 7)$ and $(6, 2)$

b. Line A contains $(3, 5)$ and $(-7, 1)$ Line B contains $(4, -1)$ and $(-1, -3)$

11. GRAPHING LINEAR EQUATIONS

TERMINOLOGY

- y-intercept
- x-intercept

PRACTICE

1. Identify the slope and y-intercept of each line.

a. $y = 7x + 9$

b. $3x - 5y = -6$

c. $y = 2$

d. $x = -8$

2. Find the x- and y-intercepts of each line.

a. $7x - 8y = 56$

b. $y = 9x + 2$

3. Graph.

a. $y = -\frac{2}{3}x - 3$

b. $2x - 5y = 15$

12. WRITING THE EQUATIONS OF A LINE

TERMINOLOGY

- slope
- y-intercept

- slope-intercept form $y = mx + b$
- point-slope form $y - y_1 = m(x - x_1)$
- standard form $ax + by = c$

PRACTICE

1. Write the equation, in slope-intercept form, for each of the following lines.

a. slope = 4, y-intercept = 7

b. slope = $\frac{1}{2}$, through (-2, 8)

c. through (6, -2) and parallel to $y = 7x - 1$

d. through (6, -2) and perpendicular to $y = 7x - 1$

e. through (-1, 7) and (4, 0)

unit 5

13. SOLVING LINEAR INEQUALITIES IN TWO VARIABLES

PRACTICE

1. Graph the solutions to the following inequalities on the coordinate plane.

a. $y < 2x + 6$

b. $y \geq \frac{2}{3}x - 2$

c. $y > -8$

d. $2x + 3y < 9$

unit 6

Test a point to shade the half plane that represents each solution set.

⑦

14. RULES OF EXPONENTS

TERMINOLOGY

- Product of powers $x^m \cdot x^n = x^{m+n}$
- Power of powers $(x^m)^n = x^{m \cdot n}$
- Quotient of powers $\frac{x^m}{x^n} = x^{m-n}$
- Power of a quotient $\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$
- Zero exponent $x^0 = 1$
- Negative exponents $x^{-1} = \frac{1}{x^1}$

Exponential functions
- Growth
- Decay

unit 7

PRACTICE

1. Simplify each expression leaving variables with positive exponents.

a. $\frac{9c^4}{-3c^2}$

b. $5^{-2} \cdot 3^{-2} \cdot 4^0$

c. $\left(\frac{2c^4}{5d}\right)^3$

d. $\frac{(4c^2)(-cd^4)^5}{8c^4}$

e. $(4x)(7x^3)$

f. $(ab)^3$

g. $(-7x^2y)^3$

h. $\frac{-6m^3n^2}{18m^5n}$

2. Graph

a. $f(x) = 5 \cdot 2^x$

b. $f(x) = 8 \cdot \left(\frac{1}{2}\right)^x$

15. MULTIPLYING POLYNOMIALS

TERMINOLOGY

- Polynomial; monomial; binomial; trinomial
- FOIL

• Box method

PRACTICE

1. Multiply and simplify each of the following.

a. $(x+1)(x+4)$

b. $(x+1)(x-4)$

c. $(2x+y)(3x+4y)$

d. $(x+6)(x-6)$

e. $(x-2)(3x^2-6x+12)$

f. $(3x-4)^2$

unit 7

16. FACTORING

TERMINOLOGY

- Factor
- Common monomial factor (GCF)
- Difference of Squares
- Perfect Square Trinomial

• Box Method

Unit 8

PRACTICE

1. Completely factor each of the following.

a. $6x^3y + 12x^2y^2 - 18x$

b. $x^2 + 11x + 18$

c. $2m^2 + 22m - 52$

d. $4x^2 - 9y^2$

e. $x^2 - 10x + 25$

17. SOLVING SYSTEMS OF EQUATIONS

TERMINOLOGY

- system of equations
- solving systems by substitution, elimination (linear combination), and graphing

PRACTICE

1. Solve the following system $\begin{cases} 3x - 2y = -7 \\ 2x - 5y = 10 \end{cases}$ using

- a. graphing
- b. substitution
- c. elimination

Unit 6

18. QUADRATIC FUNCTIONS

TERMINOLOGY

- Parabola
- Vertex
- Maximum/Minimum
- Axis of Symmetry
- Domain/Range
- Roots, solutions, x-intercepts, zeros
- Concavity
- Y-intercept
- Factoring/Zero Product Property
- Quadratic Formula
- Completing the Square
- Discriminant

PRACTICE

1. Graph the parabolas

a. $f(x) = x^2$

b. $f(x) = x^2 + 3x - 4$

c. $f(x) = -x^2 + 2$

2. Solve the quadratic equations

a. $(x - 4)(x + 1) = 0$

b. $x^2 + 3x - 4 = 0$

c. $x^2 + 6x = 3$

d. $x^2 = 12 - 4x$

unit 9