


**DigitLit**   
math instruction

# ALGEBRA I

NYS REGENTS REVIEW



## TABLE OF CONTENTS

<b>1. FOUNDATIONS OF ALGEBRA</b> .....	<b>3-6</b>
Order of Operations & Evaluating Expressions .....	3
Properties of Real Numbers .....	4
Translating Algebraic Expressions .....	5
Classifying Numbers (Rational vs. Irrational) .....	6
<b>2. LINEAR EXPRESSIONS &amp; EQUATIONS</b> .....	<b>7-11</b>
Solving Linear Equations .....	7
Solving Literal Equations & Transforming Formulas .....	8
Consecutive Integers .....	9
Modeling Linear Word Problems .....	10
<b>3. INEQUALITIES</b> .....	<b>11-13</b>
Inequalities & Interval Notation .....	11
Solving Linear Inequalities .....	12
Modeling Linear Inequalities .....	13
<b>4. FUNCTIONS</b> .....	<b>14-18</b>
Function Definition .....	14
Evaluating Functions .....	15
Graphical Features of Functions .....	16
Domain & Range .....	17
Average Rate of Change .....	18
<b>5. LINEAR FUNCTIONS &amp; INEQUALITIES</b> .....	<b>19-23</b>
Evaluate & Graph Linear Functions .....	19
Writing Linear Equations .....	20
Modeling Linear Functions .....	21
Absolute Value Piecewise Linear Functions .....	22
Linear Inequalities .....	23
<b>6. SYSTEMS OF EQUATIONS &amp; INEQUALITIES</b> .....	<b>24-31</b>
Solve Systems of Equations by Graphing .....	24
Solve Systems of Equations by Substitution .....	25
Solve Systems of Equations by Elimination .....	26
Model Systems of Linear Equations .....	27,28
Solve Systems of Inequalities .....	29,30
Model Systems of Inequalities .....	31
<b>7. EXPONENTIAL &amp; LOGARITHMIC FUNCTIONS</b> .....	<b>32-36</b>
Rules of Exponents .....	32
Exponential Equations .....	33
Exponential Growth & Decay .....	34
Linear vs Exponential Functions .....	35
Transformations of Exponential Functions .....	36

PREVIEW

<b>8. SEQUENCES.....</b>	<b>37-39</b>
Sequences .....	37
Arithmetic Sequence.....	38
Geometric Sequence.....	39
<b>9. POLYNOMIALS.....</b>	<b>40-43</b>
Operations with Polynomials.....	40
Factoring GCF & DOTS .....	41
Factoring Trinomials.....	42
Factoring Completely.....	43
<b>10. SQUARE ROOTS.....</b>	<b>44-45</b>
Operations with Radicals.....	44
Square Root Functions.....	45
<b>11. QUADRATIC FUNCTIONS.....</b>	<b>47-51</b>
Vertex & Axis of Symmetry.....	47
Solving Quadratics (Factoring).....	47
Solving Quadratics (Complete the Square).....	48
Solving Quadratics (Quadratic Formula).....	49
Modeling Quadratics .....	50,51
<b>12. STATISTICS.....</b>	<b>52-55</b>
Linear Regression.....	52
Box Plots.....	53
Two-Way Frequency Tables .....	54
Variability.....	55

Preview



Skill: Order of Operations

Use the order of operations to simplify the following expression.

$$32 - [(5 - 8)^2 + 2(3)]$$



Skill: Evaluating Expressions

Evaluate the expression for the given values.

$$\frac{a^2 - 4b}{2} \text{ if } a = 4 \text{ and } b = -$$



Regents Practice Question

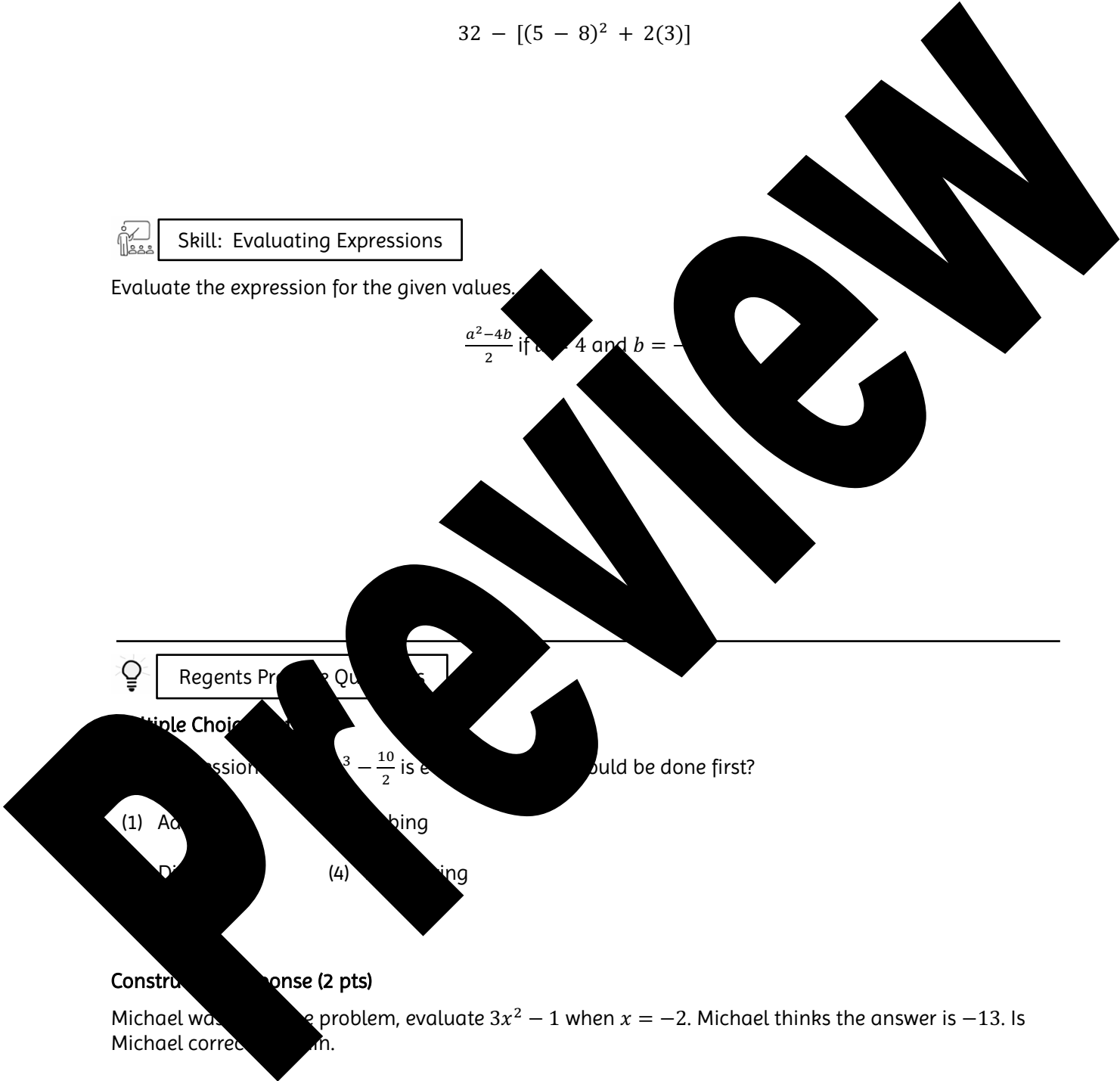
Multiple Choice

Which operation should be done first in the expression  $3 - \frac{10}{2}$  is e... could be done first?

- (1) Addition
- (2) Subtraction
- (3) Division
- (4) Multiplication

Constructed Response (2 pts)

Michael was solving the problem, evaluate  $3x^2 - 1$  when  $x = -2$ . Michael thinks the answer is  $-13$ . Is Michael correct? Explain.





Skill: Identifying Properties

Fill in the blank with either the commutative, associative, or distributive property.

a.  $-2 + (x + y) = -2 + (y + x)$  \_\_\_\_\_ property of \_\_\_\_\_

b.  $2 \cdot (x \cdot y) = (2 \cdot x) \cdot y$  \_\_\_\_\_ property of \_\_\_\_\_

c.  $\frac{15x+30}{3} = 5x + 10$  \_\_\_\_\_ property of \_\_\_\_\_



Skill: Distributive Property

Simplify the expression using the distributive property. Combining like terms is needed.

$-2(g + 4) - 6(f - 3)$



Regents Practice Question

Multiple Choice (2pts)

When Ryan is solving the equation  $x^2 + 12x - 6 = 4x$ , he writes  $x^2 + 12x - 6 = 4x$ . Which property justifies Ryan's first step?

- (1) Associative Property
- (2) Distributive Property
- (3) Commutative Property
- (4) Addition Property

Constructed Response (2 pts)

Lily solved the equation  $4(2x - 1) - 1 = 11$  for  $x$ . Her work is shown below. Is she right?

Between which two lines did Lily make a mistake? Explain which property was used *incorrectly*.

**Line 1**  $4(2x - 1) - 1 = 11$

**Line 2**  $4(2x - 1) = 12$

**Line 3**  $8x - 1 = 12$

**Line 4**  $8x = 13$

**Line 5**  $x = \frac{13}{8}$



Skill: Translating Words to Algebra

Translate each of the statements below into algebraic equations.

- a. Nine less than “ $x$ ” is equal to 10 \_\_\_\_\_
- b. The quotient of 36 and “ $a$ ” is 4 \_\_\_\_\_
- c. Twice the sum of  $f$  and 6 is 18 \_\_\_\_\_



Skill: Translating Algebra to Words

Directions: Translate each of the equations below into algebraic words.

- a.  $3(k + 3) = 9$
- b.  $4k - 1$



Regents Practice Questions

Multiple Choice (2pts)

Jenna deposits \$500 into her bank account and withdraws \$50 every week,  $w$ . Which of the following expressions represents the amount in her bank account after  $w$  weeks?

- (1)  $500 \cdot 50w$
- (2)  $500 - 50w$
- (3)  $500 - 50w$
- (4)  $500 - 50w$

Response Area (1pt)

Rachel went to the deli to buy lunch for her and her friends. She bought slices of pizza, soda, and bags of chips. She bought three times as many bags of chips as sodas, and two fewer pizza slices than sodas.

If  $s$  represents the number of sodas they bought, write an algebraic expression that represents the number of each item they bought in total.



Skill: Rational & Irrational Numbers

Identify whether each of the following numbers is rational or irrational.

a.  $.8\overline{6}$

b. 2.7

c.  $2\pi$

d.  $\sqrt{169}$

e. 8.54172948 ...

f.  $\frac{\pi}{3}$

g.  $\sqrt{2}$

h.  $\frac{3}{4}$



Regents Practice Questions

Multiple Choice (2pts)

1. Which expression results in an irrational number?

(1)  $\sqrt{100} - \sqrt{25}$

(2)  $\sqrt{36} \cdot \sqrt{1}$

(3)  $\sqrt{4} + \sqrt{9}$

(4)  $\sqrt{2} + \sqrt{8}$

2. Given  $M = \sqrt{10}$ ,  $N = 3\sqrt{14}$ , and  $H = \sqrt{121}$

Which expression results in a rational number?

(3)  $T + H$

(4)  $H + M$

Short Response (2pts)

A teacher wrote the following set of numbers on the board:

$a = \sqrt{15}$   $b = 3.1$   $c = \sqrt{81}$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.



Skill: Solving Linear Equations

What is the solution to the equation  $\frac{2}{3}\left(x + \frac{6}{5}\right) = 5$ ?



Skill: Solving Linear Equations with Variables on Both Sides

Solve algebraically for  $x$ :

$$-\frac{3}{5}(x - \frac{3}{5}) = -\frac{1}{2}$$



Regents Practice Question

## Multiple Choice (2 pts)

1. Which value of  $x$  makes the equation  $\frac{x-2}{3} + \frac{1}{4} = \frac{1}{2}$  true?  
 (1) 0 (2) 1 (3)  $-\frac{5}{2}$  (4)  $-\frac{1}{2}$
2. The value of  $x$  that satisfies the equation  $\frac{2}{3} = \frac{x+9}{15}$  is  
 (1) 1 (2) -1 (3) 19 (4) -19

## Short Response (2 pts)

Solve the equation below algebraically for the exact value of  $x$ .

$$6 - \frac{3}{4}(x + 7) = 6x$$





Skill: Solving Literal Equations

The formula for the perimeter of a rectangle is  $P = 2w + 2l$ . Write a formula that can be used to find the length,  $l$ , in terms of  $P$ , and  $w$ .



Skill: Solving Literal Equations with Square Roots

The volume of a right circular cone can be calculated using the formula  $V = \frac{1}{3}\pi r^2 h$ . Write a formula that can be used to find the positive value for the radius,  $r$ , in terms of  $V$  and  $h$ .



Regents Practice Questions

Multiple Choice (2pts)

Three students were asked to solve the equation  $x^2 + 4x + 4 = 0$  for  $x$ . Their responses are shown below.

- i.  $x = -2$
  - ii.  $x = -2 + z^2$
- Which of the following responses are correctly solving the equation?
- (1) i. and ii.
  - (2) i. and iii.
  - (3) ii. and iii.
  - (4) ii. and iii.

Constructed Response (2 pts)

The formula for converting degrees Fahrenheit,  $F$  to degrees Kelvin,  $K$  is:

$$K = \frac{5}{9}(459.67 + F)$$

Solve for  $F$  in terms of  $K$ .