ALGEBRA I REGENTS 2023 CHEAT SHEET

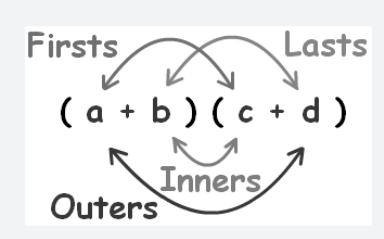
Be calm. Make the test work for you. Look for like/similar questions. Rewrite the question to take out the info that you need.

NEED-TO-KNOW VOCABULARY

ORDER OF OPERATIONS - PEMDAS	
	ex: $25 - 4^2 + 3 * 4$
Parenthesis ……	no parenthesis in this problem
Exponents ……	25 – 16 + 3 * 4
Multiply/Divide ……	25 - 16 + 12
Add/Subtract ……	9 + 12
Solution ……	21

ALGEBRA		
Constant	the term that doesn't change	*ex:* 2m + **7**
Coefficient	the number attached to the letter	*ex:* **2**m + 7
Variable	any term with a letter	*ex:* 2**m** + 7
	Combining Like Terms *ex*: 3m + 2b + 12m - 5b = 15m - 3b ★ be sure to use symbol in front of coefficient when combining	
Ratio	comparison of two numbers	*ex*: $\frac{3}{4}$ *or* $3:4$
Exponents	the power/degree, how many times to multiply the base number	*ex*: 5^3 (3 = exponent)
Base	the number that gets multiplied by itself	*ex*: 5^3 (5 = base) *ex:* To solve (5 * 5 * 5) = 125

FOIL METHOD FOR MULTIPLYING TWO BINOMIALS		
FOIL	First - Outer - Inner - Last	working with trinomials



NAMES FOR DIFFERENT TYPES OF TOTALS, ANSWERS, OR SOLUTIONS		
Sum	a result after adding two or more numbers	*total, add*
Difference	a result after subtracting two or more numbers	*less than, minus, subtract*
Product	a result after multiplying two or more numbers	*factor, of*
Quotient	a result after dividing two or more numbers	*dividing*
Absolute Value	distance from zero	★ value is always positive (**+**)

COORDINATE PLANE AND FUNCTIONS		
Function (FNC)	a relationship between x and y	for each *x-value,* there is only one *y-value* (no repeating x-value)
Domain	x- value	(**x**, y)
Range	y- value	(x, **y**)
Line Formula	y **= m**x **+ b**	**m**=slope, **b**= y-intercept
Point Slope	$y\text{-}y_1 = m\,(x - x_1)$	
Slope Formula	**m** = $\frac{y2-y1}{x2-x1}$	*rise over run*
Y-Intercept	where the line intersects y axis	**b** value (start here when making a line)
Linear FCN	points make a line, constant rate of change	
Non-Linear FCN	does not look like a line	*ex:* parabola, repeating x-values
Quadratic FCN	make parabolas	*smile-y face* or *frowny face*
Exponential	upward sloping, y-value increases faster than the x, always lies above the x-axis	
Sequence	a type of function used to describe patterns	

EXPONENT RULES

Multiplying: When multiplying exponents with the same base, we add the exponents	*ex*: $5^3 * 5^3 = 5^{3+3} = 5^6$
Dividing: When dividing exponents with the same base, we subtract the exponents	*ex:* $2^3 \div 2^2 = 2^{3-2} = 2^1 = 2$ ★Note: anything to the ^1 = invisible
Raising to another power: We will multiply the exponents, when raising the base to another power	*ex*: $(2^3)^3 = 2^{3*3}$ $3*3 = 2^9 = 2 *2 *2 *2 *2 *2 *2 *2 *2 = 256$ ★ any base to the ^0 (zero power) = 1 *ex:* $2^0 = 1$, $10^0 = 1$, $x^0 = 1$
Negative exponents: Neg. exponents in the numerator, become a positive exponent in the denominator	*ex*: $4^{-3} = \frac{1}{4^3} = \frac{1}{64}$

QUADRATIC EQUATIONS

How to solve

Set equation equal to zero, then break polynomial into 2 factors: ( ) ( )

ex: $x^2 + 5x + 6 = 0$	Look for factors of 6, that when combined together will give us the middle term of 5.
$(x + 3)(x + 2) = 0$	Solve each quantity individually for x
$x + 3 = 0$ $\quad$ $x + 2 = 0$ $-3 \quad -3$ $\quad$ $-2 \quad -2$	
$x = -3$ $\quad$ $x = -2$	Our two solutions for x are -3 and -2

How to FOIL given 2 quantities

Basically, you are using the distributive property twice.

ex: Given (x + 4) (x - 5) =

First:	$x \cdot x = x^2$	first term in 1st ( ) times 1st term in 2nd ( )
Outer:	$x \cdot (-5) = -5x$	x from 1st ( ) -5 from the 2nd ( )
Inner:	$4 \cdot x = 4x$	4 from the 1st ( ) times x from the 2nd ( )
Last:	$4 \cdot (-5) = -20$	4 from 1st ( ) times -5 from the 2nd ( )

Combine all terms: $x^2 - 5x + 4x - 20 = x^2 - 1x - 20$

THE NUMBER SYSTEM

REAL includes all the numbers

A. Irrational — numbers that cannot be written as a fraction, never end and never repeat — *ex*: π *or* $\sqrt{2}$

B. Rational — can be written as a fraction or a decimal that ends or repeats. — *ex*: 0.3333 or 0.25

I. Integers*:* whole numbers and their opposites — *ex:* 4 and -4

II. Whole: start with 0 — *ex:* 0, 1, 2, 3 …

III. Natural: where one naturally wants to start counting — *ex*: 1, 2, 3 …

PROPERTIES

Commutative	with addition and multiplication of numbers, you can change the order of the numbers in the problem, and it will not affect the answer.	*ex:* a + b = b + a
Distributive	number outside property is multiplied by all terms inside properties	*ex:* 2(3+4) = (2*3)+(2*4)
Associative	values inside of the parenthesis change / grouping changes	*ex:* (a+b)+c = a+(b+c)
Identity (Addition)	add any number to zero, the number stays the same ★ also called the Zero Property	*ex*: a+0 = a, 9+0 = 9
Identity (Multiplication)	anything times one is the number	*ex:* 5*1 = 5
Equation vs. Expression	equations have **=** expressions are just phrases	
Inequalities	a phrase is greater than (x > 1), less than (x < 1), ($\leq$) less than or equal to, or ($\geq$) greater than or equal to.	

STATISTICS		
Mean	the average of the values	sum of values, divided by how many values there are. *a.k.a. Fair value*
Median	middle value	★ arrange the data points **smallest to largest**, find the middle number
Range	largest value minus smallest value	
Mode	the value that occurs most frequently	*most*
Quartile	three identifiers in which the data set can be grouped	*ex:* Q1, Q2 (same as median), Q3
Interquartile Range (IQR)	a way in which to measure the spread of data	*ex:* Q3 – Q1
Square Root	the reverse of a squared number (a number multiplied by itself to get that number)	
Cubed Root	the reverse of a cubed number (a number multiplied by itself three times to get that number)	

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Turn on:

- Clear all : 2nd → + → 7 → 1 → 2
- Input Data for tables:

  Stat → Edit → Enter

- To clear: ↑ *clear* ↓
- Insert data to get a linear regression:

  x-values = L1, y-values = L2 → *stat* → *calc* → *#4* → *enter*

- Input data for tables

Reference Sheet for Algebra I (NGLS)

Conversions

1 mile = 5280 feet

1 mile = 1760 yards

1 pound = 16 ounces

1 ton = 2000 pounds

Conversions Across Measurement Systems

1 inch = 2.54 centimeters

1 meter = 39.37 inches

1 mile = 1.609 kilometers

1 kilometer = 0.6214 mile

1 pound = 0.454 kilogram

1 kilogram = 2.2 pounds

Quadratic Equation	$y = ax^2 + bx + c$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Equation of the Axis of Symmetry	$x = -\frac{b}{2a}$
Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Linear Equation Slope Intercept	$y = mx + b$
Linear Equation Point Slope	$y - y_1 = m\left(x - x_1\right)$

Exponential Equation	$y = ab^x$
Annual Compound Interest	$A = P\left(1 + r\right)^n$
Arithmetic Sequence	$a_n = a_1 + d\left(n - 1\right)$
Geometric Sequence	$a_n = a_1 r^{n\text{-}1}$
Interquartile Range (IQR)	$IQR = Q_3 - Q_1$
Outlier	Lower Outlier Boundary $= Q_1 - 1.5\left(IQR\right)$
	Upper Outlier Boundary $= Q_3 + 1.5\left(IQR\right)$