Mrs. Velasquez
H Algebra 2

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Date____________ Per. ____

ALGEBRA/GEOMETRY FORMULAS

DISTANCE FORMULA

1. $d(P_1,P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

SLOPE *m* OF A LINE

2. $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

SLOPE-INTERCEPT FORM OF A LINE

3. $y = mx + b$

POINT-SLOPE FORM OF A LINE

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

SPECIAL PRODUCT FORMULAS

5. $(x + y)(x - y) = x^2 - y^2$

6. $(x + y)^2 = x^2 + 2xy + y^2$

7. $(x - y)^2 = x^2 - 2xy + y^2$

SPECIAL FACTORING FORMULAS

8. $x^2 - y^2 = (x + y)(x - y)$

9. $x^2 + 2xy + y^2 = (x + y)^2$

10. $x^2 - 2xy + y^2 = (x - y)^2$

MIDPOINT FORMULA

11. $M(P_1,P_2) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

QUADRATIC FORMULA

If $a \neq 0$, the roots of
$ax^2 + bx + c = 0$ are

12. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

EXPONENTS AND RADICALS

13. $a^m a^n = a^{mn}$

14. $(a^m)^n = a^{mn}$

15. $(ab)^n = a^n b^n$

16. $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$

17. $\dfrac{a^m}{a^n} = a^{m-n}$

18. $a^{-n} = \dfrac{1}{a^n}$

19. $\sqrt{ab} = \sqrt{a}\sqrt{b}$

20. $\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$

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CHAPTER 1

Properties of Real Numbers

Terminology	General case	Meaning
(1) Addition is **commutative.**	$a + b = b + a$	Order is immaterial when adding two numbers.
(2) Addition is **associative.**	$a + (b + c) = (a + b) + c$	Grouping is immaterial when adding three numbers.
(3) 0 is the **additive identity.**	$a + 0 = a$	Adding 0 to any number yields the same number.
(4) $-a$ is the **additive inverse,** or **negative,** of a.	$a + (-a) = 0$	Adding a number and its negative yields 0.
(5) Multiplication is **commutative.**	$ab = ba$	Order is immaterial when multiplying two numbers.
(6) Multiplication is **associative.**	$a(bc) = (ab)c$	Grouping is immaterial when multiplying three numbers.
(7) 1 is the **multiplicative identity.**	$a \cdot 1 = a$	Multiplying any number by 1 yields the same number.
(8) If $a \neq 0$, $\frac{1}{a}$ is the **multiplicative inverse,** or **reciprocal,** of a.	$a\left(\frac{1}{a}\right) = 1$	Multiplying a nonzero number by its reciprocal yields 1.
(9) Multiplication is **distributive** over addition.	$a(b + c) = ab + ac$ and $(a + b)c = ac + bc$	Multiplying a number and a sum of two numbers is equivalent to multiplying each of the two numbers by the number and then adding the products.

Properties of Equality	If $a = b$ and c is any real number, then **(1)** $a + c = b + c$ **(2)** $ac = bc$

Products Involving Zero	**(1)** $a \cdot 0 = 0$ for every real number a. **(2)** If $ab = 0$, then either $a = 0$ or $b = 0$.

Properties of Negatives

Property	Illustration
(1) $-(-a) = a$	$-(-3) = 3$
(2) $(-a)b = -(ab) = a(-b)$	$(-2)3 = -(2 \cdot 3) = 2(-3)$
(3) $(-a)(-b) = ab$	$(-2)(-3) = 2 \cdot 3$
(4) $(-1)a = -a$	$(-1)3 = -3$

Notation for Reciprocals

Definition	Illustrations
If $a \neq 0$, then $a^{-1} = \frac{1}{a}$.	$2^{-1} = \frac{1}{2}$ $\left(\frac{3}{4}\right)^{-1} = \frac{1}{3/4} = \frac{4}{3}$

Properties of Quotients

Property	Illustration
(1) $\frac{a}{b} = \frac{c}{d}$ if $ad = bc$	$\frac{2}{5} = \frac{6}{15}$ because $2 \cdot 15 = 5 \cdot 6$
(2) $\frac{ad}{bd} = \frac{a}{b}$	$\frac{2 \cdot 3}{5 \cdot 3} = \frac{2}{5}$
(3) $\frac{a}{-b} = \frac{-a}{b} = -\frac{a}{b}$	$\frac{2}{-5} = \frac{-2}{5} = -\frac{2}{5}$
(4) $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$	$\frac{2}{5} + \frac{9}{5} = \frac{2+9}{5} = \frac{11}{5}$
(5) $\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$	$\frac{2}{5} + \frac{4}{3} = \frac{2 \cdot 3 + 5 \cdot 4}{5 \cdot 3} = \frac{26}{15}$
(6) $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$	$\frac{2}{5} \cdot \frac{7}{3} = \frac{2 \cdot 7}{5 \cdot 3} = \frac{14}{15}$
(7) $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$	$\frac{2}{5} \div \frac{7}{3} = \frac{2}{5} \cdot \frac{3}{7} = \frac{6}{35}$

Relationships Between a and $-a$	(1) If a is positive, then $-a$ is negative. (2) If a is negative, then $-a$ is positive.

Trichotomy Law	If a and b are real numbers, then exactly one of the following is true: $a = b$, $a > b$, or $a < b$.

Laws of Signs	(1) If a and b have the same sign, then ab and $\frac{a}{b}$ are positive. (2) If a and b have opposite signs, then ab and $\frac{a}{b}$ are negative.

Definition of Absolute Value	The absolute value of a real number a, denoted by $\lvert a \rvert$, is defined as follows. (1) If $a \geq 0$, then $\lvert a \rvert = a$. (2) If $a < 0$, then $\lvert a \rvert = -a$.

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Definition of the Distance Between Points on a Coordinate Line	Let a and b be the coordinates of two points A and B, respectively, on a coordinate line. The **distance between A and B**, denoted by $d(A, B)$, is defined by $d(A, B) = \lvert b - a \rvert$.