TOPIC 1

Absolute Value

$$|x| = \begin{cases} x & \text{if } x \ge 0\\ -x & \text{if } x < 0 \end{cases}$$

|X| represents the distance to the origin from the point *x*.

Properties of Absolute Value

For all real number *a* and *b*

1. $|a| \ge 0$ 2. |-a| = |a|3. $a \le |a|$ 4. |ab| = |a||b|5. $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}, b \ne 0$ 6. $|a+b| \le |a|+|b|$

Algebraic Expressions

A combination of variables and numbers using the operation of addition, subtraction, multiplication, or division, as well as powers or root an algebraic expression.

Examples of algebraic expressions

x/6, 3x + 5.

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Evaluating Algorithm Dispressions \Rightarrow **in difference of the expressions** \Rightarrow **in difference of the expression of the variable**

The order of Operations Agreement

- 1. Perform operations within the innermost parentheses and work outward. If the algebraic expression involves division, treat the numerator and the denominator as if they were each enclosed in parentheses.
- 2. Evaluate all exponential expressions.
- 3. Perform multiplication or division as they occur, working from left to right.
- 4. Perform addition or subtraction as they occur, working from left to right.

Example: Evaluate the algebraic expression 2.35x + 179.5 when

ii) *x* = 30

NameMeaningExamplesCommutativeTwo real numbers can be added in any order. $A ddition$ > $13 + 7 = 7 + 13$ > $13x + 7 = 7 + 13x$ > $13x + 7 = 7 + 13x$ > $13x + 7 = 7 + 13x$ Addition $a + b = b + a$ > $13x + 7 = 7 + 13x$ > $13x + 7 = 7 + 13x$ CommutativeTwo real numbers can be multiplied in any order. Multiplication> $x \cdot 6 = 6x$ Multiplication $ab = ba$ > $x \cdot 6 = 6x$ AssociativeIf 3 real numbers are added, it makes no difference which 2 are added first. $(a + b) + c = a + (b + c)$ > $3 + (8 + x)$ $= (3 + 8) + x$ $= 11 + x$ AssociativeIf 3 real numbers are multiplied, it makes no difference which 2 are $x = 11 + x$ > $-2(3x) = (-2 \cdot 3)x = 0$	
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Multiplication multiplied first.	
$(a \cdot b) \cdot c = a \cdot (b \cdot c)$	
Distributive Multiplication distributes over > $5 \cdot (3x + 7)$	
Property of addition. $= 5 \cdot 3x + 5 \cdot 7$	
Multiplication $a \cdot (b + c) = a \cdot b + a \cdot c$ $= 15x + 35$	
over Addition	
Identity Property ofZero can be deleted from a sum. $a + 0 = a$ $6 + 6x = 6x$	
Property of $a + 0 = a$	
Addition $0 + a = a$	
Identity One can be deleted from a product. $\rightarrow 1 \cdot 2x = 2x$	
Property of $a = a$ and $1 \cdot a = a \Delta^{1}$	
Multiplication	
In terse Property The sum of a real number and its \succ (-6x) + 6x = 0	
of Addition additive inverse gives 0, the additive	
identity.	
a + (-a) = 0 and $(-a) + a = 0$	
Inverse Property The product of a nonzero real number $> 2 \cdot 1/2 = 1$	
of and its multiplicative inverse gives 1,	
Multiplication the multiplicative identity.	
$a \cdot 1/a = 1$ and $1/a \cdot a = 1$	

Properties of Real Numbers and Algebraic Expressions