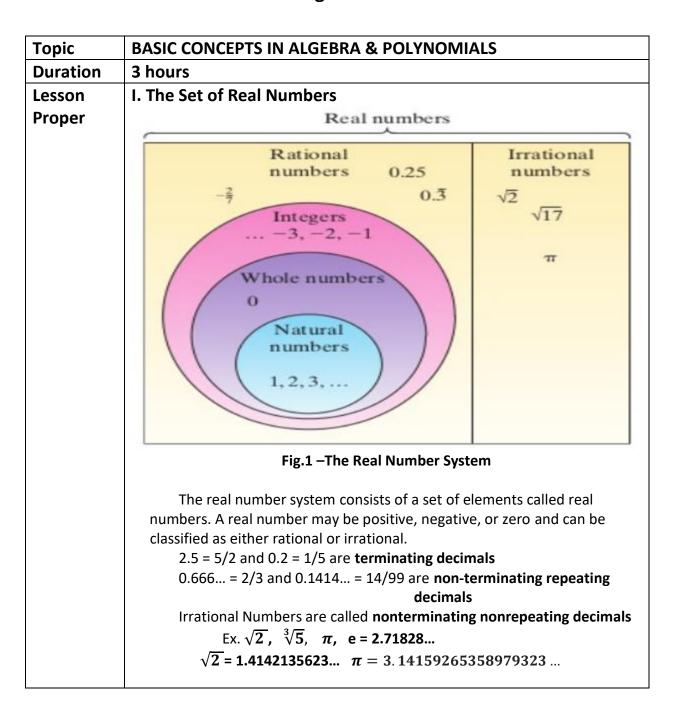
Mathematics Department

COLLEGE ALGEBRA Learning Module #1



Let
$$x = 0.999...$$

$$10x = 9.999...$$

$$10x - x = 9$$

$$X = 1$$

Thus, 0.999... = 1

Exercises: Give the equivalent value in fraction of the following:

- a. 0.777... Ans: 7/9
- b. 0.41444... Ans: 14,003/9
- c. 0.2156262...

Performing Operations on Series of Numbers

$$4^2 * 3 \div 6 + 2 - \sqrt{9} =$$

- > Operations Involved: addition, subtraction, multiplication, division, involution and evolution.
- In a series of numbers involving the basic operations in Arithmetic, the following give the order of performing the operations
 - From left to right, perform first involution/evolution
 - Second, perform the operations within the presence of parentheses or grouping symbols
 - Perform multiplication/division whichever comes first
 - Perform addition/subtraction whichever comes first

Examples:

a.
$$55 - 3 * 8$$

g.
$$-4^2 \div (4 \div 2)$$

b.
$$(6-3)+(4*9)$$

h.
$$(-4)^2 \div 4 - 3(-2)$$

c.
$$16 \div 2 * 4 + 2^3$$

b.
$$(6-3)+(4*9)$$

c. $16 \div 2*4+2^3$
h. $(-4)^2 \div 4-3(-2)$
i. $(-5^2 \div 5)*3^2-\sqrt{49}$

d.
$$3^3 + 9 \div 3 * 6 * \sqrt[3]{8}$$
 j. $[-(-6)^2 - \sqrt[3]{-64} - 2]$

$$i \left[-(-6)^2 - \sqrt[3]{-64} - 2\right]$$

e.
$$(-4^2 \div 4) \div 2$$

$$\div [-4^2 - 1^2]$$

Properties of Equality

- Reflexive : a = a
- 2. Symmetric : If a = b, then b = a
- 3. Transitive : If a = b and b = c, then a = c
- 4. Addition Property of Equality (APE):

If
$$a = b$$
, then $a + c = b + c$

5. Multiplication Property of Equality

If
$$a = b$$
, then $ac = bc$

6. Substitution: If a = b, then a can be replaced by b in any mathematical statement without changing the value of the statement

Properties of Real Numbers

Property Name	Algebraic Representation	Example	Description/Notes
Commutative property of addition Commutative property	$a + b = b + a$ $a \cdot b = b \cdot a$	5 + 3 = 3 + 5 (5)(3) = (3)(5)	The order in which two real numbers are added or multiplied does not affect the
of multiplication	u	(5)(5) (5)(5)	result.
Associative property of addition	(a+b)+c = a+(b+c)	(2+3)+7 = 2+(3+7)	The manner in which two real numbers are grouped under
Associative property of multiplication	$(a \cdot b)c = a(b \cdot c)$	$(2 \cdot 3)7 = 2(3 \cdot 7)$	addition or multiplication does not affect the result.
Distributive property of multiplication over addition	a(b+c) = ab + ac	$3(5+2) = 3 \cdot 5 + 3 \cdot 2$	A factor outside the parentheses is multiplied by each term inside the parentheses.
Identity property of addition	0 is the identity element for addition because a + 0 = 0 + a = a	5 + 0 = 0 + 5 = 5	Any number added to the identity element 0 will remain unchanged.
Identity property of multiplication	1 is the identity element for multiplication because $a \cdot 1 = 1 \cdot a = a$	$5 \cdot 1 = 1 \cdot 5 = 5$	Any number multiplied by the identity element 1 will remain unchanged.
Inverse property of addition	a and $(-a)$ are additive inverses because a + (-a) = 0 and (-a) + a = 0	3 + (-3) = 0	The sum of a number and its additive inverse (opposite) is the identity element 0.
Inverse property of multiplication	a and $\frac{1}{a}$ are multiplicative inverses because $a \cdot \frac{1}{a} = 1$ and $\frac{1}{a} \cdot a = 1$ (provided $a \neq 0$)	$5 \cdot \frac{1}{3} = 1$	The product of a number and its multiplicative inverse (reciprocal) is the identity element 1.

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