MAT 105
Assessment of Readiness – Part 1

Exponents: Repeated multiplications may be written in an abbreviated form by using exponents.
i.e. $3 \cdot 3 \cdot 3 \cdot 3 = 3^4$. The 3 is called the base and 4 is called the exponent or power of 3 (the base)

Find the value of each of the exponential expressions:

a) $2^5 =$ b) $\left(\frac{4}{3}\right)^3 =$ c) $(0.1)^2 =$

Order of Operations:
Many numerical problems involve more than one operation. Sometimes, grouping symbols, such as parenthesis, are utilized to indicate the order in which the operations should be done. **If grouping symbols are present, simplify within the group, doing the innermost parenthesis first.** If no grouping symbols are used, we apply the following order of operations:

1. Evaluate all exponents.
2. Perform any multiplication or division operations in the order in which they occur, working from left to right.
3. Perform any addition or subtraction operations in the order in which they occur, working from left to right.

Note: Fractions are simplified by evaluating the numerator and denominator separately.

Find the value of each expression:

a) $5 + 3 \cdot 6 =$

b) $3 \cdot 2 + 8 \div 4 =$

c) $4 \cdot 5 - 2(3 - 1) =$

d) $3\left[2 + 5(2^3)\right] =$

e) $\frac{8 + 2(8^2 - 4)}{4 \cdot 3 - 10} =$

Converting Words to Symbols using $=,\ \neq,\ <,\ \leq,\ >,\ \geq$

a) Nine equals eleven minus two. _____

b) Twelve is less than twenty-two. _____

c) Three is not equal to four. _____

d) Eight is greater than five. _____

e) Two is greater than or equal to two. _____

Converting Symbols to Words

a) $4 < 7$ _____

b) $1 \geq 0$ _____

c) $3 \neq 7$ _____

Variables: letters used to represent numbers.

Algebraic Expression: is a way of representing a calculation with numbers, using letters to stand for some of

the numbers i.e. $0.2B$, $\frac{x+3}{6}$, $2n-6$, $3x^2+2(x-4)$

Evaluating Algebraic Expressions: We evaluate algebraic expressions by giving particular values to the variables in the expression.

Evaluate each expression if $x=3$ and $y=4$:

a) $2x+4y$

b) $2x^2-3y$

c) $\frac{9y-8x}{2x-y}$

d) $(6x-10)(2y-x)$

Equation: An equation is a statement that two expressions are equal. Depending on the value of the variable,

the statement can be true or false i.e. $x+4=10,\ 2y=16$

Solving an equation means to find the values of the variable that make the equation true. Such values of the variables are called the solutions of the equation.

Decide whether the given number is a solution of the equation:

a) Is 2 a solution to the following equation: $p-1=3$?

b) Is 7 a solution to the following equation: $2k+3=15$?

c) Is $\frac{1}{2}$ a solution to the following equation: $6x-3=0$?

Important Vocabulary to Know

Natural Numbers (counting numbers) $\{1,\ 2,\ 3,\ 4,\ 5,...\}$

Whole Numbers $\{0,\ 1,\ 2,\ 3,\ 4,\ 5,...\}$

Integers- The natural numbers, their opposites and 0 form the set of integers:

$$\{...,-3\ ,-2,\ -1,\ 0,\ 1,\ 2,\ 3...\}$$

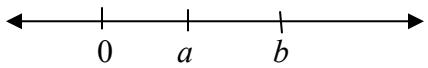
Rational Numbers are numbers that can be expressed as fractions with denominators not equal to 0, i.e. $\frac{5}{12}$

- This set includes all integers since any integer can be written as a fraction, i.e. -6 is a rational number since it could be written as $\frac{-6}{1}$
- This set includes terminating decimals, i.e. 0.23 is a rational number since it could be written as $\frac{23}{100}$.
- This set includes decimal numbers that repeat in a fixed block of digits, i.e. 0 .333… is a rational number since $0.333... = 0.\overline{3} = \frac{1}{3}$.

Irrational numbers are numbers that cannot be expressed as fractions with denominators not equal to 0. These numbers include non-repeating, non-terminating decimals i.e. $\sqrt{3}$

Real Numbers- $\{$all numbers that are either rational or irrational$\}$

Ordering of the Real Numbers- For any two real numbers a and b, a is less than b if a is to the left of b on a number line.



Opposite of a Real Number- each real number, except 0, can be paired with another real number that is the same distance from 0 on the number line, but in opposite directions. i.e. 5 and -5 are opposite numbers

Double Negative Rule: $-(-x) = x$ for all values of x. Except for 0, the opposite of a number is found by changing the sign of the number.

Absolute value is the distance between 0 and the number on the number line. The absolute value of a number can never be negative. i.e. $|2| = 2 \quad |-3| = 3 \quad |0| = 0$

Fill – in the chart below

Simplify:

a) $|-8|$

b) $-|-10|$

c) $-|12-4|$

Number	Reciprocal	opposite
8		
	-3	
		$\frac{7}{2}$
0.5		
		-7
	$\frac{5}{6}$	

Operations with signed numbers

Addition

1. $10+(-3)=$
2. $-4+(-8)=$
3. $-2+[(-6)+(-3)+1]=$
4. $[(-3)+(+8)]\ +\ [5+(-1)+(-6)\ ]=$
5. $5-7=$
6. $3-6+8-2=$
7. $2-5+(-3)-7+1=$

Subtraction

8. $-6-(3-4)=$
9. $(10-3)-(6-9)=$
10. $5-[\ (4-2)-(\ 10-15\ )\ ]=$
11. $(1-2)\ -\ [4-(6-8)-3]=$
12. $(3-7)+8-2+[(-3-5)-(2-5)]=$

Evaluate if $x=-2$ and $y=3$

13. $x+y$
14. $x-y$
15. $y-x$

Multiplication

16. $2(6-8)=$
17. $-3(10-7)-2(1-3)=$
18. $(2)(-1)-(8-9)=$
19. $(-2-4)(-3)-(-5)=$

Evaluate if $x=-2$ and $y=3$

20. xy
21. x^3
22. $3y-2x$
23. $2x^2-3xy$

Division

24. $\dfrac{(-3)(4)}{-2-1} =$

25. $\dfrac{6-(2)(-1)}{8-2\cdot 5} =$

26. $\dfrac{6-2\cdot 4}{18-20} =$

27. $\dfrac{4^2-2(13-5)}{2-1}$

28. $\dfrac{(4-3)-(8+2)}{2(-3-6)} =$

29. $\dfrac{2+[3(1-4)-(4-6)]}{5-2\cdot 5} =$

Evaluate if $x=-1 \quad y=2$ and $z=-3$

30. $4xyz$

31. $3x-2y$

32. $\dfrac{xz+yz}{x}$

33. $z^2+2xz-x^2$

34. $\dfrac{2y-8x}{yz}$

35. $\dfrac{x^2+1}{z+y-x}$