



Gulfport School District
Mathematics Instructional Strategies
PRE-ALGEBRA



Check Grade Level K___ 1___ 2___ 3___ 4___ 5___ 6___ 7 X 8 X 9___ 10___ 11___ 12___

Competency: 2A SIMPLIFY AND EVALUATE NUMERICAL AND ALGEBRAIC EXPRESSIONS. (DOK1)

Vocabulary: EVALUATE, ALGEBRAIC EXPRESSIONS, ORDER OF OPERATIONS, LIKE TERMS, AND COMMUTATIVE PROPERTY.

Teaching Strategy(ies):

TO EVALUATE AN ALGEBRAIC EXPRESSION YOU WOULD SUBSTITUTE THE VALUE FOR EACH VARIABLE INTO THE GIVEN ALGEBRAIC EXPRESSION. LIKE THE GLADE COMMERCIAL SAYS "PLUG IT IN PLUG IT IN". AFTER SUBSTITUTING IN THE VALUES YOU WOULD FOLLOW THE ORDER OF OPERATIONS TO FIND THE VALUE OF THE EXPRESSION. REMEMBER THE ORDER OF OPERATIONS TELLS YOU TO DO PARENTHESIS, EXPONENTS, MULTIPLICATION AND DIVISION FROM LEFT TO RIGHT, AND ADDITION AND SUBTRACTION FROM LEFT TO RIGHT.

EXAMPLE:

LET $a = 2$, $b = -3$, and $c = 4$

$$\frac{2a^2 - b^3}{4c} = \frac{2(2)^2 - (-3)^2}{4(4)} = \frac{2(4) - 9}{16} = \frac{8 - 9}{16} = -\frac{1}{16}$$

AFTER DOING IT BY HAND STUDENTS CAN CHECK TO MAKE SURE THE ANSWER IS CORRECT BY PLUGGING IT INTO THE CALCULATOR. MAKE SURE TO STRESS THE IMPORTANCE OF PUTTING FRACTIONS AND NEGATIVES IN PARENTHESIS IN THE CALCULATOR. THE REASON IS BECAUSE THE CALCULATOR FOLLOWS THE ORDER OF OPERATIONS.

WHEN SIMPLIFYING ALGEBRAIC EXPRESSIONS YOU MUST FIRST GET RID OF ANY PARENTHESIS. AFTER GETTING RID OF PARENTHESIS YOU WILL NEED TO IDENTIFY LIKE TERMS AND COMBINE THEM. IN ORDER TO ADD OR SUBTRACT YOU MUST HAVE LIKE TERMS WHICH MEANS THE VARIABLES MUST BE EXACTLY THE SAME.

EXAMPLE: $2(x - 4) + 3(x + 2)$

$$2x - 8 + 3x + 6$$

$2x + 3x = 5x$ AND $-8 + 6 = -2$ THEREFORE, THE ANSWER IS $5x - 2$ WHICH IS ALSO THE SAME AS $-2 + 5x$ ACCORDING TO THE COMMUTATIVE PROPERTY.

Materials:

PROMETHEAN BOARD, WHITE BOARD, CALCULATOR

Competency: 2B Content Standard(s): APPLY PROPERTIES OF REAL NUMBERS WITH AN EMPHASIS ON THE DISTRIBUTIVE PROPERTIES OF MULTIPLICATION OVER ADDITION AND SUBTRACTION. (DOK1)

Vocabulary: DISTRIBUTIVE PROPERTY,

Teaching Strategy(ies):

THE DISTRIBUTIVE PROPERTY IS USED BY MULTIPLYING THE MONOMIAL ON THE OUTSIDE OF THE PARENTHESIS BY EACH TERM ON THE INSIDE OF THE PARENTHESIS. USUALLY THE MOST COMMON MISTAKES WHEN USING THE DISTRIBUTIVE PROPERTY ARE NOT MULTIPLYING BY EVERYTHING IN THE PARENTHESIS OR NOT DISTRIBUTING THE SIGN AS WELL. MAKE SURE TO EMPHASIS THOSE POINTS. LOOK AT THE FOLLOWING EXAMPLES:

EXAMPLE 1: $2(3x - 5) = 2(3x) + 2(-5) = 6x - 10$

EXAMPLE 2: $-3(2x + 7) = -3(2x) + -3(7) = -6x - 21$

EXAMPLE 3: $(2x - 3) - 2(3x - 2) = 2x - 3 - 6x + 4 = -4x + 1$

MANY STUDENTS WILL SAY THE ANSWER IS $-4x - 7$ BECAUSE THEY WILL NOT CARRY THE SIGN WHEN THEY DISTRIBUTE.

CAUTION:

YOU MAY SEE A PARENTHESIS WITH ONLY ONE NEGATIVE SIGN ON THE OUTSIDE. THAT MEANS TO MULTIPLY EVERY TERM IN THE PARENTHESIS BY NEGATIVE ONE. OR JUST CHANGE THE SIGNS OF EACH TERM AND REMOVE THE PARENTHESIS.

$$(-2x - 7) - (x + 3)$$

$$-2x - 7 - x - 3$$

$-3x - 10$ is the answer.

Materials:

PROMETHEAN BOARD, MARKERS AND WHITE BOARD



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Competency: 1B **Content Standard(s):** FORMULATE AND SOLVE STANDARD AND REAL-LIFE PROBLEMS INVOLVING ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF RATIONAL NUMBERS.

Vocabulary: RATIO, PROPORTION

Teaching Strategy(ies):

WHEN SOLVING PROPORTIONS ALWAYS TELL STUDENTS TO BE CONSISTENT. IF YOU KNOW THREE VALUES AND YOU ARE LOOKING FOR THE FOURTH THEN A PROPORTION CAN BE USED TO SOLVE IT. WHEN YOU ARE DEALING WITH TWO ITEMS FOR INSTANCE SUGAR AND FLOUR JUST MAKE SURE THAT IF YOU HAVE SUGAR ON TOP OF THE FIRST RATIO THEN YOU NEED SUGAR ON THE TOP OF THE SECOND RATIO. IT IS VERY HELPFUL IF STUDENTS WRITE THE FIRST PROPORTION IN WORDS BEFORE NUMBERS.

GIVE THE STUDENTS A RECIPE FOR MAKING TWO DOZEN CUPCAKES. THE ONLY PROBLEM IS THAT YOU ONLY HAVE ENOUGH INGREDIENTS TO MAKE ONE AND ONE-HALF DOZEN. THIS MEANS THAT THE RECIPE MUST BE REDUCED TO MAKE FEWER CUPCAKES. USING A PROPORTION

FIND OUT HOW MUCH SUGAR IS NEEDED TO MAKE THE REDUCED AMOUNT. THE RECIPE CALLS FOR 1 ½ CUPS OF SUGAR USING A PROPORTION FIND OUT HOW MUCH SUGAR IS NEEDED TO MAKE THE REDUCED

AMOUNT.
$$\frac{1.5 \text{ CUPS OF SUGAR}}{24 \text{ COOKIES}} = \frac{X \text{ CUPS OF SUGAR}}{18 \text{ COOKIES}}$$

Materials: RECIPE, PENCIL, AND PAPER.



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Competency: 1A **Content Standard(s):** DEFINE, CLASSIFY, AND ORDER RATIONAL AND IRRATIONAL NUMBERS AND THEIR SUBSETS. (DOK1)

Vocabulary: NATURAL NUMBERS, RATIONAL NUMBERS, WHOLE NUMBERS, REAL NUMBERS, IRRATIONAL NUMBERS, AND THE VENN DIAGRAM.

Teaching Strategy(ies):

PRECEED THIS ACTIVITY WITH THE DEFINITIONS AND CLARIFICATION OF THE DEFINITIONS OF ALL SUBSETS OF REAL NUMBERS. FOLLOWED BY THIS ACTIVITY.

GIVEN THE PICTURE OF A VENN DIAGRAM GIVE THE STUDENTS A STICKY NOTE THAT CONTAINS ONE OF THE TYPES OF NUMBERS. HAVE THEM TO COME UP TO THE FRONT OF THE ROOM AND PLACE THEIR NUMBER ON THE DIAGRAM. AFTER EVERYONE HAS PLACED THEIR NUMBER ON THE DIAGRAM REVIEW THE CHOICES THAT THEY MADE TO SEE IF THEY WERE CORRECT.

Materials:

POST-IT NOTES, WHITE BOARD AND MARKERS

Competency: 1B **Content Standard(s):** FORMULATE AND SOLVE STANDARD AND REAL-LIFE PROBLEMS INVOLVING ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF RATIONAL NUMBERS.

Vocabulary: TAX, TIPS, RATIONAL NUMBERS

Teaching Strategy(ies):

BEGIN BY TEACHING THE STUDENTS HOW TO FIND THE SALES TAX OF A TOTAL. SALES TAX IN MISSISSIPPI IS 7% THEREFORE THEY WOULD MULTIPLY THEIR TOTAL BY 0.07. TIPS ARE GENERALLY BETWEEN 10% AND 20% DEPENDING ON THE SIZE OF THE GROUP. FOR THIS ACTIVITY WE WILL USE A 15% GRATUITY. AGAIN AFTER FINDING THEIR TOTAL AND ADDING THE TAX THEN THEY WOULD MULTIPLY THAT TOTAL BY .15 AND ADD IT TO FIND THE TOTAL PRICE FOR THEIR MEAL.

GIVE THE STUDENTS A MENU FROM A RESTAURANT. ASK THEM TO WRITE THEIR ORDER ON A PIECE OF PAPER. THEY NEED TO PURCHASE A DRINK, MEAL, AND A DESSERT. AFTER ADDING THE PRICE OF ALL THE ITEMS ASK THEM TO CALCULATE THE TAX AND TIPS. THIS WILL REVIEW THEIR SKILLS OF ADDITION AND MULTIPLICATION.

Materials: MENU FROM A RESTAURANT, PENCIL, AND PAPER.



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Competency: 1d **Content Standard(s):** SIMPLIFY AND EVALUATE EXPRESSIONS USING ORDER OF OPERATIONS AND USE REAL NUMBER PROPERTIES TO JUSTIFY SOLUTIONS. (DOK2)

Vocabulary: EVALUATE, ORDER OF OPERATIONS, SOLUTION

Teaching Strategy(ies):

GIVEN THE PROBLEM $12 \div 4 \times 3$ ALLOW THE STUDENTS TO FIND A SOLUTION. ASK THE STUDENTS HOW THEY GOT THEIR ANSWER. ASK WHY DO WE HAVE TO FOLLOW THE ORDER OF OPERATIONS? THE CORRECT ANSWER IS 9. HOWEVER, MANY STUDENTS WILL SAY 1 BECAUSE THEY WANT TO MULTIPLY FIRST. REMIND STUDENTS THAT MULTIPLICATION AND DIVISION ARE DONE IN ORDER FROM LEFT TO RIGHT.

GIVEN THE PROBLEM $2(3)^2 \div 2$ ALLOW THE STUDENTS TO FIND A SOLUTION. ASK THE STUDENTS HOW THEY GOT THEIR ANSWER. ASK THEM ABOUT THE ORDER OF OPERATIONS. THE CORRECT ANSWER IS 9 BUT, MANY OF THE STUDENTS WILL SAY 18 BECAUSE THEY MULTIPLIED FIRST. REMIND THEM THAT THE REASON WE FOLLOW THE ORDER OF OPERATIONS IS SO THAT ALL THE STUDENTS HAVE A WAY TO COME UP WITH THE SAME ANSWER. IF WE DIDN'T HAVE AN ORDER TO FOLLOW THEN WE COULD GET ALL TYPES OF ANSWERS.

Materials:

PENCIL AND PAPER AND PROMETHEAN BOARD

Competency: 1E **Content Standard(s):** EXPLAIN THE RULES OF EXPONENTS RELATED TO MULTIPLICATION AND DIVISION OF TERMS WITH EXPONENTS.

Vocabulary: BASE, EXPONENTS

Teaching Strategy(ies):

X^2 MEAN $X \cdot X$ BECAUSE THE EXPONENT TELLS YOU HOW MANY TIMES TO MULTIPLY THE BASE TIMES ITSELF. X^3 MEANS $X \cdot X \cdot X$. THEREFORE $X^2 \cdot X^3$ IS $X \cdot X \cdot X \cdot X \cdot X$. WHICH MEANS X^5 . DO SEVERAL EXAMPLES LIKE THIS. NOW ASK STUDENTS DO THEY SEE THE PATTERN OR A RULE. THE FOLLOWING RULE SHOULD EMERGE.

WHEN MULTIPLYING AND YOU HAVE THE SAME BASE YOU ADD THE EXPONENTS FOR EXAMPLE $X^2 \cdot X^3 = X^5$.

X^4 MEANS $X \cdot X \cdot X \cdot X$ AND X^2 MEANS $X \cdot X$ SO $\frac{X^4}{X^2} = \frac{X \cdot X \cdot X \cdot X}{X \cdot X}$ NOTICE THAT TWO SETS OF X'S CANCEL OUT

ON TOP AND BOTTOM SO THE ANSWER IS X^2 . DO SEVERAL EXAMPLES LIKE THIS. NOW ASK THE STUDENTS DO THEY SEE A RULE OR PATTERN. THE FOLLOWING RULE SHOULD EMERGE.

WHEN DIVIDING AND YOU HAVE THE SAME BASE YOU SUBTRACT THE EXPONENTS (TOP – BOTTOM) FOR

EXAMPLE: $\frac{X^4}{X^2} = X^2$.

$(X^3)^2$ MEANS $X^3 \cdot X^3 = X \cdot X \cdot X \cdot X \cdot X \cdot X$ WHICH EQUALS X^6 . AFTER REVIEWING SEVERAL PROBLEMS ASK THE STUDENTS DO THEY SEE A PATTERN OR A RULE. THE FOLLOWING RULE SHOULD EMERGE.

POWER OF A POWER TELLS YOU TO MULTIPLY THE EXPONENTS. THEREFORE $(X^3)^2 = X^{3(2)} = X^6$.

Materials: PENCIL AND PAPER



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Competency: 1F Content Standard(s): RECOGNIZE AND APPROPRIATELY USE EXPONENTIAL AND SCIENTIFIC NOTATION. (DOK1)

Vocabulary: STANDARD FORM, SCIENTIFIC NOTATION

Teaching Strategy(ies):

ONE WAY OF GOING FROM STANDARD FORM TO SCIENTIFIC NOTATION IS BY USING THE GRAPHING CALCULATOR. YOU CAN CHANGE IT BY USING THE MODE BUTTON AND SELECTING SCIENTIFIC. YOU CAN USE THE CALCULATOR TO MULTIPLY AND DIVIDE NUMBERS WRITTEN IN SCIENTIFIC NOTATION AS WELL.

EXAMPLE: $(3 \times 10^8)(2.1 \times 10^{-6})$ THE ANSWER IS 6.3×10^2 HOWEVER THE CALCULATOR WILL SAY 6.3E2 WHICH IS ALSO THE SAME THING.

SCIENTIFIC NOTATION IS USED TO WRITE VERY LARGE AND VERY SMALL NUMBERS IN A MORE COMPACT WAY. TO CHANGE A NUMBER FROM STANDARD FORM TO SCIENTIFIC NOTATION THE DECIMAL MUST BE MOVED LEFT OR RIGHT. WHEN THE NUMBER IS LARGER THAN 1 YOU MOVE THE DECIMAL LEFT AND THE EXPONENT WILL BE POSITIVE. WHEN THE NUMBER IS SMALLER THAN 1 THAN YOU MOVE THE DECIMAL RIGHT AND THE EXPONENT WILL BE NEGATIVE. THE DECIMAL MUST BE MOVED UNTIL THE NUMBER IN FRONT OF THE DECIMAL IS GREATER THAN OR EQUAL TO 1 AND LESS THAN OR EQUAL TO 9.

EXAMPLE:

486,000 IS 4.86×10^5 AND 0.0000352 IS 3.52×10^{-5}

Materials:

SCIENTIFIC CALCULATOR

Competency: 1G Content Standard(s): EXPLAIN AND USE THE INVERSE RELATIONSHIP BETWEEN SQUARE ROOTS AND SQUARES. (DOK2)

Vocabulary: SQUARE ROOT, SQUARES

Teaching Strategy(ies):

THE SQUARE OF A NUMBER IS FOUND BY MULTIPLYING A NUMBER TIMES ITSELF.

$2 \times 2 = 4$ THE SQUARE OF 2 IS 4. $3 \times 3 = 9$ THE SQUARE OF 3 IS 9.

THE SQUARE ROOT OF A NUMBER TELLS YOU WHAT THE ORIGINAL NUMBER (or ROOT) THAT PRODUCED THE SQUARE. WHEN ASKING $\sqrt{81}$, ASK STUDENTS, "WHAT IS THE ROOT THAT MULTIPLIED BY ITSELF WILL YIELD 81?" IT CAN ALSO BE FOUND BY USING A GRAPHING CALCULATOR OR BY DOING A FACTOR TREE. FOR EXAMPLE 64 IS 8×8 SO THE SQUARE ROOT OF 64 IS 8.

Materials:

PENCIL AND PAPER OR A SCIENTIFIC CALCULATOR