

SURVEY OF THE FUNDAMENTALS OF ALGEBRA

THE SURVEY OF THE FUNDAMENTALS OF ALGEBRA IS AN END OF YEAR OPPORTUNITY AND CHALLENGE FOR STUDENTS. THE SURVEY OF ALGEBRA ACTIVITY:

- CONTAINS 20 FUNDAMENTAL PROBLEMS THAT SPAN THE ALGEBRA I EXPERIENCE,***
- HAS POINT VALUES ASSIGNED TO EACH PROBLEM,***
- CHALLENGES STUDENTS TO SELECT AND SOLVE PROBLEMS WHOSE VALUES TOTAL 125 POINTS,***
- PROVIDES THE SOLUTIONS OF SIMILAR PROBLEMS FOR STUDENTS TO REVIEW,***
- PROVIDES AN ANSWER FORM ON WHICH STUDENTS CAN RECORD THEIR ANSWERS, AND***
- PROVIDES A COMPLETE ANSWER KEY FOR TEACHERS.***

STUDENTS WHO SUCCESSFULLY EARN 125 POINTS CAN USE THEIR POINTS TO REPLACE MISSING HOMEWORK GRADES OR OTHER POINT DEFICITS THAT MAY ADVERSELY IMPACT THEIR FINAL GRADE.

THE RECOMMENDED TIME FRAME FOR IMPLEMENTING THE SURVEY OF THE FUNDAMENTALS OF ALGEBRA ACTIVITY IS THE LAST 1 OR 2 WEEKS OF THE COURSE.

STUDENTS SHOULD BE ALLOWED TO USE THEIR NOTES AND TEXTS AS RESOURCES FOR SOLVING THE PROBLEMS. AT THE END OF THE DAY, PARTICIPATING IN THIS ACTIVITY IS A GREAT WAY FOR STUDENTS TO REVIEW AND PREPARE FOR THE FINAL EXAM.

SURVEY OF THE FUNDAMENTALS OF ALGEBRA

STUDENT NAME _____ THE FOLLOWING PROBLEMS ARE REPRESENTATIVE OF THE STUDY OF ALGEBRA I. CHOOSE AND CORRECTLY SOLVE ANY NUMBER OF PROBLEMS WHOSE POINTS TOTAL 125. YOUR POINTS WILL BE APPLIED TO THE PROCESS THAT DETERMINES YOUR FINAL GRADE.

5 POINTS

#1

SIMPLIFY:

$$2(10 - 6)^2 - 5$$

NUMERIC EXPRESSIONS

10 POINTS

#2

EVALUATE $A(B - C)^2 + A$

FOR $A=2$, $B=5$, & $C=2$

ALGEBRAIC EXPRESSIONS

#5

10 POINTS

EVALUATING POLYNOMIALS

EVALUATE THE POLYNOMIAL $2X^2 + 5X - 10$ FOR $X=1$

5 POINTS

#3

SOLVE FOR X.

$$2X + 10 = 20$$

SOLVING EQUATIONS

10 POINTS

#4

SOLVE FOR X.

$$5X + 8 = 3X + 16$$

SOLVING EQUATIONS

5 POINTS

#6

SKETCH THE GRAPH OF:

$$X \geq 4$$

INEQUALITIES

10 POINTS

#7

SKETCH THE GRAPH OF:

$$-2 < X \leq 4$$

INEQUALITIES

IS THIS A FUNCTION?

10 POINTS

EXPLAIN WHY OR WHY NOT

#10

$(1,2)$, $(2,4)$, $(3,6)$, $(4,8)$, $(5,10)$, $(X,2X)$...

5 POINTS

#8

$$F(X) = 10X - 1$$

FIND $F(6)$

EVALUATING FUNCTIONS

10 POINTS

#9

$$F(X) = 2X + 2$$

FIND $F(0) + F(4)$

EVALUATING FUNCTIONS

#11

5 POINTS

USING A FORMULA

USE THE FORMULA $D=RT$ TO SOLVE THE PROBLEM. TERRANCE DROVE AT AN AVERAGE SPEED OF 65 MPH FOR 3 HOURS. HOW FAR DID TERRANCE DRIVE.?

SURVEY OF THE FUNDAMENTALS OF ALGEBRA

5 POINTS

#12

SIMPLIFY:
 $(x^2)(x^2)(x^3)$

LAWS OF EXPONENTS

10 POINTS

#13

SIMPLIFY:
 $(2x)(4x^2)3(x^5)$

LAWS OF EXPONENTS

#14

10 POINTS

ADDING POLYNOMIALS

SIMPLIFY: $(2x^2 + 5x + 4) + (3x^2 + 5x - 2)$

#15

10 POINTS

SUBTRACTING POLYNOMIALS

SIMPLIFY: $(5x^2 + 3x + 9) - (3x^2 + 2x - 4)$

#16

10 POINTS

MULTIPLYING POLYNOMIALS

SIMPLIFY: $2x^2(5x^2 + 3x + 4)$

5 POINTS

#17

FIND THE SLOPE OF
 $y = 3x - 5/2$

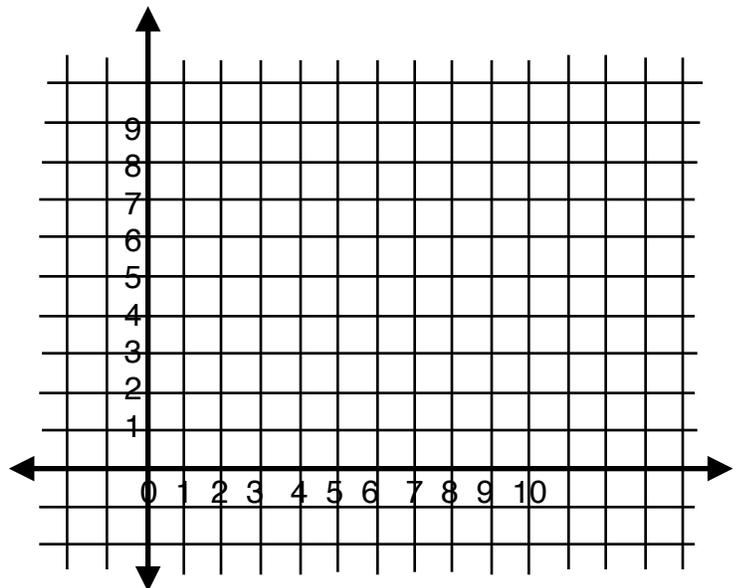
LINEAR EQUATIONS

15 POINTS

#18

SKETCH THE GRAPH OF
 $y = 2x + 3$

LINEAR EQUATIONS



#19

RADICALS

5 POINTS

SIMPLIFY:

$$\sqrt{20x^3}$$

#20

RADICALS

5 POINTS

SIMPLIFY:

$$3\sqrt{2} \cdot \sqrt{8}$$

SURVEY OF THE FUNDAMENTALS OF ALGEBRA

ANSWER KEY

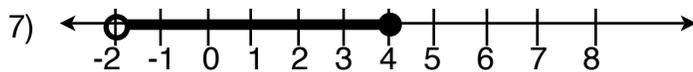
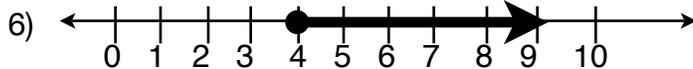
1) 27.

2) 20.

3) $x = 5$.

4) $x = 4$.

5) -3



8) $f(6) = 59$

9) $f(0) + f(4) = 2 + 10 = 12$.

10) Yes, function. Each domain element has one and only one range element.

11) $d = rt$, $d = 65 \text{ mph} (3 \text{ hrs.}) = 195 \text{ miles}$

12) x^7

13) $24x^8$

14) $5x^2 + 10x + 2$

15) $2x^2 + x + 13$

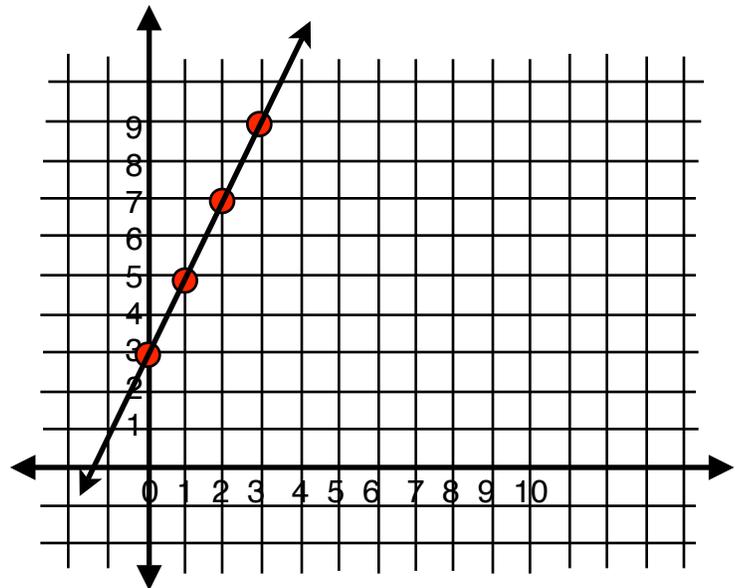
16) $10x^4 + 6x^3 + 8x^2$

17) $m = 3$

18) See the graph to the right.

19) $2x\sqrt{5x}$

20) 12



SURVEY OF THE FUNDAMENTALS OF ALGEBRA

STUDENT ANSWER SHEET (160 POINTS)

1) **5 PTS** _____

STUDENT NAME _____

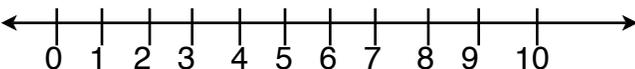
2) **10 PTS** _____

CLASS _____

3) **5 PTS** _____

4) **10 PTS** _____

5) **10 PTS** _____

6) **5 PTS** 

7) **10 PTS** 

8) **5 PTS** _____

9) **10 PTS** _____

10) **10 PTS** _____

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12) **5 PTS** _____

13) **10 PTS** _____

14) **10 PTS** _____

15) **10 PTS** _____

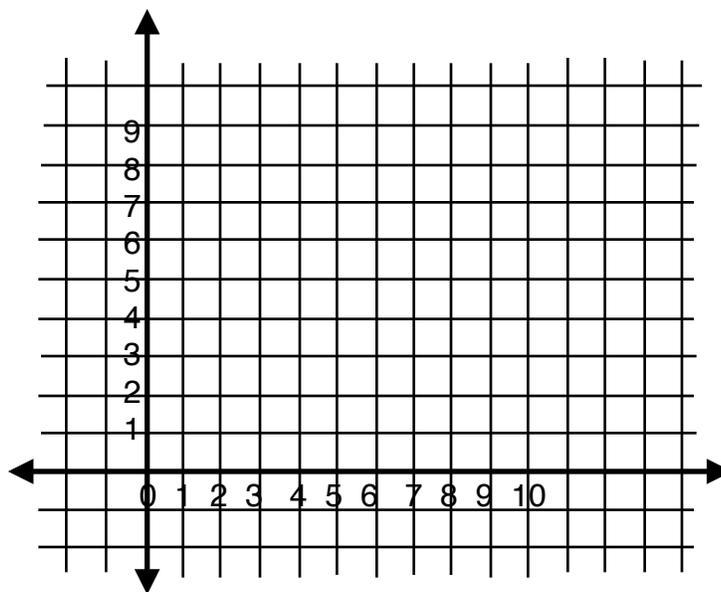
16) **10 PTS** _____

17) **5 PTS** _____

18) **15 PTS** _____

19) **5 PTS** _____

20) **5 PTS** _____



STUDENT TUTORIAL

THE PROBLEMS AND SOLUTIONS BELOW CORRESPOND TO THE PROBLEMS ON THE SURVEY OF ALGEBRA CHALLENGE. STUDY THESE SOLUTIONS BEFORE YOU SOLVE THE PROBLEMS ON THE CHALLENGE PAGES.

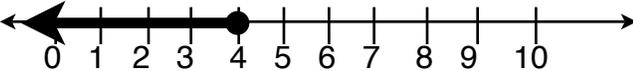
1) Simplify: $2(12 - 9)^2 - 3$ Solution: Follow the Order of Operations PEMDAS.
 $2(12 - 9)^2 - 3 = 2(3)^2 - 3 = 2(9) - 3 = 18 - 3 = 15.$

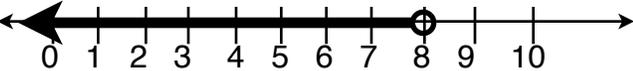
2) Evaluate $a(b - c)^2 + a$ for $a=3$, $b=4$, & $c=2$. Solution: Substitute and follow Order of Operations
 $a(b - c)^2 + a = 3(4 - 2)^2 + 3 = 3(2)^2 + 3 = 3(4) + 3 = 12 + 3 = 15.$

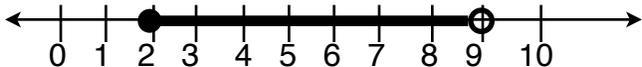
3) Solve for x . $5x + 14 = 24$. Solution: Subtract 14 from both sides.
New equation: $5x = 10$. Divide both sides by 5. New equation and solution: $x = 2$.

4) Solve for x . $6x + 12 = 4x + 20$. Solution: Subtract $4x$ from both sides.
New Equation: $2x + 12 = 20$. Subtract 12 from both sides. New equation: $2x = 8$.
Divide both sides by 2. New equation and solution: $x = 4$.

5) Evaluate $2x^2 + 3x - 4$ for $x=2$. Solution: Substitute 2 for x and simplify.
 $2x^2 + 3x - 4 = 2(2)^2 + 3(2) - 4 = 2(4) + 6 - 4 = 8 + 6 - 4 = 14 - 4 = 10$

6) Sketch the graph of $x \leq 4$. Solution: 

6.1) Sketch the graph of $x < 8$. Solution: 

7) Sketch the graph of $2 \leq x < 9$. Solution: 

8) Given that $f(x) = 8x - 2$, find $f(4)$. Solution: $f(4) = 8(4) - 2 = 32 - 2 = 30$.

9) Given that $f(x) = 5x + 2$ find $f(0) + f(2)$. Solution: $f(0) = 5(0) + 2 = 2$. $f(2) = 5(2) + 2 = 12$.
 $f(0) + f(2) = 2 + 12 = 14$.

10) Determine if the data is a function. $(3,5)$, $(6,10)$, $(3,15)$, $(9,20)$, $(12,25)$, $(15,30)$
Solution: NO. This data is not a function because the domain element 3 is paired with TWO range values. To be a function, each domain element must be paired with *one and only one* range value.

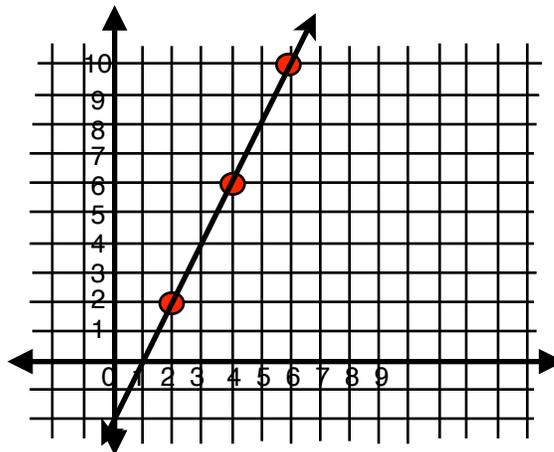
$(3,5)$, $(6,10)$, $(3,15)$, $(9,20)$, $(12,25)$, $(15,30)$.

11) The formula $d = rt$ indicates that distance = rate of speed • the time traveled. Assume that a person drives a car at 55 mph (miles per hour) for 6 hours. The distance traveled is given by the formula $d = rt$. Thus, $d = 55 \text{ mph} \cdot 6 \text{ hr} = 55(6) = 330$ miles.

STUDENT TUTORIAL CONTINUED . . .

- 12) Simplify: $a^2 (b^2) (a^3) (b^6)$. Solution: Like variables with exponents can be multiplied by adding the exponents. $a^2 (b^2) (a^3) (b^6) = a^5 (b^8)$.
- 12.1) Simplify: $a^6 (b^7) \div (a^2) (b^6)$. Solution: Like variables with exponents can be divided by subtracting the exponents. $a^6 (b^7) \div (a^2) (b^6) = a^4 (b^1) = a^4 b$
- 13) Simplify: $2a^2 (3b^4) (4a^4) (b)$. Solution: Multiply the coefficients. Multiply like variables with exponents by adding the exponents. $2a^2 (3b^4) (4a^4) (b) = 24 a^6 b^5$.
- 13.1) Simplify: $20a^2 b^5 \div 5 a b^2$. Solution: Divide the coefficients. Divide like variables with exponents by subtracting the exponents. $20a^2 b^5 \div 5 a b^2 = 4ab^3$.
- 14) Simplify: $(3x^2 + 2x + 6) + (4x^2 + 9x - 5)$. Solution: Combine like terms.
 $(3x^2 + 2x + 6) + (4x^2 + 9x - 5) = 7x^2 + 11x + 1$. **Note:** When adding or subtracting like variables with like exponents, the exponents stay the same.
- 15) Simplify: $(7x^2 + 5x + 6) - (4x^2 + 2x + 2)$. Solution: Combine like terms.
 $(7x^2 + 5x + 6) - (4x^2 + 2x + 2) = 3x^2 + 3x + 4$.
- 16) Simplify: $4x^2 (3x^2 - 2x + 5)$. Solution: $4x^2 (3x^2 - 2x + 5) = 12x^4 - 8x^3 + 20x^2$
Note: The distributive property is applied in this problem. The term $4x^2$ is multiplied times the three terms in the parentheses. To multiply algebraic terms, multiply the coefficients and add the exponents of like variables.
- 17) Find the slope of $y = 6x - 1/2$. Solution: The slope of a linear equation $y = mx + b$ is the number m . For this linear equation, the slope is $m = 6$.

- 18) Sketch the graph of $y = 2x - 2$
 Solution: Apply the algebraic expression $2x - 2$ to the arbitrary x numbers 2, 4, and 6.
 $2(2) - 2 = 4 - 2 = 2$.
 $2(4) - 2 = 8 - 2 = 6$.
 $2(6) - 2 = 12 - 2 = 10$.
 Place points 2, 6, and 10 spaces above the x -numbers 2, 4, and 6.
 Draw the line.



- 19) Simplify $\sqrt{45 x^6}$. Solution: $\sqrt{45 x^6} = \sqrt{9 (5) x^6} = 3 x^3 \sqrt{5}$
- 20) Simplify $\sqrt{12} \cdot \sqrt{3}$. Solution: $\sqrt{12} \cdot \sqrt{3} = \sqrt{36} = 6$.
- 21) Simplify $\sqrt{32 x^7}$. Solution: $\sqrt{32 x^7} = \sqrt{16 \cdot 2 \cdot x^6 x} = 4 x^3 \sqrt{2x}$