

NAME: _____ Score _____ /100
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SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

2 points each for questions 1 – 20. Point value for others as indicated.

Circle T or F, whichever is correct.

1. **T** F A system of equations consists of two or more equations involving the same variables.
2. **T** F $3x^2$ is a term.
3. **T** F All terms are polynomials.
4. T **F** All polynomials are terms.
5. **T** F The difference of two polynomials is computed by changing the operation to addition and replacing the subtrahend with its opposite.
6. T **F** The foil method may be used to compute the product of any two polynomials.
7. **T** F The boundary equation for $3x + 7y > 11$ is the same as the boundary equation for $3x + 7y < 11$.
8. **T** F If a and n are real numbers then $\frac{1}{a^{-n}} = a^n$.
9. T **F** 34.987×10^{-63} is scientific notation.
10. **T** F In a system of linear equations, if the value of one of the variables is known, an equivalent system is generated if that value is substituted into the equations.

Fill in each of the blanks to make the statements true.

11. At what point does the graph of the line $3x - 2y = 6$ intersect the vertical line $x = 4$? **(4, 3)**.
12. What is the first coordinate of the point whose second coordinate is 1 and is on the graph of $2x + y^2 = 5$?
2.
13. Is the point (2, 1) a solution of the system $\begin{cases} 2x - 3y = 5 \\ x + 5y = 7 \end{cases}$ **NO**.
14. The following systems are **equivalent** $\begin{cases} x + y = 3 \\ 2x - y = 5 \end{cases}$ and $\begin{cases} 2x - 5 + y = 3 \\ 2x - y = 5 \end{cases}$.
15. The graph of the solution of a system of two equations in two variables is the point (or points) of **intersection** of the two lines.
16. Compute the sum $(x^3 + 4x - 8) + (2x^2 - 5x + 5) = x^3 + 2x^2 - x - 3$.

17. Write the opposite of $x^3 + 4x - 8$ **$-x^3 - 4x + 8$** .
18. What is the leading term of the polynomial $5x^3 + 7x^9 + 3x^2 + 9x^3 + 7$? **$7x^9$**
19. What is the leading coefficient of the polynomial $5x^3 + 7x^9 + 3x^2 + 9x^3 + 7$? **7**
20. What is the degree of the polynomial $5x^3 + 7x^9 + 3x^2 + 9x^3 + 7$? **9**

For questions 21 through 25, consider the following list

- a) x^3 b) $3x^2 - 8x + 5$ c) 9 d) $4x + 5 = 9$ e) $\sqrt{3}x^5 + 2x^3 - \frac{3}{2}x^2 - x + 28$
- f) $3x^{-5} + 5x^2 + 3$ g) $3^{-2}x^2 + 5x + \frac{2}{3}$ h) $x^4 + x^3 + 5$ j) $(x + 4)(x + 3)$
- k) $\sqrt{x^4 + x^2 + 16}$

21. (3 pts) Which items in the above list are polynomials?

Circle the correct response. **a b c d e f g h j k**

22. (3 pts) Which items in the above list are trinomials?

Circle the correct response. **a b c d e f g h j k**

23. (3 pts) Which items in the above list are quadratic polynomials?

Circle the correct response. **a b c d e f g h j k**

24. (3 pts) Which items in the above list are polynomials with natural number coefficients?

Circle the correct response. **a b c d e f g h j k**

25. (3 pts) Which items in the above list are terms?

Circle the correct response. **a b c d e f g h j k**

26. (5 pts).

a) Write 31,250,000 in scientific notation **3.125×10^7**

c) Write 3.6×10^{-9} in standard notation **0.0000000036**

e) Compute the product $(3.2 \times 10^{15})(5 \times 10^{-8})$ **$16 \times 10^7 = 1.6 \times 10^8$**

d) Simplify $3x^0$ **3**

e) What is the base in the exponential expression -3^4 ? **3**

27. (3 pts) Compute the product $(3x^2 + 5)(-2x + 7) = -6x^3 + 21x^2 - 10x + 35$

28. (3 pts) Compute the product $(x^3 + 4x - 8)(2x^2 - 5x) = 2x^5 - 5x^4 + 8x^3 - 20x^2 - 16x^2 + 40x = 2x^5 - 5x^4 + 8x^3 - 36x^2 + 40x$

29. (3 pts) Compute the sum $(x^3 + 4x - 8) + (2x^2 - 5x + 5) = x^3 + 2x^2 - x - 3$

30. (8 pts) Consider the graph in Figure 1 and the nine systems of equations below. This is a matching question.

The region enclosed by the four lines has four vertices labeled Vertex A, Vertex B, Vertex C, and Vertex D.

The coordinates of each vertex is found by solving a particular system of equations. A number of systems are listed below.

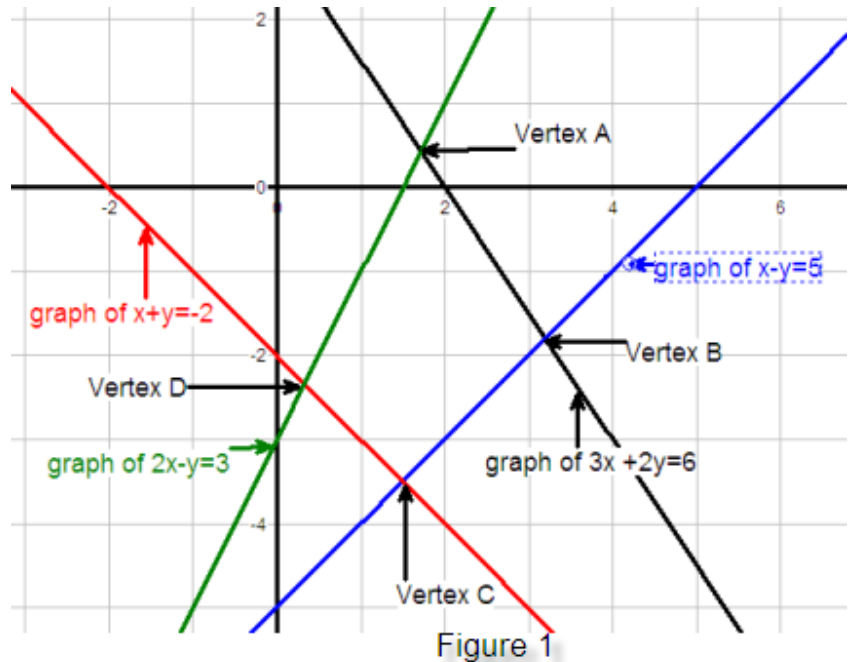
You are to match each of the vertices with the system whose solution yields the coordinates of that vertex.

NOTE—You are not expected to solve any of the systems nor are you expected to determine any of the coordinates.

Write your answers in the blanks

Vertex A **System 3** Vertex B **System 1**

Vertex C **System 4** Vertex D **System 6**



$3x + 2y = 6$ $x - y = 5$ System 1	$3x + 2y = 6$ $x + y = -2$ System 2	$3x + 2y = 6$ $2x - y = 3$ System 3
$x - y = 5$ $x + y = -2$ System 4	$x - y = 5$ $2x - y = 3$ System 5	$x + y = -2$ $2x - y = 3$ System 6
$3x + 2y = 6$ $x - y = 5$ $x + y = -2$ System 7	$3x + 2y = 6$ $x - y = 5$ $2x - y = 3$ System 8	$x - y = 5$ $x + y = -2$ $2x - y = 3$ System 9

31. (2 pts) Which systems in the table above have the null set as their solution set? **Systems 7, 8 and 9**

For problems 34, 35, and 36 show the steps.

32. (3 pts) Use the **substitution** method to solve $\begin{cases} 5x + 2y = -17 \\ x = 3y \end{cases}$

$$\begin{cases} 5x + 2y = -17 \\ x = 3y \end{cases} \longrightarrow \begin{cases} 5(3y) + 2y = -17 \\ x = 3y \end{cases} \longrightarrow \begin{cases} 15y + 2y = -17 \\ x = 3y \end{cases} \longrightarrow \begin{cases} 17y = -17 \\ x = 3y \end{cases}$$

$$\longrightarrow \begin{cases} y = -1 \\ x = 3y \end{cases} \longrightarrow \begin{cases} y = -1 \\ x = -3 \end{cases}$$

The solution is the ordered pair $(-3, -1)$.

33. (3 pts) Use the **substitution** method to solve $\begin{cases} 5x + 2y = 1 \\ x - 3y = 7 \end{cases}$

$$\begin{aligned} \begin{cases} 5x + 2y = 1 \\ x - 3y = 7 \end{cases} &\longrightarrow \begin{cases} 5x + 2y = 1 \\ x = 7 + 3y \end{cases} \longrightarrow \begin{cases} 5(7 + 3y) + 2y = 1 \\ x = 7 + 3y \end{cases} \longrightarrow \begin{cases} 15y + 35 + 2y = 1 \\ x = 7 + 3y \end{cases} \longrightarrow \begin{cases} 17y = -34 \\ x = 7 + 3y \end{cases} \\ &\longrightarrow \begin{cases} y = -2 \\ x = 7 + 3y \end{cases} \longrightarrow \begin{cases} y = -2 \\ x = 7 + 3(-2) \end{cases} \longrightarrow \begin{cases} y = -2 \\ x = 1 \end{cases} \end{aligned}$$

The solution is the ordered pair (1, -2).

34. (3 pts) Solve the system $\begin{cases} y + x > 2 \\ y - 2x < 5 \end{cases}$

The boundary equation for $y + x > 2$ is $y + x = 2$.

If $x = 0$, then $y = 2$, so (0, 2) is the y-intercept.

If $y = 0$, then $x = 2$, so (2, 0) is the x-intercept.

Sketch the boundary line as a dashed line.

Test the origin (0, 0) in $y + x > 2$ to obtain $0 > 2$ which is false.

Shade the other side.

The boundary equation for $y - 2x < 5$ is $y - 2x = 5$.

If $x = 0$, then $y = 5$, so (0, 5) is the y-intercept.

If $y = 0$, then $x = -\frac{5}{2}$, so $(-\frac{5}{2}, 0)$ is the x-

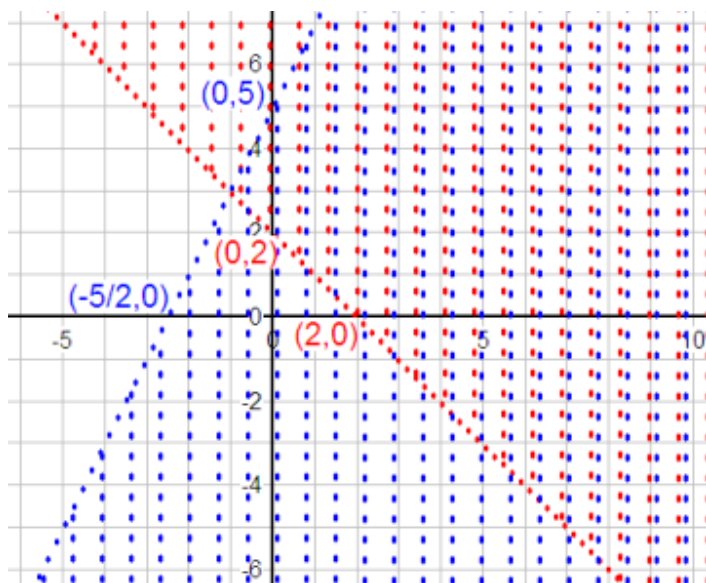
intercept.

Sketch the boundary line as a dashed line.

Test the origin (0, 0) in $y - 2x < 5$ to obtain $0 < 5$ which is true.

Shade the side containing the origin.

The solution for the system is the half-plane which is shaded both red and blue.



35. (3 pts) Simplify $(x^3y^4)(x^2y^{-1}) = x^5y^3$

36. (3 pts) Simplify $\left(\frac{x^{-2}}{x^3}\right)^4$ Write your answer with positive exponents.

$$\left(\frac{x^{-2}}{x^3}\right)^4 = (x^{-5})^4 = x^{-20} = \frac{1}{x^{20}}$$

37. (3 pts) Write $\left(\frac{3x^{-2}}{y^4}\right)^{-5}$ using negative exponents only and no parenthesis

$$\left(\frac{3x^{-2}}{y^4}\right)^{-5} = \frac{3^{-5}x^{10}}{y^{-20}} = \frac{3^{-5}}{x^{-10}y^{-20}}$$

38. (3 pts) Expand $(x + 2)^{-2}$. Expand means to write with positive exponents and do the indicated multiplication.

$$(x + 2)^{-2} = \frac{1}{(x + 2)^2} = \frac{1}{x^2 + 4x + 4}$$