Name ___________________________

Summer Problems
Algebra 2 and Honors Integrated Algebra 2

The following problems are for students to practice over the summer who are enrolled in Algebra 2 or Honors Integrated Algebra 2 for the 2023-2024 school year. Please bring them with you on the first day of classes. This will be due one week after the first class meeting.

Name the property that each exercise illustrates.

1. $^{-}r = ^{-}r$	**2.** If $k < m^2$ and $m^2 < 4$, then $k < 4$
3. If $x = w^2$, then $w^2 = x$	**4.** $(62+15)+38 = 62+(15+38)$
5. $62+0+(15+38) = 62+(15+38)$	**6.** $50 \bullet 17 \bullet 2 = 50 \bullet 2 \bullet 17$
7. $9(2^3-4^2) = 9(2^3)-9(4^2)$	**8.** $^{-}0.5 \bullet (^{-}2) = 1$

Simplify each expression.

9. $5(8t)+4(9-t)-37$	**10.** $8b+7a-4b-9a$

Solve each equation.

11. $-\frac{1}{5}t-2=4$	**12.** $^{-}6+6z=0$
13. $\frac{1}{2}=\frac{2}{5}c-3$	**14.** $\frac{a-10}{^{-}4}=2$

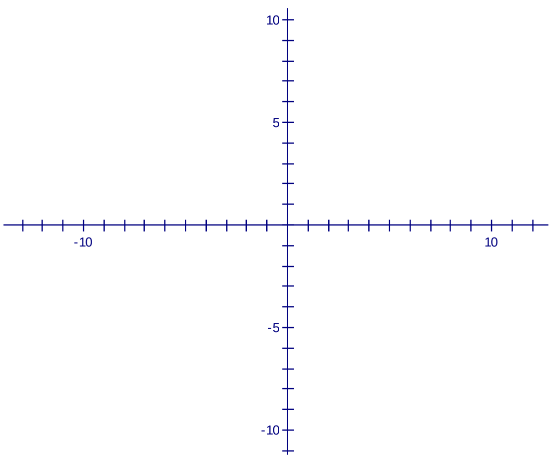
Solve each inequality.

15. $9+x<7-2(x-3)$

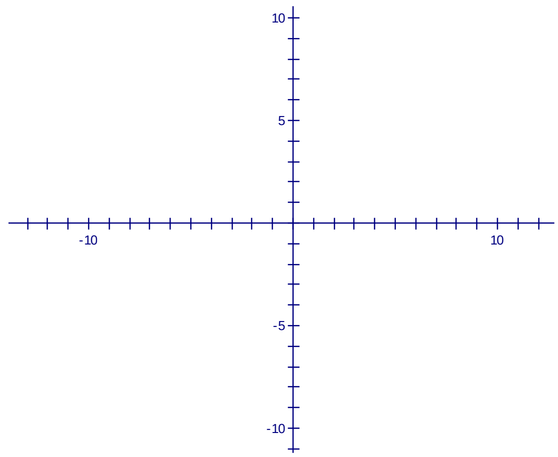
16. $2v-4\le 2(3v-6)$

Graph each equation or inequality.

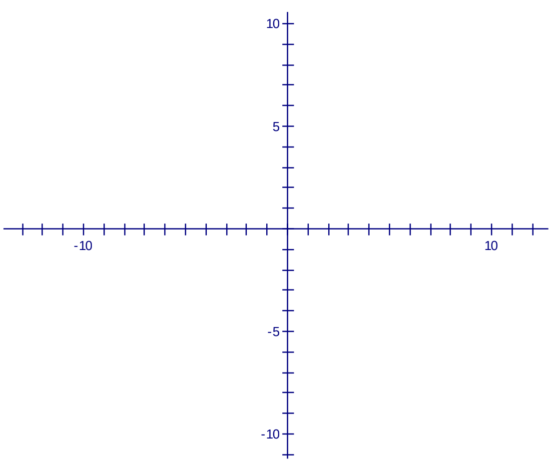
17. $2y+4x=0$



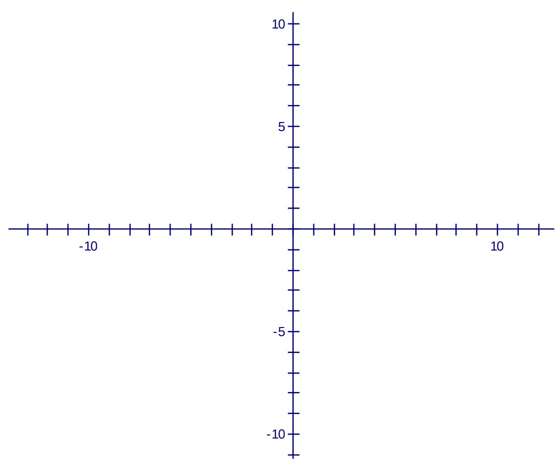
18. $3y+6={}^{-}2x$



19. $y\le -3x$



20. ${}^{-}4y-6x>8$



Write an equation of the line that passes through the given points.

21. $({}^{-}6,6)(3,3)$

22. $(5,{}^{-}5),(5,7)$

Is each equation a direct variation? If it is, find the constant of variation.

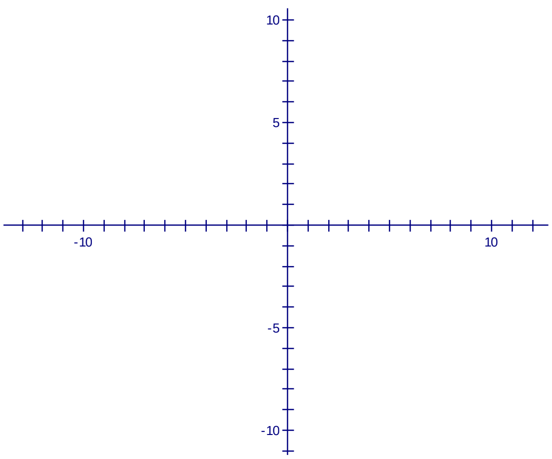
23. $y+8={}^{-}\,x$	**24.** $5x-6y=0$

Write an equation of the direct variation that includes the given point.

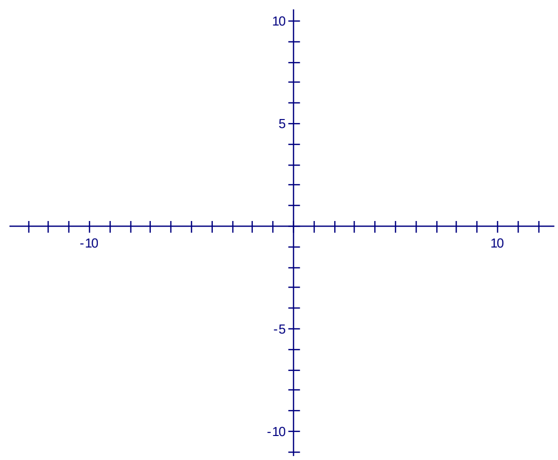
25. $\left({}^{-}8,10\right)$	**26.** $\left(1,5\right)$

Solve each system by graphing. Check your solution.

27. $\begin{cases} y=x+4 \\ y=4x+1 \end{cases}$



28. $\begin{cases} y=\dfrac{1}{2}x+2 \\ y={}^{-}\,x+5 \end{cases}$



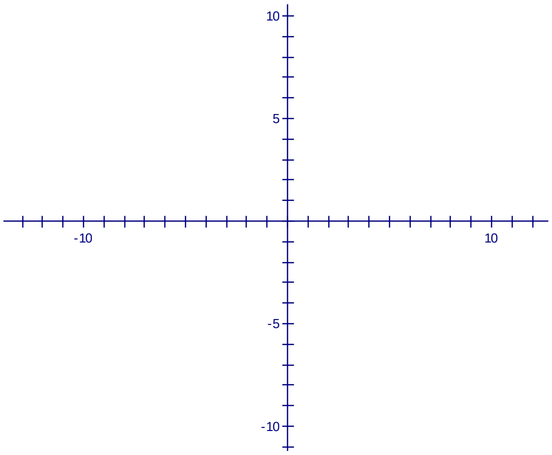
Solve each system using substitution. Check your solution.

29. $\begin{cases} y={}^{-}\,4x+12\dfrac{1}{2} \\ y=\dfrac{1}{4}x+4 \end{cases}$

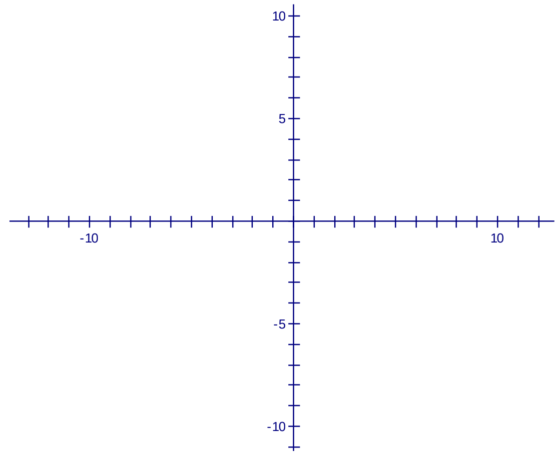
30. $\begin{cases} m=4n+11 \\ {}^{-}6n+8m=36 \end{cases}$

Graph each system. Tell whether the system has *no solution* or *infinitely many solutions.*

31. $\begin{cases} x + 2y = 10 \\ 2x + 4y = 10 \end{cases}$



32. $\begin{cases} y = 3x + 4 \\ ^{-}12x + 4y = 16 \end{cases}$



Solve each system by elimination.

33. $\begin{cases} 7x + 15y = 32 \\ x - 3y = 20 \end{cases}$

34.

Two groups of students order burritos and tacos at a local restaurant. One order of 3 burritos and 4 tacos cost $11.33. The other order of 9 burritos and 5 tacos costs $23.56. Find the cost of each taco and each burrito.

Name each expression based on its degree and number of terms.

35. $5x^2 - 2x + 3$	**36.** $\frac{3}{4}z + 5$
37. $7a^3 + 4a - 12$	**38.** $^{-}15$

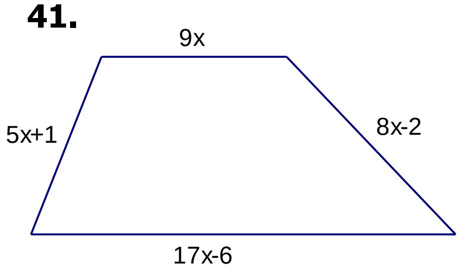
Simplify. Write each answer in standard form.

39. $\left(7a^3 - a + 3a^2\right) + \left(8a^2 - 3a - 4\right)$

40. $\left(11 + k^3 - 6k^4\right) - \left(k^2 - k^4\right)$

Find the perimeter of the following figure.

41.



Find the GCF of the terms of each polynomial.

42. $6a^2 - 8a$

43. $x^3 + 7x^2 - 5x$

Simplify each product.

44. ${}^{-}p^2\left(p - 11\right)$

45. $4y^2\left(9y^3 + 8y^2 - 11\right)$

Factor each polynomial.

46. $v^2 + 4v$

47. $6p^6 + 24p^5 + 18p^3$

Divide.

48. $(12x^8 - 8x^3) \div (4x^4)$	**49.** $(^-7t^5 + 14t^4 - 28t^3 + 35t^2) \div (7t^2)$

Factor each expression.

50. $y^2 - 9y + 14$	**51.** $3x^2 + x - 2$
52. $30x^3 + 42x^2 - 5x - 7$	**53.** $20y^4 - 45y^2$

Solve by factoring.

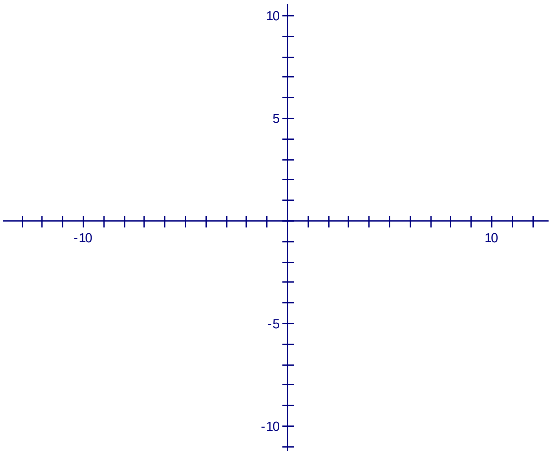
54. $x^2 - 16x + 55 = 0$	**55.** $n^2 = 6n$
56. $3a^2 + 4a = 2a^2 - 2a - 9$	**57.** $x^3 - 5x^2 + 4x = 0$

Use the quadratic formula $\left(x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right)$ **to solve each equation. If necessary, round answers to the nearest hundredth.**

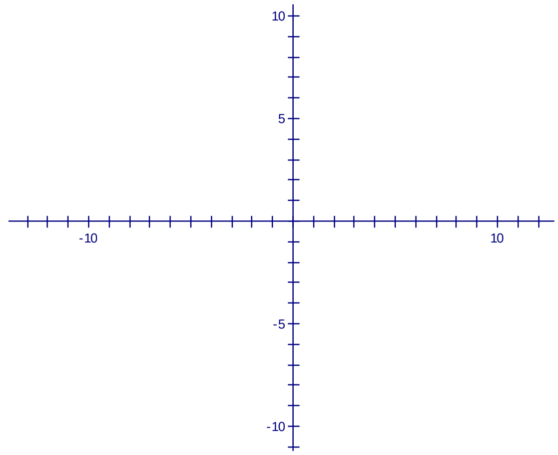
58. $3x^2 + 39x + 108 = 0$	**59.** $2t^2 = 72$

Solve each equation by graphing the related function. If the equation has no solution, write *no solution*.

60. $x^2 + 5 = 0$



61. $\frac{1}{3}x^2 - 3 = 0$



Simplify each radical expression.

62. $5\sqrt{320}$

63. $\sqrt{108b^4}$

64. $^{-}2\sqrt{6a^3} \bullet \sqrt{3a}$

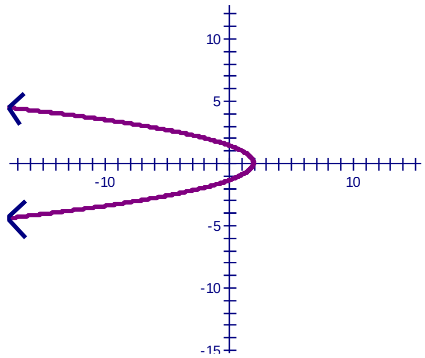
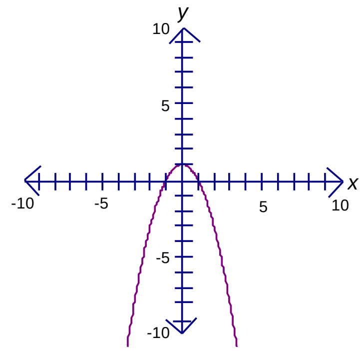
65. $\sqrt{a^3b^5c^3}$

Determine whether each relation is a function. If the relation is a function, state the domain and range.

66. $\{(^{-}2,9),(3,9),(^{-}0.5,9),(4,9)\}$

67.

x	*y*
0	2
3	1
3	-1
5	3

68.	**69.**
	

Evaluate each function rule for $x = {}^{-}3$**.**

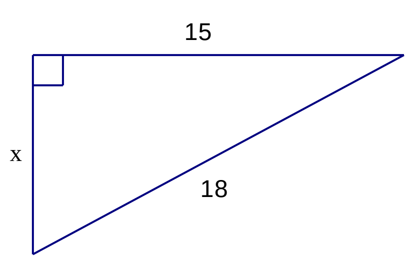
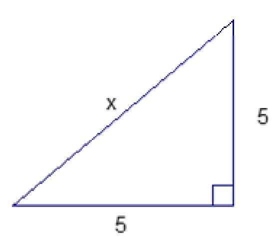
70. $f(x) = x^2$	**71.** $y = 3x + 2$

Use the functions $f(x) = 2x$ and $g(x) = x^2 + 1$ **to find the value of each expression.**

72. $g(3) + f(4)$	**73.** $f(5) - 2g(1)$

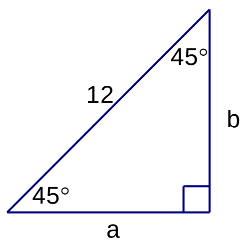
The Below Problems are for HONORS INTEGRATED ALGEBRA 2 only!!

Use the Pythagorean Theorem $\left(a^2 + b^2 = c^2\right)$ **to find the value of** x**. Leave your answer in simplest radical form.**

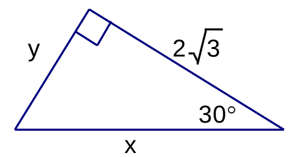
74.	**75.**
	

Use the special right triangles ratios $\left(\left(1:1:\sqrt{2}\right)\right.$ and $\left.\left(1:\sqrt{3}:2\right)\right)$ to find the value of each variable. If your answer is not an integer, leave it in simplest radical form.

76.

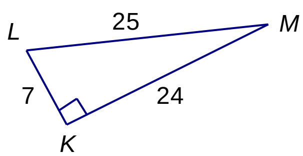


77.

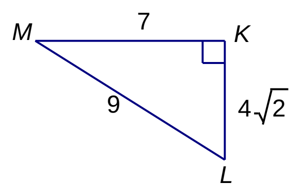


Write the ratios for $\sin M$, $\cos M$ and $\tan M$.

78.

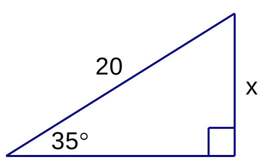


79.

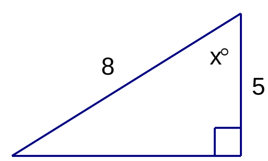


Find the value of x. Round answers to the nearest hundredth.

80.



81.



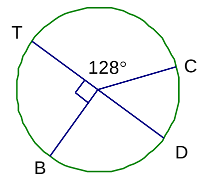
82.

The world's tallest unsupported flagpole is a 282-ft-tall steel pole in Surrey, British Columbia. The shortest shadow cast by the pole during the year is 137 ft long. To the nearest degree, what is the angle of elevation of the sun when the shortest shadow is cast?

83.

A blimp is providing aerial television views of a football game. The television camera sights the stadium at a $7°$ angle of depression. The blimp's altitude is 400 m. What is the line-of-sight distance from the TV camera to the stadium, to the nearest ***hundred meters***?

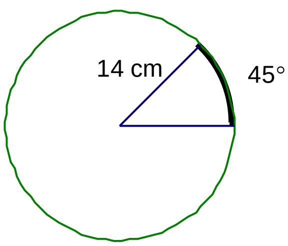
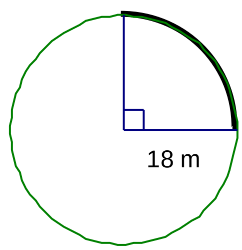
Find the measure of each arc in $\odot P$.



84. TCB	**85.** CD

Find the length of each highlighted arc. Leave your answers in terms of π.

length of $AB = \left(\dfrac{mAB}{360} \bullet 2\pi r\right)$

86.	**87.**
	

Use the distance formula $\left(\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}\right)$ to find the distance between the points to the nearest hundredth.

88. $E(6, {}^{-}2), F({}^{-}2, 4)$

Please see next page for last problem

Roses-R-Red Activity

Osbourn High school often does fundraisers to help support clubs. One activity that is being considered is selling roses for Valentines Day. The school has found several companies that are willing to sell them roses in bulk. Two of these companies have provided the following information:

Rose-Buds sells roses for $0.25 per stem, plus a $5 delivery fee.

Smellin' Good Flowers sells roses for $0.15 per stem, plus a $50 delivery fee.

Your Job:

-Represent both of these situations graphically by plotting their linear equations on the same sheet of standard 8.5"x11" graph paper. Make your graph neat and be sure to label your axes and linear equations. Your graph will need to at least show where the lines cross (keep in mind you will only need to use Quadrant I since all numbers will be positive). Your work is valued and could be presented to other classes once school starts. Putting your 8.5"x11" graph on a small piece of poster would help in the presentation of your data!

Questions:

1) Which company would you say is better based on your graph? Why?

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2) Why is the point of intersection so important?

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3) Give one example of a real-world situation which would require you to create a similar graph in order to make a choice between various competing companies.

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