Honors Precalculus

Sometime during the first week of school in August you will take a quiz covering the material. This material represents an expectation of skills for students to have a firm grasp of in Honors Precalculus. If needed, refer to your Algebra 2 notes or seek online resources for review.
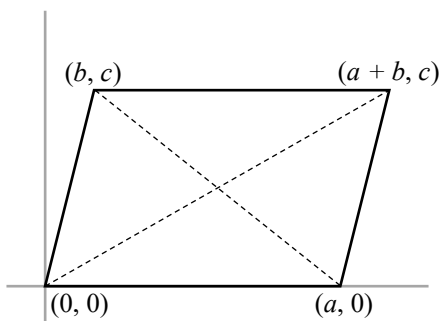
An answer key is provided at https://www.plcschools.org/domain/1471

1.1 Rectangular Coordinates

o   State the Pythagorean Theorem

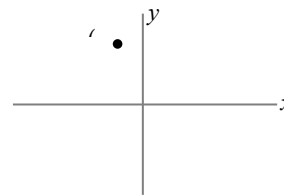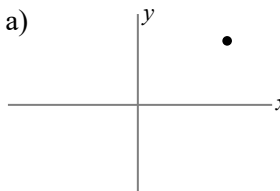o   State the Distance Formula

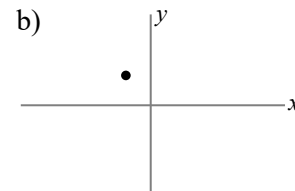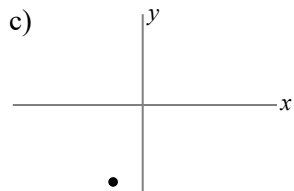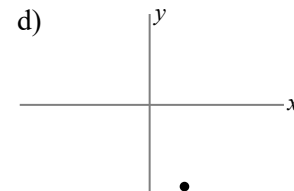o   State the Midpoint Formula
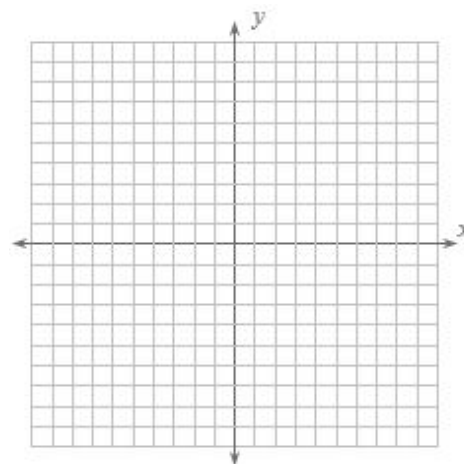
Given points $S(-3, 4)$ **and** $T(6, -7)$**. Find each of the following:**

1.   The midpoint of $\overline{ST}$.

2.   The distance between S and T.

3.   Plot the points on the coordinate plane and verify the distance using the Pythagorean Theorem.

4.   Do the points (4, 0), (2, 1), and (-1, -5) form a right triangle? Verify algebraically.

5.   Prove the diagonals of the parallelogram in the figure below intersects at their midpoints.

Use the plot of point $\left(x_0, y_0 \right)$ **in the figure to answer questions 6-9.**

a)   b)   c)   d)

Match the transformation of the point with the correct plot above.

6. $\left(x_0, -y_0 \right)$ 7. $\left(-2x_0, y_0 \right)$ 8. $\left(x_0, \tfrac{1}{2} y_0 \right)$ 9. $\left(-x_0, -y_0 \right)$

1.2 Graphs of Equations

o   Explain how to find the x-intercepts of a given equation.

o   Explain how to find the y-intercepts of a given equation.

o   State the Standard Form of the equation of a circle.

Determine whether each point lies on the graph of the equation.

10. $y = \sqrt{x+4}$ a) $(0, 2)$ b) $(5, 3)$

11. $y = x^2 - 3x + 2$ a) $(2, 0)$ b) $(-2, 8)$

12. $y = 4 - |x - 2|$ a) $(1, 5)$ b) $(6, 0)$

13. $y = \frac{1}{3}x^3 - 2x^2$ a) $\left(2, \frac{16}{3}\right)$ b) $(-3, 9)$

Find the x and y-intercepts of the following equations.

14. $y = 5x - 6$ 15. $y = \sqrt{x+4}$ 16. $y = 2x^3 - 4x^2$ 17. $y = x^4 - 16$

Write the standard form of the equation of the circle with the given characteristics.

18. Center: $(2, -1)$; radius: 4   19. Endpoints of a diameter: $(-4, -1), (4, 1)$

1.3 Linear Equations in Two Variables

o   State the Slope-Intercept Form of the equation of a line.

o   State the Point-Slope Form of the equation of a line.

o   Give the equation of a vertical line.

o   Give the equation of a horizontal line.

o   Define slope.

o   State the equation for finding the slope of a line passing through two points.

o   How can you use slope to determine if two non-vertical lines are parallel?

o   How can you use slope to determine if two non-vertical line are perpendicular?

Find the slope and y-intercept of the equation of the line.

20. $7x + 6y = 30$ 21. $5x - 2 = 0$ 22. $y + 4 = 0$ 23. $2x - 3y = 9$

Find the slope-intercept form of the equation of the line passing through the points.

24. $(5, -1), (-5, 5)$ 25. $(-8, 1), (-8, 7)$ 26. $\left(\frac{3}{4}, \frac{3}{2}\right), \left(-\frac{4}{3}, \frac{7}{4}\right)$ 27. $(1, 0.6), (-2, 0.6)$

Write the slope-intercept forms of the equations of the lines through the given point (a) parallel to the given line and (b) perpendicular to the given line.

28. $(2, 1);\ 4x - 2y = 3$ 29. $\left(-\frac{2}{3}, \frac{7}{8}\right);\ 3x + 4y = 7$ 30. $(2, 5);\ x = 4$
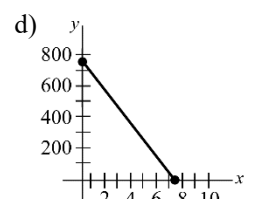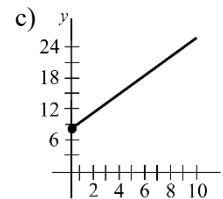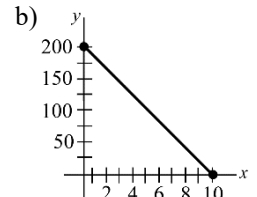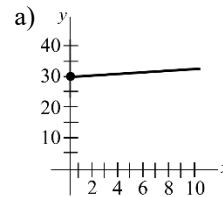
In exercises 31-34, match the description of the situation with its graph.

31. A person is paying $20 a week to a friend to repay a $200 loan.

32. An employee is paid $8.50 per hour plus $2 for each unit produced per hour.

33. A sales representative receives $30 per day for food plus $0.32 for each mile traveled.

34. A computer that was purchased for $750 depreciates $100 per year.

a)

b)

c)

d)

35. A microchip manufacturer pays its assembly line workers $11.50 per hour. In addition, workers receive a piecework rate of $0.75 per unit produced. Write a linear equation for the hourly wage W in terms of the number of units x produced per hour.

1.4 Functions

o   State what the domain of a function represents.

o   State what the range of a function represents.

o   Define a function.

For exercises 36-39, state whether or not the relationship is a function. If not, explain why.

36. Domain   Range

-2   5
-1   6
0   7
1   8
2

37. Domain   Range

-2   3
-1   4
0   5
1
2
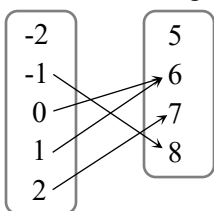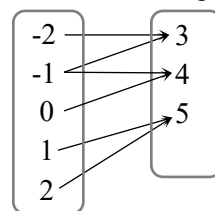
38.

Input	10	7	4	7	10
Output	3	6	9	12	15

39.

Input	0	3	9	12	15
Output	3	3	3	3	3

Evaluate the function at each specified value of the independent variable and simplify.

40. $f(x) = 2x - 3$ a) $f(1)$ b) $f(-3)$ c) $f(x-1)$

41. $g(x) = \sqrt{x+8} + 2$ a) $g(-8)$ b) $g(1)$ c) $g(x-8)$

42. $q(x) = \dfrac{1}{x^2 - 9}$ a) $q(0)$ b) $q(3)$ c) $q(y+3)$

43. $h(x) = x^2 - 2x$ a) $h(2)$ b) $h(1.5)$ c) $h(x+2)$

44. $s(x) = |x| + 4$ a) $s(2)$ b) $s(-2)$ c) $s\left(x^2\right)$

Skills Review

Solve the equation or inequality.

45. $\frac{1}{3}x + 2 = 5 - \frac{1}{6}x$ 46. $2x^2 + 3x - 8 = 0$ 47. $3x - 8 \geq \frac{1}{2}(10x + 7)$

48. $|2x + 15| \geq 11$ 49. $\dfrac{8}{2x-7} = \dfrac{4}{9-4x}$ 50. $\sqrt{x-9} + 15 = 0$

51. $-7(3-x) = 14(x-1)$ 522. $\dfrac{t}{3} + \dfrac{t}{5} = 1$ 53. $\dfrac{3}{x(x+1)} - \dfrac{4}{x} = \dfrac{1}{x+1}$

54. $x^3 - x = 0$ 55. $(x-5)^2 = 8$ 56. $9x^2 + 12x + 3 = 0$

57. $x^2 - 6x + 4 = 0$ 58. $2x^2 - 4x - 6 = 0$ 59. $\dfrac{1}{4} = 8^{x+3}$

60. $27^{x+1} = 9^{2x-4}$ 61. $\log_3 9 = x$ 62. $\ln e^x = 4$

Simplify the expression

63. $\sqrt{18x} - \sqrt{2x}$

64. $\sqrt[4]{x^5}$

65. $\dfrac{70}{\sqrt{7x}}$

66. $\dfrac{55}{\sqrt{20} - 3}$

67. $\sqrt[3]{\sqrt{y}}$

68. $\dfrac{2}{x+5} - \dfrac{2}{x-5}$

69. $\dfrac{3}{x-1} - \dfrac{2}{x(x-1)}$

70. $\dfrac{x}{x-5} + \dfrac{1}{2}$

71. $(x-4)\dfrac{1}{\sqrt{x^2 - 4}}$

72. $\left(\dfrac{x}{x^2 - 4}\right)\left(\dfrac{x^2 - x - 2}{x^2}\right)$

73. $\dfrac{x}{x^2 - 3x - 28} \div \dfrac{x^2 + 3x}{x^2 + 5x + 4}$

Factor completely.

74. $(x-5)^2 - y^2$

75. $x^3 - 64$

76. $3x^3 - 6x^2 - 45x$