

Honors Precalculus

Summer Packet

Due Thursday, August 12, 2021

To help prepare you for the class there is a summer assignment. To receive credit for your work, all steps and work must be shown. For problems needing an explanation I expect several sentences that show in detail your knowledge of the subject area. Work all graphing problems (number line, conics, and statistics) on graph paper.

All problems need to be clearly numbered and worked on notebook or graph paper. All work should be done in pencil.

This assignment is due Thursday, August 12 and will be graded for accuracy. If you have any questions you may email me or ask Wednesday, August 11.

I look forward to seeing you,

Mrs. Fox

Honors Precalculus summer math review

Simplify the expression. Write your answer with only positive exponents. Assume that all variables represent nonzero real numbers.

$$1) \frac{(2p^2a^3)^{-4} (7p^3a)^{-4}}{(p^2a^4)^2 (p^3a)^{-2}}$$

$$2) \frac{2p^{-1}q^{-1}r}{p^2q^2r^{-1}} \left(\frac{3pq^{-2}r^{-3}}{p^{-3}q^3r^{-2}} - \frac{q^{-3}r^2}{p^4} \right)$$

$$3) \text{ SOLVE: } \begin{cases} x^2 + y^2 = 26 \\ x - 3y = -14 \end{cases}$$

4) GRAPH THE INEQUALITY ON A NUMBER LINE:

$$x + 1 \neq -4; D = \{\text{Real Numbers}\}$$

5) GRAPH ON A NUMBER LINE:

$$-5 < x - 1 \leq 4; D = \{\text{Integers}\}$$

6) SOLVE:

$$\begin{cases} 6x - 4y - 5z = 6 \\ 5x + 5y + 2z = -53 \\ 2x + 4y + 5z = -46 \end{cases}$$

$$7) \text{ GRAPH THE SOLUTION: } \begin{cases} y < \frac{-1}{4}x + 6 \\ y \geq 2x + 4 \end{cases}$$

8) GRAPH ON A NUMBER LINE: $|x| + 4 \geq 10$; $D = \{\text{Reals}\}$

Solve the equation algebraically.

$$9) x \cdot \sqrt{8x-16} = 0$$

$$10) x^2 - 7x - \frac{1}{7} = 0$$

Find the distance between the points.

$$11) (7,6) (-3,-1)$$

Determine whether the equation is linear in x . Explain.

$$12) 4x^2 - 2.6x = x^2 - 8$$

Solve the equation.

$$13) \frac{7x+7}{5} + \frac{6x-2}{2} = -1$$

Solve the inequality.

$$14) \frac{2y-3}{3} + \frac{3y+1}{5} \leq y + 1$$

Find the value of x so that the line through the pair of points has the given slope.

$$15) (-1, 2) \text{ and } (4, y); m = -2$$

Find a point-slope form equation for the line through the point with the given slope.

$$16) (-3, -7), m = \frac{-1}{11}$$

Find a general form equation for the line through the pair of points.

$$17) (-3, -4) \text{ and } (8, -2)$$

Find the value of x and the value of y for which $(x, 2)$ and $(8, y)$ are points on the graph.

$$18) 2x - 3y = 9$$

Determine the equation of the line described. Put answer in slope-intercept form, if possible.

$$19) \text{ through } (5, -3), \text{ perpendicular to } -7x - 3y = -44$$

Solve the equation by factoring.

$$20) 24x^2 + 52x + 24 = 0$$

Solve the equation by extracting the square roots.

$$21) 2y^2 - 8 = 4 - 2y^2$$

Find the midpoint of the line segment with the given endpoints.

$$22) \left(\frac{-9}{2}, \frac{-5}{2}\right) \text{ and } \left(\frac{7}{2}, \frac{-3}{2}\right)$$

Evaluate the function.

$$23) \text{ find } f(k-1) \text{ when } f(x) = 5x^2 - 3x + 6$$

Factor the following polynomial.

$$24) 49 - (m + 4n)^2$$

Factor completely.

$$25) 20x^2 - 24x - 25x + 30$$

Solve by completing the square.

$$26) 2x^2 - 7x + 22 = (x - 2)(x + 1) + 4x$$

Solve the equation using the quadratic formula.

$$27) 7x^2 + 8x = -2$$

Write the sum or difference in the standard form $a + bi$.

$$28) \sqrt{11 + i^2} - (5 - \sqrt{-25})$$

Write the product in standard form.

$$29) -3i(-4 - 8i)^2$$

Write the expression in standard form.

$$30) \frac{3}{4 - 12i}$$

Find the real numbers x and y that make the equation true.

$$31) 6 + yi = x - 6i$$

Perform the indicated operation. Write the result in standard form.

$$32) (-3 + 3i\sqrt{3})^3$$

Find an equation for the circle.

$$33) \text{center } (-1, -5), \text{ radius } \sqrt{2}$$

Graph the parabola.

$$34) 4y = x^2$$

Find the vertex, the focus, and the directrix of the parabola. Graph and label all.

$$35) x^2 + 8x - 4y + 36 = 0$$

Find the center, vertices, and foci of the ellipse with the given equation.

$$36) \frac{x^2}{625} + \frac{y^2}{225} = 1$$

Find the vertices and foci of the hyperbola. Graph.

$$37) \frac{(x-2)^2}{81} - \frac{(y-4)^2}{144} = 1$$

38) Explain the differences between an ellipse and a hyperbola. Both definitions emphasize distance, but how is distance used differently in these two definitions?

A boy is standing on a flat field and tosses his ball toward a second boy standing at the other end of the field. The path of the ball is a parabola, and the equation of the path is $y = -4x^2 + 8x$.

Explain your answer.

39) What is the highest the ball will be above the flat field and for what value of x ?

- a) highest height = 4 when $x=2$
- b) highest height = 4 when $x=1$
- c) cannot determine answer with information given
- d) none of these is correct.

40) What are the points on the parabola called where the ball is at ground level?

41) Explain why the graph of an ellipse does not satisfy the conditions for the graph of a function.

42) Decide whether the statement is true or false. If false, explain why. The x -intercepts of the hyperbola

$$\frac{x^2}{49} - \frac{y^2}{16} = 1 \text{ are } (7,0) \text{ and } (-7,0).$$

43) The length of a rectangle is 8 inches more than its width. If 4 inches are taken from the length and added to the width, the figure becomes a square with an area of 275.56 sq inches. What are the dimensions of the original figure?

44) Show that the points $P_1(2,4)$, $P_2(5,2)$, and $P_3(7,5)$ are the vertices of a right triangle. Make sure to prove.

45) A projectile is thrown upward so that its distance above the ground after t seconds is

$$h = -12t^2 + 432t. \text{ After how many seconds does it reach its maximum height?}$$

46) The number of mosquitoes $M(x)$, in millions, in a certain area depends on the June rainfall x , in inches: $M(x) = 10x - x^2$. What rainfall produces the maximum number of mosquitoes?

47) The following data set gives the average home value, in dollars, for a city at 5-year intervals.

Year	1970	1975	1980	1985	1990	1995
Value	109,694	117,744	122,144	134,984	148,694	168,114

Determine where f is increasing or decreasing. Explain.

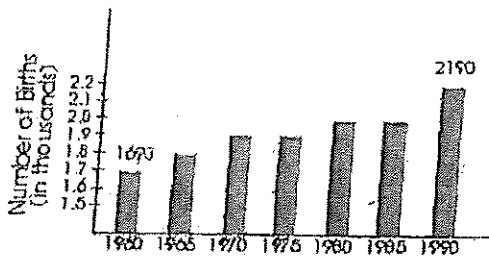
- a) f is increasing for the given x -values.
- b) f is decreasing for the given x values.
- c) f is increasing until 1980, then f is decreasing for remainder of x -values.
- d) f is constant for the given x -values.

48) Find the domain and range of the given function.

$$F(x) = \sqrt{14-x}$$

49) Assume that the sales of a certain appliance dealer are approximated by a linear function. Suppose that sales were \$7500 in 1982 and \$71,500 in 1987. Let $x=0$ represent 1982. Find the equation giving yearly sales $S(x)$.

50) Assume that the situation described can be modeled by a straight line graph. Use the given information to find the $y=mx+b$ form of the equation of the line. The number of births in County A has been increasing in recent years. Use the information given on the bar graph for the years 1960 and 1990. Let $x=0$ represent the year 1960 and y represent the number of births.



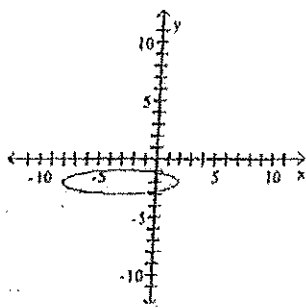
51) Suppose $y=mx+b$ is a mathematical model for actual time as a function of estimated time, where y represents actual time and x represents estimated time and m and b are constants. If $m=4.9$ and $b = -3.2$, find y when x is 60 min.

52) Employees of a publishing company received an increase in salary of 5% plus a bonus of \$1200. Find the total annual pay after the increase for an initial salary of \$1200.

53) Solve the inequality algebraically. Write the solution in interval notation.

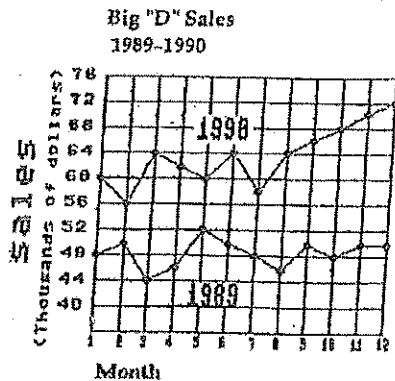
$$|3x - 1| < 3.7$$

54) Determine whether the graph is the graph of a function. Explain.



55) The area of a rectangle is $30m^2 + 20m - 10$. Find the length if the width is $6m-2$.

Use the graph to answer the following question.



56) What was the percent of increase in sales between month 2 and month 12 of 1990? Round your answer to the nearest tenth.

57) The fact that $8\sqrt{56} = 7$ and $7\sqrt{56} = 8$ demonstrates a way to check division. Perform the following division, and then use the above property to check it.

$$2z+10 \overline{) 8z^2 + 56z + 80}$$

58) Explain domain and range in your own words.

59) Is the following solution correct?

$$81y^3 = 1y$$

$$81y^2 = 1$$

$$9y = 1$$

$$y = \frac{1}{9} \text{ or } y = -\frac{1}{9}$$

60) Explain why a cubic equation of the form $ax^3 + bx^2 + cx = 0$ must have 0 in its solution set.