

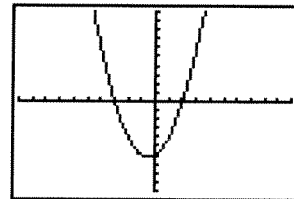
These will be your first 15 points on the Final Exam
You MUST show your work. * No work – no credit! *****

Due: on YOUR exam day, it will not be accepted after YOUR exam day.

You will have a chance to compare your answers with mine prior to the exam, please let me know when you are ready to compare. If you have questions about how to get the correct answer, please ask for help. Plan accordingly.

1. Use completing the square to rewrite this equation in vertex form. $x^2 + 10x = 8$

2. What are the factors of the quadratic whose graph is shown? →



3. Write the intercept form (factored form) of this equation. $y = 3x^2 - 48$

If you choose to use your calculator to answer each question, write the calc. buttons you used.

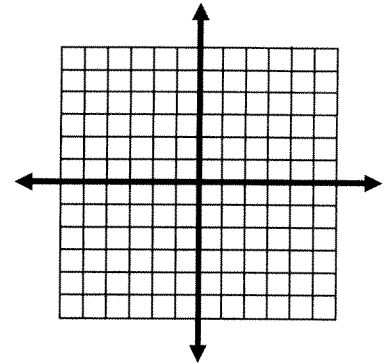
<p>4. What are the zeros of this function? $f(x) = 5x^2 - 4x - 12$</p>	<p>5. What is the vertex of this quadratic function? $y = 5x^2 + 11x + 2$</p>
<p>6. At what <i>point</i> does the minimum of this function occur? $y = x^2 - 4x + 3$</p>	<p>7. Solve the related equation of this function: $y = x^2 + 2x - 24.$</p>
<p>8. Where does the maximum of this function occur? $y = -x^2 + 9$</p>	<p>9. Find the x-intercepts of: $y = x^2 + 3x - 10$</p>
<p>10. Find the roots of $15 = x^2 + 2x.$</p>	<p>11. Name the vertex of this equation: $y = -3x^2 + 12x + 1$</p>

12. Create an infinite geometric series and tell how you know it will have a sum. Provide an answer (the sum) with your expression. Be sure to show all work involved.

13. On the graph provided, carefully draw a function with a least degree of 4.

Properly name an increasing interval on your graph: _____

Properly name a decreasing interval on your graph: _____



<p>14. Factor $125x^3 + 216$ completely. (hint: SOAP)</p>	<p>15. Given that $f(2) = 0$, correctly factor $f(x) = 2x^3 - x^2 - 5x - 2$ by means of synthetic division.</p>
<p>16. If one zero is -4, the other zeros for $f(x) = 3x^3 + 17x^2 + 18x - 8$ are:</p>	<p>17. Factor completely: $x^3 - 5x^2 - 16x + 80$ by grouping.</p>
<p>18. What is the simplified form of: $\sqrt[4]{162}$?</p>	<p>19. $h(x) = \frac{8}{x-4}$ and $p(x) = -3x$ find $h \circ p$. Then state the domain.</p>

20. What is the simplified form of the expression: $\sqrt[3]{54x^3y^6z^{10}}$?

21. Divide $x^3 - 6x + 7$ by $x - 2$ careful ☺

22. What is the value of $f(x) = -8x^5 + 6x^4 - 5x^3 + 10x^2 + 9x - 1$ when $x = 1$? (show using synthetic substitution)

23. Find the quotient of: $x^4 + 10x^3 + 8x^2 - 59x + 40 \div x^2 + 3x - 5$

24. Evaluate ${}_7P_3$?

25. The variable x varies inversely with y . When $x = 15$, $y = 1.2$. Which equation relates x and y ? Express your equation set equal to your constant.

26. The variable z varies jointly with x and y . When $x = 10$ and $y = \frac{1}{2}$, $z = 45$. Which equation relates x , y , and z ? Express your equation set equal to your constant.

27. The variable z varies directly with y and inversely with x . When $x = 4$ and $y = 28$, $z = 56$. Write an equation relating x , y , and z ? Express your equation set equal to your constant.

28. The amount of interest (I) owed on a loan varies directly with the length of time (t) of the loan. If k is the constant of proportionality, which formula represents this relationship?

a) $I = kt$

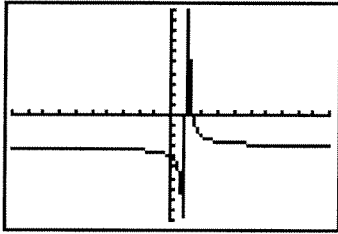
b) $I = \frac{k}{t}$

c) $t = kI$

d) $t = \frac{k^2}{I}$

29. What are the asymptotes of the graph of $y = \frac{3}{2x-6} + 5$? H.A. _____ V.A. _____

30. Which function is graphed?



a) $f(x) = \frac{1}{x-1} + 3$

b) $f(x) = \frac{1}{x+1} + 3$

c) $f(x) = \frac{1}{x-1} - 3$

d) $f(x) = \frac{1}{x+1} - 3$

31. What is the simplified form of $\frac{x^2 + 5x + 6}{x^2 - 9}$?

32. What is the product $\frac{x^2 - 3x - 10}{x^2 - 6x + 5} \cdot \frac{x - 1}{x^2 - 4}$?

33. What is the quotient $(x + 6) \div \frac{x^2 + 5x - 6}{x^2 + 7x - 8}$?

34. What is the sum $\frac{4}{3x} + \frac{x}{3x^2 - 6x}$? Identify your common denominator before you start!

35. What is the simplified form of the following complex fraction?

$$\frac{\frac{10}{x+1}}{\frac{1}{2} + \frac{3}{x+1}}$$

36. What is the solution of the equation $\frac{6}{x} - \frac{2}{3} = -\frac{4}{x}$

37. What are all the solutions of the equation $\frac{x+2}{5} = \frac{8}{x-4}$?

38. What is the fifth term of the sequence defined by $a_n = 3n - 1$?

39. Evaluate: $\sum_{k=3}^5 (3k^2 + k)$?

40. Select the arithmetic sequence. Identify d. _____

- a) 2, 5, 9, 14, 20 b) 1, 3, 6, 10, 15 c) -5, -2, 1, 4, 7 d) -3, 0, 4, 9, 15

41. Select the geometric sequence. Identify r. _____

- a) 2, 4, 6, 8... b) 2, 6, 24, 120... c) 8, 4, 2, 1... d) 80, 20, 10, 10...

42. Simplify. $(2y^{-5})(4x^0)$

43. Create a polynomial function with the following characteristics:
cubic, leading coefficient is 12, quadratic coefficient is 3, and the constant term is -2.

Consider this function and the synthetic division problems which follow.

$$f(x) = x^3 + x^2 - 8x - 8$$

A)
$$\begin{array}{r|rrrr} -1 & 1 & 1 & -8 & -8 \\ & & -1 & 0 & 8 \\ \hline & 1 & 0 & -8 & 0 \end{array}$$

B)
$$\begin{array}{r|rrrr} 2 & 1 & 1 & -8 & -8 \\ & & 2 & 6 & -4 \\ \hline & 1 & 3 & -2 & -12 \end{array}$$

44. What is the quotient (answer) in B? (You must interpret the synthetic division answer.)

45. Can you determine a factor from either computation? If so, name the factor _____.

46. Can you determine a root from either computation? If so, name it _____.

47. What is $f(-1)$? _____

48. What is $f(2)$? _____

<p>49. Simplify. $\left(\frac{4x^6y^8z}{x^{-5}}\right)^3$</p>	<p>50. Multiply. $(8x^4 - 1)(7x - 5)$</p>
<p>51. $(-5x^2 + 11x - 1) - (6x^2 + 8x - 7)$</p>	<p>52. $\left(\frac{4}{7}x^2 + 6x + 2\right) + \left(\frac{5}{7}x^2 - x + \frac{1}{3}\right)$</p>

53. Using your calculator - what are all the real zeros of $f(x) = x^3 - 3x^2 - 40x + 84$?

54. Consider this polynomial function: $f(x) = 2x^3 + 3x^2 + 4x + 12$. Using the Rational Zero Theorem, the *possible* rational zeros are

A. $\pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

B. $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

C. $\pm \frac{1}{2}, \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

D. $\pm \frac{1}{2}, \pm \frac{3}{2}, \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

55. Use the graph to the right to answer the following:

End Behavior: As $x \rightarrow +\infty$, $f(x) \rightarrow$

As $x \rightarrow -\infty$, $f(x) \rightarrow$

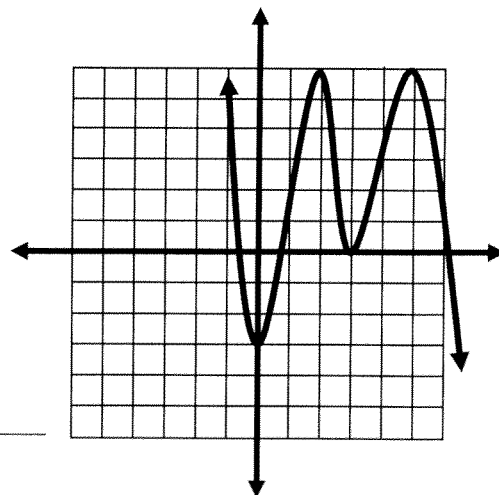
Turning Points: _____

Least Degree of polynomial: _____

Give the coordinate (if any) in the following:

Absolute Min: _____ Relative Min (Name one.): _____

Absolute Max: _____ Relative Max (Name one.): _____

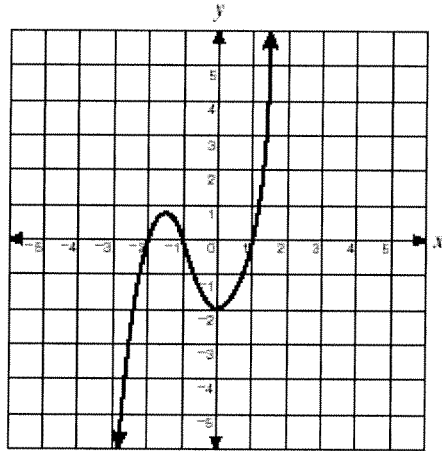


56. Using the graph of the polynomial shown below, name all the roots that you can see: _____

Provide those same roots in factor form: _____

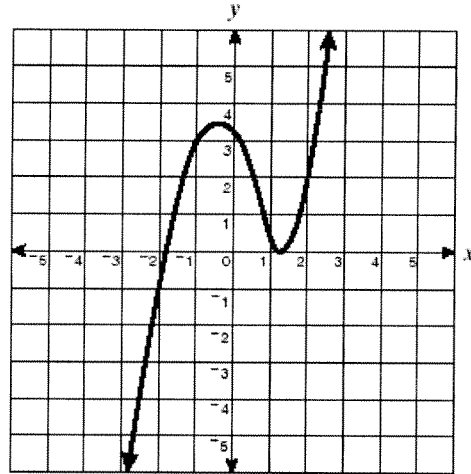
Now that you have the factors, what does the equation look like: _____

What would this equation be in standard form: _____



57. The graph of the function to the right has a double root

between _____ and _____



58. Completely factor the following:

a. $16x^2 - 1$

b. $y^2 - 5y - 14$

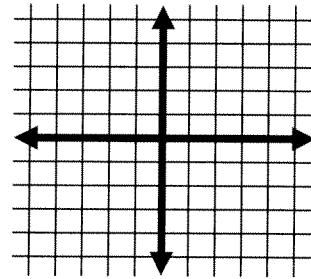
c. $-4r + 8$

d. $5x^2 - 11x + 2$

e. $t^2 + 25$

f. $2a^2 - 4a - 6$

59. Do a **quick** sketch of a polynomial function that has NO real roots showing. Briefly describe (yes, that means in words ☺ - writing about math – my fav. too!!!) How do you know that your sketch has NO real roots.

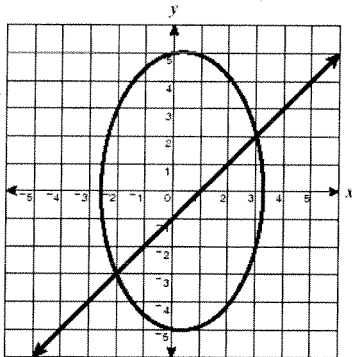


60. Given that a quadratic equation has solutions at: $x = \frac{1}{2}$ and $x = \frac{2}{3}$

a. Determine what the factors would look like: _____

b. Determine the functions' equation in standard form: $f(x) =$ _____

61. Which is most likely the solution set for the system graphed?



62. What are the solutions to $x^2 - 12x + 16 = 0$

63. What is the solution set for $3x^2 - 4x - 15 = 0$

64. What is the *product* of the solutions to the equation below?

$$2x^2 - 11x - 6 = 0$$

65. Twelve babies spoke for the first time at the following ages (in months).

15 26 10 9 15 20 18 11 8 20 12 13

- a) What is the \bar{x} . _____
b) What is the standard deviation for this data set? _____
c) Which data pieces lie within one standard deviation?

What percentage is that for our data set? _____

- d) What percentage does the Empirical Rule say should lie within one standard deviation?

- e) Standardize (aka find the z-score) the data points 11 and 26. Then tell in words what it is that you have found.

Use Table A for the following questions.

66. Draw a picture of $z < -1.5$.

What is the probability of the picture you have drawn? (give answer as a %)

67. Draw a picture of $z > 0$.

Draw a picture of $z < 0$.

Describe in words the probabilities for these two pictures?

68. Draw a picture of $-1.5 < z < 2.5$.

Show work to find the probability of this situation. Give your final answer as a %.

69. The average weight of newborn, term babies at a local hospital is 7.5 lbs with a standard deviation of 1.6 lbs. Assuming that the distribution of weights is approximately normal, find the probability that a newborn weighs:

a. Less than 6 lbs. (show picture and calculations)

b. More than 8 lbs. (show picture and calculations)

c. Between 6 and 8 lbs. (show picture and calculations)

70. In how many different orders can 3 married couples be seated in a row of 6 chairs under the following conditions:

a. Anyone may sit in any chair. (show picture)

b. Men must occupy the first and last chairs. (show picture)

c. Men must occupy the first three chairs and women must occupy the last three chairs. (show picture)

d. Everyone must be seated beside his or her spouse. (show picture)

71. Suppose Curly, Larry, Mo and Jo were competing in a comedian contest for 1st, 2nd, and 3rd. In how many different ways can they be awarded prizes so that any person gets at most one prize? (show work)

72. How many different arrangements are there of the letters in the word "number"? (show work)

73. Suppose that 3 freshmen, 5 sophomores, 4 juniors, and 2 seniors are being nominated to serve on a student advisory committee. How many different committees can be formed under the following circumstances? (show all work)

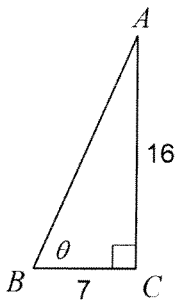
a. The committee is to consist of any 4 persons.

b. The committee is to consist of one freshman, one sophomore, one junior, and one senior.

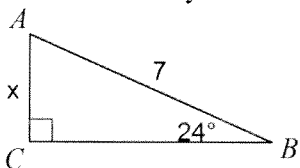
c. The committee is to consist of two persons: one freshman or soph AND one junior or senior.

74. Provide the other five trig functions knowing that: $\cos \theta = \frac{6}{7}$

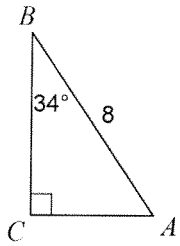
75. Round any sides or angles to the nearest tenth. Solve for theta.



76. Round any sides or angles to the nearest tenth. Solve for x.



77. Round any sides or angles to the nearest tenth. Solve the given triangle.



78. Convert each degree measure into radians and each radian measure into degrees. Provide a picture of the angle along with your answer.

a. $\frac{11\pi}{12}$

b. -540°

c. 50°

d. $-\frac{5\pi}{4}$

79. You are standing 100 feet from the main entrance of the Sears Tower in Chicago, Illinois. You estimate that your angle of elevation to the top of the skyscraper is 77° . What is the approximate height of the Sears Tower? (round to the nearest foot)

Suppose your friend is at the top of the tower. What is the straight-line distance between you and your friend? (round to the nearest foot)