1.)   A rock is thrown through the air by a large catapult. The path of the boulder can be modeled by the quadratic equation $s(t) = -16t^2 + 96t + 128$, where $s(t)$ represents the rock's height (in feet) after t seconds.

a.)   When does the rock reach its maximum height?

b.)   What is the maximum height?

c.)   Write the equation in vertex form.

d.)   When will the rock land?

e.)   When will the rock be at an altitude of 80 feet?

_____

Define variables, write a system of equations and then solve.

2.)   An instructor wants to write a quiz with 9 questions where each question is worth 3, 4, or 5 points based on difficulty. He wants the number of 3-point questions to be twice as many the number of 5-point questions, and he wants the quiz to be worth a total of 35 points. How many 3, 4, and 5 point questions could there be?

Perform the indicated operation.

3.) $(5 - 2i)(3i + 4)$

4.) $(4i + 3)^2$

5.) $\dfrac{4-i}{2i+3}$

6.) $(2x^2 - 4x + 7) - 4(5 - 6x^2 + 3) - (11x^2 - 3)$	7.) $(2x - 5y)^2$
8.) $(5a^3 + 7) - 4(2 - 6a^2 + 3a) - 4(2a^3 - 8)$	9.) $(3w - 2)(2w^2 - 7w - 2)$
10.) Evaluate. If $f(t) = 4t^2 - 2t + 7$; find $f(t + 5)$	11.) Evaluate. If $f(y) = -2y^2 - 2y$; find $f(y - 3)$

Factor Completely.

12.) $2n^4 - 26n^2 + 72$

13.) $27m^3 - 8n^3$

14.) $16x^4 - 81$

15.) $6m^3 - 33m^2 + 24m$

Solve each of the following using the method of your choice.

16.) $-3(2x+4)^2 = 36$

17.) $4x^2 - 5x + 3 = 6x - 4$

18.) $2x^4 - 3x^3 + 16x - 24 = 0$

19.) $c^5 - 125c^2 = 0$

20.) Find the remaining zeros for the polynomial given $(x - 1)$ is a factor of $P(x) = x^4 - 7x^3 + 17x^2 - 17x + 6.$
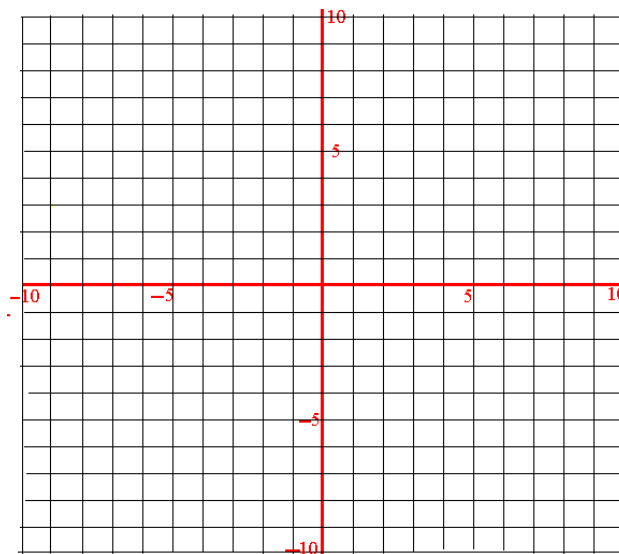
Zeros: _____

21.) Find all roots for the following polynomial, $j(a) = 2a^3 - 2a^2 + 6a - 6$

Roots: _____

22.) Solve Algebraically and Graphically.

$$y = x^2$$
$$y + x^2 = 8$$

Solutions: _____

Solutions: _____

23.)   Find the value of k given that $(x - 3)$ is a factor of $p(x) = 2x^3 - kx - 42$.

_____

24.)   A grasshopper leaps from a short table (we'll name him J. Cricket) and its path through the air is modeled by the following equations

$$h(x) = -x^2 + 12x + 13 \qquad \text{AND} \qquad h(x) = -(x - 6)^2 + 49$$

where height (h) is measured in inches, and horizontal distance traveled (x) is also measured in inches.

a.)   How tall is the short table that the grasshopper leaps from?

b.)   How far has the grasshopper traveled horizontally when it reaches its maximum height?

c.)   What is the maximum height of the grasshopper?

d.)   How high is the grasshopper after it has traveled 3 inches horizontally?

e.)   How far has the grasshopper traveled horizontally when it is at a height of 33 inches?

f.)   When the grasshopper lands, how far has it traveled horizontally?

25.) For the given polynomial state the following information.

Degree: Even or Odd

Lead Coefficient: Positive or Negative

Zero(s): _____

Factor(s): _____

Equation: _____

Rel. Max: _____

Rel. Min: _____

Intervals Increasing: _____

Intervals Decreasing: _____

Domain: _____

Range: _____

End Behavior:

$as\ x \to \infty, f(x) \to$ _____

$as\ x \to -\infty, f(x) \to$ _____

_____
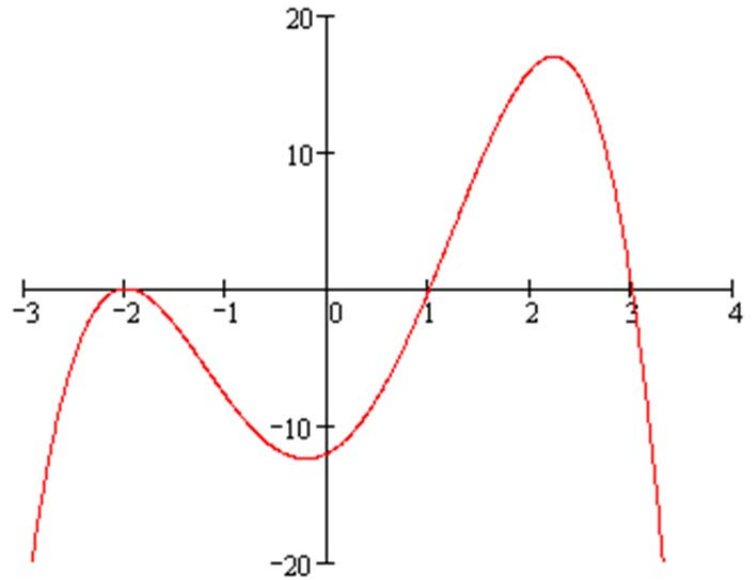
26.) A rectangular piece of cardboard is 15 inches longer than it is wide. If 5-inch squares are cut from each corner, and the remaining piece folded up to form a box, the volume of the box is 1250 cubic inches. Find the dimensions of the piece of cardboard.

27.) $f(x) = \dfrac{x^2 - 5x + 6}{x^2 - 4x + 3}$

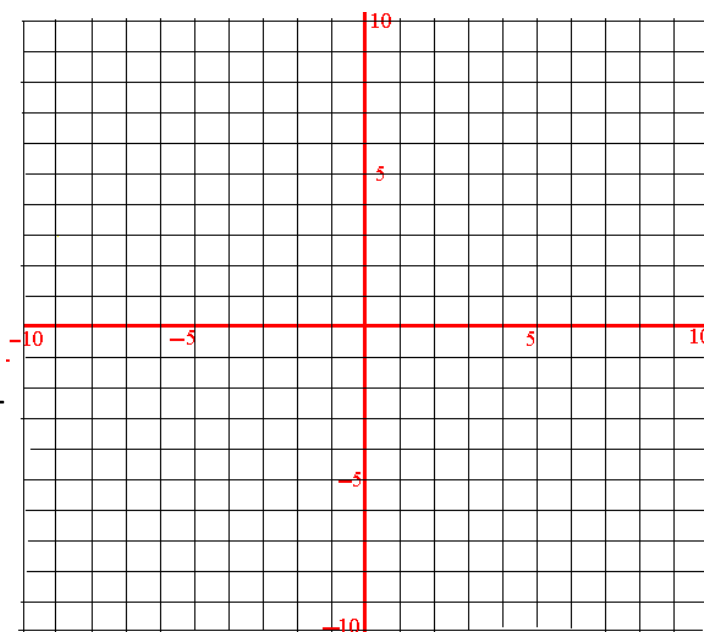**Hole(s):** _____

Vertical Asymptote: _____

Horizontal Asymptote: _____

X-intercept(s): _____**Y-intercept(s):** _____

Domain: _____

Range: _____

as $x \to \infty, f(x) \to$ _____

as $x \to -\infty, f(x) \to$ _____

x					
$f(x)$					

_____

28.) $f(x) = \dfrac{8}{x^2 - x - 6}$

Hole(s): _____

Vertical Asymptote: _____

Horizontal Asymptote: _____

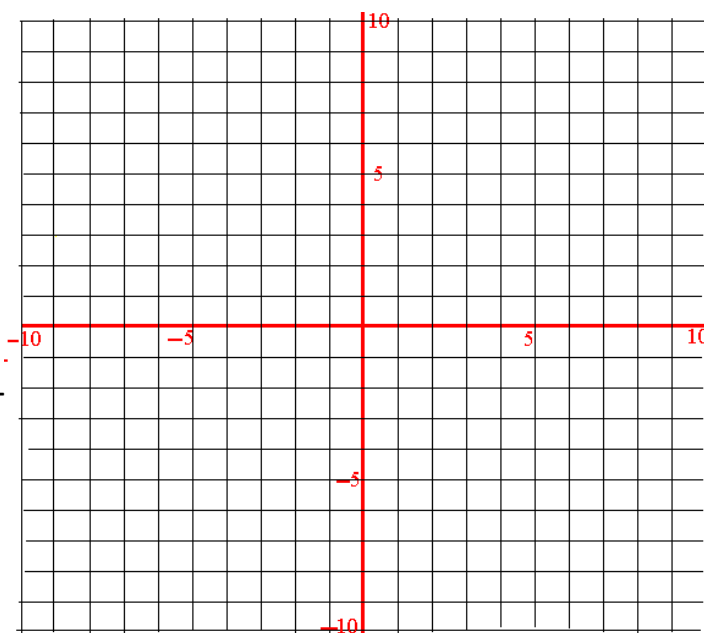**X-intercept(s):** _____**Y-intercept(s):** _____

Domain: _____

Range: _____

as $x \to \infty, f(x) \to$ _____

as $x \to -\infty, f(x) \to$ _____

x					
$f(x)$					

Solve.

29.) $\dfrac{v-6}{2v^2+2v-4} + \dfrac{v}{2v-2} = \dfrac{1}{2}$

30.) $\dfrac{5}{n^3+5n^2} = \dfrac{4}{n+5} + \dfrac{1}{n^2}$

_____
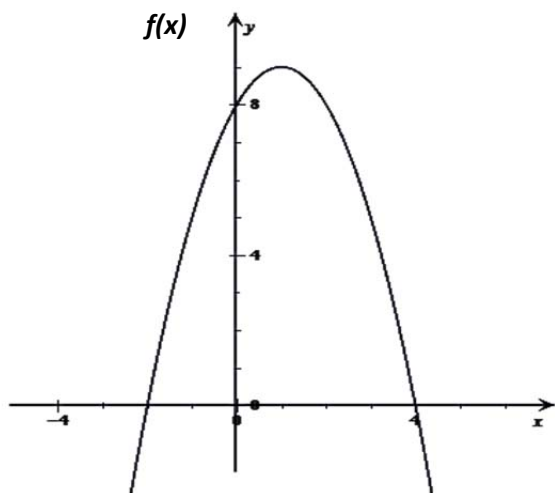
Perform the indicated operation.

31.) $\dfrac{m^2-2m-8}{8m+24} \div \dfrac{2m-8}{m^2+7m+12}$

32.) $\dfrac{4x}{2x+2} \cdot \dfrac{x^2-6x-7}{x^2-7x}$

33.) $\dfrac{2x+3}{5x-30} - \dfrac{3x+4}{x-6}$

34.) $\dfrac{2c-8}{c^2+7c+12} - \dfrac{c-4}{c+3}$

Use the following graph and table to answer questions 35 – 38. Assume $g(x)$ is linear.

f(x)

x	g(x)
-3	17
-1	11
1	5
3	-1

For 35 – 38, compare the following quantities, and fill in the blank with either < , > , or = .

35.) $f(0)$ _____ $g(0)$

36.) $f(-2)$ _____ $g(-2)$

37.)   **Max value of $f(x)$** _____ **Max value of $g(x)$.**   **(Use ONLY interval -5 ≤ x ≤ 5 for both functions.)**

38.) $\dfrac{f(4)-f(0)}{4-0}$ _____ $\dfrac{g(4)-g(0)}{4-0}$