

Polynomials and Quadratic Functions Review

Name _____ Class _____

Factor the following expressions:

1 $y^2 - y - 30$

2 $x^4 - 1$

3 $3x^2 + 11x + 6$

4 $5x^2 + 60x + 100$

5 $2x^5y - 32xy$

6 $4x^4 - 29x^2 + 25$

Solve the following equations:

7 $r^2 + 2r - 3 = 4$

8 $r^2 + 20r + 73 = -9$

9 For which function defined by a polynomial are the zeros of the polynomial -4 and -6?

(1) $y = x^2 - 10x - 24$

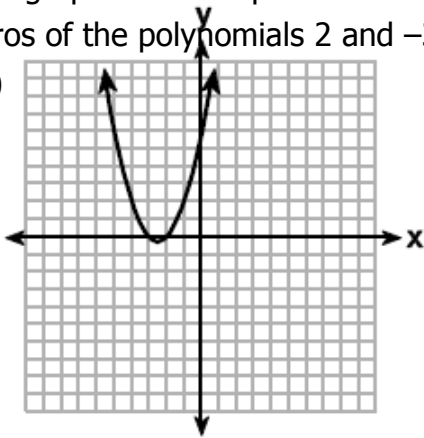
(3) $y = x^2 + 10x - 24$

(2) $y = x^2 + 10x + 24$

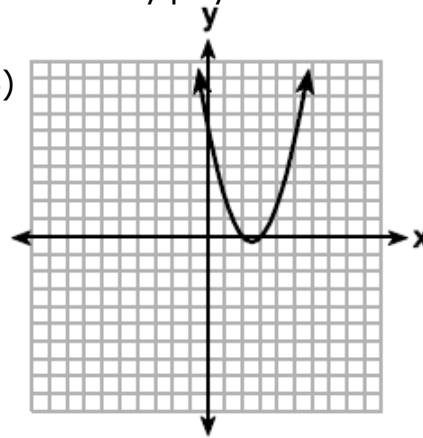
(4) $y = x^2 - 10x + 24$

10 The graphs below represent functions defined by polynomials. For which function are the zeros of the polynomials 2 and -3 ?

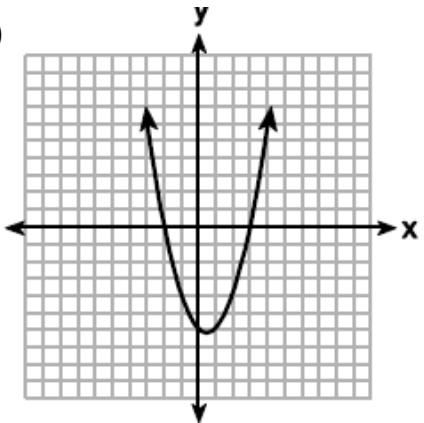
(1)



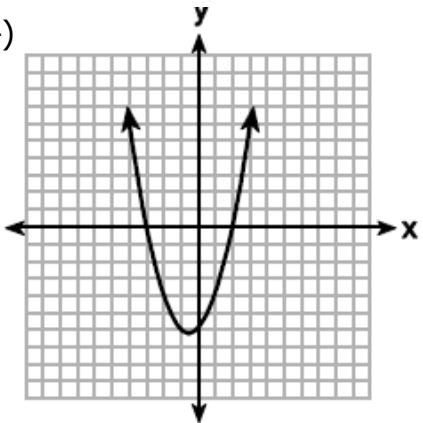
(3)



(2)



(4)



11 Which equation has roots of -3 and 5 ?

(1) $x^2 + 2x - 15 = 0$

(3) $x^2 + 2x + 15 = 0$

(2) $x^2 - 2x - 15 = 0$

(4) $x^2 - 2x + 15 = 0$

12 The function $f(x)$ is given below.

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

a) Describe the effect on the graph of $f(x)$, if $g(x) = f(x - 5)$.

b) Show that the vertices of $f(x)$ and $g(x)$ support your description.

- 13** A model rocket is launched from a platform in a flat, level field and lands in the same field. The height of the rocket follows the function, $f(x) = -16x^2 + 150x + 5$, where $f(x)$ is the height, in feet, of the rocket and x is the time, in seconds, since the rocket is launched.
- Determine the maximum height, to the *nearest tenth of a foot*, the rocket reaches.
 - Determine the length of time, to the *nearest tenth of a second*, from when the rocket is launched until it hits the ground.
- 14** Consider the equation $x^2 - 2x - 6 = y + 2x + 15$ and the function $f(x) = 4x^2 - 16x - 84$ in the following questions.
- Show that the graph of the equation $x^2 - 2x - 6 = y + 2x + 15$ has x -intercepts at $x = -3$ and 7.
 - Show that the zeroes of the function $f(x) = 4x^2 - 16x - 84$ are the same as the x values of the x -intercepts for the graph of the equation in part (a).
 - Explain how this function is different from the equation in part (a).
 - Identify the vertex of the graphs of each by rewriting the equation and function in the completed-square form, $f(x) = a(x - h)^2 + k$. Show your work. What is the same about the two vertices? How are they different? Explain why there is a difference.

- 15** An arrow is shot into the air. A function representing the relationship between the number of seconds it is in the air, t , and the height of the arrow in meters, h , is given by:

$$h(t) = -4.9t^2 + 29.4t + 2.5$$

- a) Complete the square for this function.
- b) What is the maximum height of the arrow? Explain how you know.
- c) How long does it take the arrow to reach its maximum height? Explain how you know.
- d) What is the average rate of change for the interval from $t = 1$ to $t = 2$ seconds? Compare your answer to the average rate of change for the interval from $t = 2$ to $t = 3$ seconds and explain the difference in the context of the problem.
- e) How long does it take the arrow to hit the ground? Show your work.
- f) What does the constant term in the original equation tell you about the arrow's flight?