

Pre-Calculus: 2.1 Mastery Practice

Name: _____ Date _____ Period _____

Determine which are polynomial functions. For those that are, state the degree and leading coefficient. For those that are not explain why not.

1. $f(x) = 3x^{-5} + 17$

no - neg. exponent

2. $f(x) = -9 + 2x$

yes deg = 1
l.c. = 2

3. $f(x) = 2x^5 - \frac{1}{2}x + 9$

yes deg = 5
l.c. = 2

4. $f(x) = 13$

yes deg = 0
l.c. = 13

5. $h(x) = \sqrt[3]{27x^3 + 8x^6}$

no - $\sqrt[3]{}$

6. $y(x) = 4x - 5x^2$

yes deg = 2
l.c. = -5

Write an equation for the linear function f satisfying the given conditions. Graph $y = f(x)$

7. $f(-5) = -1$ and $f(2) = 4$

$(-5, -1)$ $(2, 4)$

$m = \frac{5}{7}$

$y + 1 = \frac{5}{7}(x + 5)$
 $y - 4 = \frac{5}{7}(x - 2)$
 $y = \frac{5}{7}x + \frac{18}{7}$

11. $f(0) = 3$ and $f(3) = 0$

$(0, 3)$ $(3, 0)$

$m = \frac{-3}{3} = -1$

$y - 3 = -1(x - 0)$
 $y - 0 = -1(x - 3)$
 $y = -x + 3$

9. $f(-4) = 6$ and $f(-1) = 2$

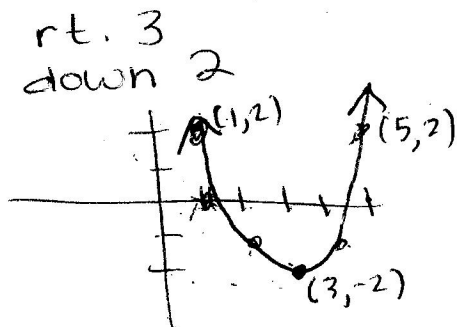
$(-4, 6)$ $(-1, 2)$

$m = \frac{-4}{3}$

$y - 6 = -\frac{4}{3}(x + 4)$
 $y - 2 = -\frac{4}{3}(x + 1)$
 $y = -\frac{4}{3}x + \frac{2}{3}$

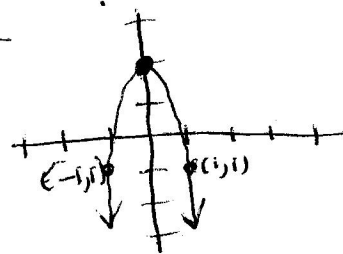
Describe how to transform the graph of $f(x) = x^2$ into the graph of the given functions. Sketch each graph by hand.

19. $g(x) = (x-3)^2 - 2$



22. $h(x) = -3x^2 + 2$

vert. stretch *3
refl. over x-axis
up 2



Find the vertex and axis of the graph of the function.

23. $f(x) = 3(x-1)^2 + 5$

V: (1, 5)
a.o.s: $x = 1$

25. $f(x) = 5(x-1)^2 - 7$

V: (1, -7)
a.o.s: $x = 1$

Find the vertex and axis of the graph of the function. Rewrite the equation for the function in vertex form.

27. $f(x) = 3x^2 + 5x - 4$ $y = 3x^2 + 5x - 4$

$y = 3(x^2 + \frac{5}{3}x + \frac{25}{36}) - 4 - \frac{75}{36}$

$y = 3(x + \frac{5}{6})^2 - \frac{73}{12}$
V: $(-\frac{5}{6}, -\frac{73}{12})$
a.o.s: $x = -\frac{5}{6}$

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

$y = -1(x^2 - 8x + 16) + 3 + 16$
 $(-\frac{8}{2})^2$

$y = -(x-4)^2 + 19$
V: (4, 19)
a.o.s: $x = 4$

31. $g(x) = 5x^2 + 4 - 6x = 5x^2 - 6x + 4$

$y = 5(x^2 - \frac{6}{5}x + \frac{9}{25}) + 4 - \frac{9}{5}$

$y = 5(x - \frac{3}{5})^2 + \frac{11}{5}$
V: $(\frac{3}{5}, \frac{11}{5})$
a.o.s: $x = \frac{3}{5}$

Use completing the square to describe the graph of each function. Support your answers graphically.

33. $f(x) = x^2 - 4x + 6$ $\left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$ 35. $f(x) = 10 - 16x - x^2$ $\left(\frac{16}{2}\right)^2 = (8)^2 = 64$

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

$$y = (x - 2)^2 + 2$$

V: (2, 2) a.o.s. $x = 2$

$y = x^2$ right 2
up 2

$$-(x^2 + 16x + 64) + 10 + 64$$

$$y = -(x + 8)^2 + 74$$

V: (-8, 74) a.o.s. $x = -8$

$y = x^2$ left 8
refl. over x -axis
up 74

37. $f(x) = 2x^2 + 6x + 7$

$$= 2\left(x^2 + 3x + \frac{9}{4}\right) + 7 - \frac{9}{2}$$

$\left(\frac{3}{2}\right)^2 = \frac{9}{4}$

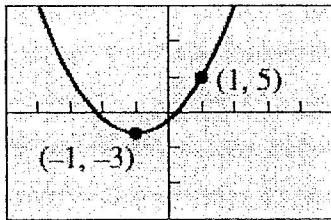
$$y = 2\left(x + \frac{3}{2}\right)^2 + \frac{5}{2}$$

V: $\left(-\frac{3}{2}, \frac{5}{2}\right)$ a.o.s. $x = -\frac{3}{2}$

$y = x^2$ left $\frac{3}{2}$, vert. stretch $\ast 2$, up $\frac{5}{2}$

Write an equation for the parabola shown, using the fact that one of the given points is the vertex.

39.



[-5, 5] by [-15, 15]

V (h, k) (x, y)
V (-1, -3) (1, 5)

$$5 = a(1 - (-1))^2 - 3$$

$$5 = 4a - 3$$

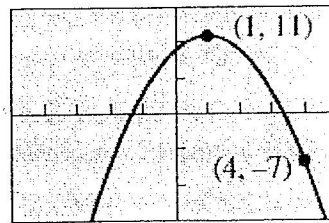
$$8 = 4a$$

$$a = 2$$

$$y = a(x - h)^2 + k$$

$$y = 2(x + 1)^2 - 3$$

41.



[-5, 5] by [-15, 15]

V (h, k) (x, y)
V (1, 11) (4, -7)

$$-7 = a(4 - 1)^2 + 11$$

$$-7 = 9a + 11$$

$$-18 = 9a$$

$$a = -2$$

$$y = -2(x - 1)^2 + 11$$