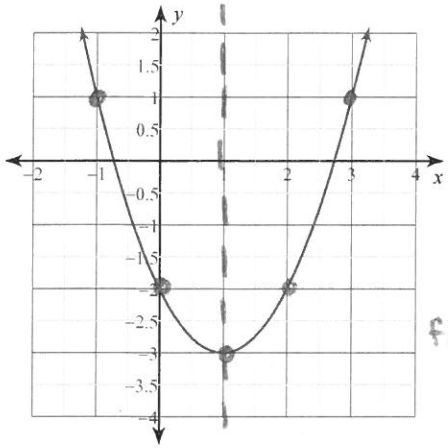
Algebra 2 Name Key ID: 1

Unit 2 Review

Date _____ Period ____

Graph each function. Find the vertex, axis of symmetry, y intercept and at least two other points.

1) $y = x^2 - 2x - 2$

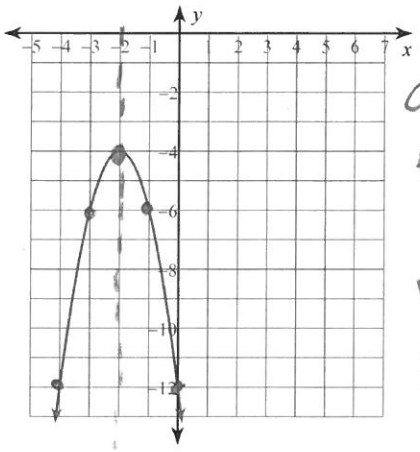


$f(3) = 3^2 - 2(3) - 2$
$= 9 - 6 - 2$
$= 1$
$(3, 1)$

$x = \frac{-(-2)}{2(1)} = 1$

axis: $x = 1$
$f(1) = 1^2 - 2(1) - 2 = 1 - 2 - 2 = -3$
vertex $(1, -3)$
y: $0^2 - 2(0) - 2 = -2$ $(0, -2)$

2) $y = -2x^2 - 8x - 12$

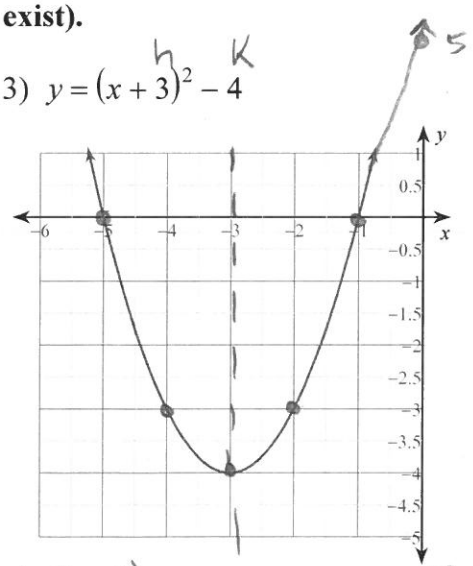


$x = \frac{-(-8)}{2(-2)} = \frac{8}{-4} = -2$

axis: $x = -2$
$f(-2) = (-2)(-2)^2 - 8(-2) - 12$
$= -4$
vertex: $(-2, -4)$
y int: $0^2 - 8 \cdot 0 - 12 = -12$
$(0, -12)$
$f(-1) = -2(-1)^2 - 8(-1) - 12$
$= -4$
$(-1, -4)$

Graph each function. Find the vertex, axis of symmetry, y intercept and x intercepts (if they exist).

3) $y = (x + 3)^2 - 4$ (h, k)

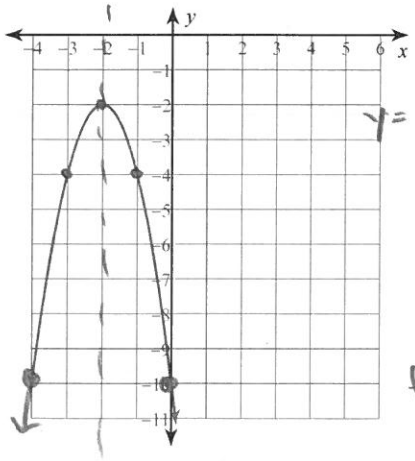


h, k
V: $(-3, -4)$
axis: $x = -3$

$y = (0+3)^2 - 4$
$= 9 - 4 = 5$
$(0, 5)$

x: $0 = (x+3)^2 - 4$
$4 = (x+3)^2$
$\pm 2 = x + 3$
$x = 2 - 3 = -1$
$x = -2 - 3 = -5$

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



axis: $x = -2$
v: $(-2, -2)$

y int.
$y = -2(0+2)^2 - 2$
$= -2(4) - 2 = -10$

no x int.

$f(-1) = -2(-1+2)^2 - 2$
$= -2(1)^2 - 2$
$= -4$
$(-1, -4)$

Solve each equation by factoring.

5) $v^2 - v - 6 = 0$

$\{-2, 3\}$

$-3 \cdot 2 = -6$, $-3 + 2 = -1$

$(x-3)(x+2) = 0$

$x = 3 \quad x = -2$

6) $x^2 = -8x - 15$

$\{-3, -5\}$

$x^2 + 8x + 15 = 0$

$(x+5)(x+3) = 0$

$5 \cdot 3 = 15$, $5 + 3 = 8$

$x = -5$

$x = -3$

7) $v^2 = -16 + 10v$

$\{2, 8\}$

$v^2 - 10v + 16 = 0$

$-8 \cdot -2 = +16$, $-8 + -2 = -10$

$(v-8)(v-2) = 0$

$v = 8 \quad v = 2$

8) $v^2 + 2v = 0$

$\{-2, 0\}$

$v(v+2) = 0$

$v = 0 \quad v = -2$

9) $4x^2 - 17x + 4 = 0$

$\left\{\frac{1}{4}, 4\right\}$

$4 \cdot 4 = 16$, $-16 + -1 = -17$

$4x^2 - 16x \mid -x + 4 = 0$

$4x(x-4) \mid -1(x-4)$

$(4x-1)(x-4) = 0$

$4x = 1$

$x = 1/4$

$x = 4$

10) $5x^2 + 3x - 6 = -4$

$\left\{\frac{2}{5}, -1\right\}$

$5x^2 + 3x - 2 = 0$

$+4$

$5x^2 + 5x \mid -2x - 2 = 0$

$5x(x+1) \mid -2(x+1)$

$(5x-2)(x+1) = 0$

$5x = 2$

$x = 2/5$

$x = -1$

$5 \cdot -2 = -10$, $5 + -2 = 3$

11) $4n^2 - 4n = 24$

$\{3, -2\}$

$4n^2 - 4n - 24 = 0$

$4(n^2 - n - 6) = 0$

$4(n-3)(n+2) = 0$

$n = 3 \quad n = -2$

$-3 \cdot 2 = -6$, $-3 + 2 = -1$

12) $2m^2 - 7m - 49 = 0$

$\left\{-\frac{7}{2}, 7\right\}$

$2 \cdot -49 = -98$, $-14 + 7 = -7$

$2m^2 - 14m \mid +7m - 49 = 0$

$2m(m-7) \mid +7(m-7) = 0$

$(2m+7)(m-7) = 0$

$2m = -7$

$m = -7/2$

$m = 7$

Solve each equation by taking square roots.

13) $p^2 - 3 = 97$

$\{10, -10\}$

$\sqrt{p^2} = \sqrt{100}$

$p = \pm 10$

14) $v^2 + 4 = -4$

$\{2i\sqrt{2}, -2i\sqrt{2}\}$

$v^2 = -8$

$v = \pm\sqrt{-8}$

$v = \pm\sqrt{-1} \cdot \sqrt{4} \cdot \sqrt{2}$

$v = \pm 2\sqrt{2}i$

15) $4n^2 + 5 = -11$

$\{2i, -2i\}$

$4n^2 = -16$

$n^2 = -4$

$\sqrt{-4}$

$\sqrt{-1} \cdot \sqrt{4}$

$n = \pm 2i$

16) Write a quadratic equation in vertex form that has vertex of (2,-3) and passes through (3,-1).

$h \quad k$

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

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

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

$+3 \quad +3$

$2 = 1a \quad a = 2$

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

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

$b^2 - 4ac$

Find the discriminant of each quadratic equation then state the number and type of solutions.

17) $5x^2 - 10x + 10 = 5$ $5x^2 - 10x + 5 = 0$

0; one real solution $a=5 \quad b=-10 \quad c=5$

$(-10)^2 - 4(5)(5)$

$100 - 100 = 0$

1 solution

18) $6x^2 - 10x + 16 = 9$ $6x^2 - 10x + 7 = 0$

−68; two imaginary solutions $a=6 \quad b=-10 \quad c=7$

$(-10)^2 - 4(6)(7)$

$100 - 168 = -68$

Solve each equation by completing the square.

19) $n^2 - 8n - 64 = 6$ $+64$ $n^2 - 8n + 16 = 70 + 16$

$\{4 + \sqrt{86}, 4 - \sqrt{86}\}$ $\sqrt{(n-4)^2} = \sqrt{86}$

$\left(\frac{-8}{2}\right)^2 = (-4)^2 = 16$ $n - 4 = \pm\sqrt{86}$

$n = \pm\sqrt{86} + 4$

20) $n^2 - 10n + 33 = -5$ -33 $n^2 - 10n + 25 = -38 + 25$

$\{5 + i\sqrt{13}, 5 - i\sqrt{13}\}$ $(n-5)^2 = -13$

$\left(\frac{-10}{2}\right)^2 = (-5)^2 = 25$ $n - 5 = \pm\sqrt{-13}$

$n = \pm\sqrt{13}i + 5$

21) $n^2 - 14n + 37 = -3$ $n^2 - 14n + 49 = -40 + 49$

$\{10, 4\}$ $(n-7)^2 = 9$

$\left(\frac{-14}{2}\right)^2 = (-7)^2 = 49$ $n - 7 = \pm 3$

$n = 3 + 7 = 10$

$n = -3 + 7 = 4$

22) $b^2 + 20b - 22 = -7$ $b^2 + 20b + 100 = 15 + 100$

$\{-10 + \sqrt{115}, -10 - \sqrt{115}\}$ $(b+10)^2 = 115$

$\left(\frac{20}{2}\right)^2 = 10^2 = 100$ $b + 10 = \pm\sqrt{115}$

$b = \pm\sqrt{115} - 10$

Solve each equation with the quadratic formula.

23) $6a^2 - 14 = 4a$ $(-4)^2 - 4(6)(-14)$

$\left\{\frac{1+\sqrt{22}}{3}, \frac{1-\sqrt{22}}{3}\right\}$ $16 + 336 = 352$

$x = \frac{+4 \pm \sqrt{352}}{2(6)}$

$6a^2 - 4a - 14 = 0$

$a=6 \quad b=-4 \quad c=-14$ $x = \frac{4 \pm \sqrt{16 \cdot 22}}{12} = \frac{4 \pm 4\sqrt{22}}{12}$

$x = \frac{1 \pm \sqrt{22}}{3}$

24) $5x^2 + 2x = -3$ $a \quad b \quad c$ $5x^2 + 2x + 3 = 0$ $2^2 - 4(5)(3)$

$4 - 60 = -56$

$\left\{\frac{-1+i\sqrt{14}}{5}, \frac{-1-i\sqrt{14}}{5}\right\}$ $x = \frac{-2 \pm \sqrt{-56}}{2(5)} = \frac{-2 \pm 2\sqrt{14}i}{10}$

$\sqrt{56} = \sqrt{4} \cdot \sqrt{14}$

$= 2\sqrt{14}$

$= \frac{-1 \pm \sqrt{14}i}{5}$

25) $7k^2 = -3k - 2$ $7k^2 + 3k + 2 = 0$

$a \quad b \quad c$

$\left\{\frac{-3+i\sqrt{47}}{14}, \frac{-3-i\sqrt{47}}{14}\right\}$ $x = \frac{-3 \pm \sqrt{-47}}{2(7)} = \frac{-3 \pm i\sqrt{47}}{14}$

$3^2 - 4(7)(2) = -47$

26) $3x^2 - 50 = -5x$ $3x^2 + 5x - 50 = 0$

$a \quad b \quad c$

$25 - 4(3)(-50)$

625

$\left\{\frac{10}{3}, -5\right\}$ $x = \frac{-5 \pm \sqrt{625}}{2(3)} = \frac{-5 \pm 25}{6}$

$\frac{-5+25}{6}$ $\frac{-5-25}{6}$ -5

$10/3$

Simplify.

27) $\sqrt{-196}$ $\sqrt{-1} \cdot \sqrt{196}$

$14i$

28) $\sqrt{-128}$ $\sqrt{-1} \cdot \sqrt{64} \cdot \sqrt{2}$

$8\sqrt{2} \cdot i$ $8i\sqrt{2}$

29) $(-8-6i)-(-2-2i)$

$-6-4i$ $-8-6i+2+2i$

$\boxed{-6-4i}$

30) $(-6-8i)+(1-4i)$

$\boxed{-5-12i}$

31) $(8i)(1+7i)-6\cdot(5i)$ $8i+56i^2-30i$

$-56-22i$ $-22i-56$

32) $(-4+5i)(7-7i)$ $-28+28i+35i-35i^2$ $(i^{-1})^2$

$7+63i$ $-28+63i+35$

$\boxed{7+63i}$

Change $i^2=-1$

33) $(-1+2i)(-8+8i)$ $8-8i-16i+16i^2$

$-8-24i$ $8-24i-16$

$\boxed{-8-24i}$

34) $(8+4i)(-6-4i)$ $-48-32i-24i-16i^2$ $(i^{-1})^2$

$-32-56i$ $-48-56i+16$

$\boxed{-32-56i}$

35) $(8i)(8-5i)+(6i)(7-2i)$

$52+106i$ $64i-40i^2+42i-12i^2$

$106i+40+12$

$\boxed{106i+52}$

36) $(6i)(-4i)-6(6+4i)$ $-24i^2-36-24i$

$-12-24i$ $24-36-24i$

$\boxed{-12-24i}$

37) $\dfrac{10+8i}{10-6i}$ $\dfrac{10+6i}{10+6i}=\dfrac{100+60i+80i+48i^2}{100-60i+60i-36i^2}$

$\dfrac{13+35i}{34}$ $=\dfrac{52+140i}{136}$

$\dfrac{52}{136}+\dfrac{140i}{136}=\boxed{\dfrac{13}{34}+\dfrac{35}{34}i}$

38) $\dfrac{6}{4-6i}$ $\dfrac{4+6i}{4+6i}=\dfrac{24+36i}{16-24i+24i-36i^2}$

$\dfrac{6+9i}{13}$ $=\dfrac{24+36i}{52}$

$=\dfrac{24}{52}+\dfrac{36i}{52}=\boxed{\dfrac{6}{13}+\dfrac{9i}{13}}$

39) Write a quadratic equation in standard form that has roots of $\frac{1}{2}$ and 4.

$(2x-1)(x-4)=0$ in st. form $2x^2-9x+4=0$

$x=1/2$ $x=4$ $(2x-1)(x-4)=0$

$2x=1$ $x-4=0$ $2x^2-8x-x+4=0$

$2x-1=0$ $\boxed{2x^2-9x+4=0}$

40) The equation $h(t)=-16t^2+20t+26$ describes the height h of a diver in feet, t seconds after jumping off a cliff. What is the maximum height of the diver? $\frac{-20}{2(-16)}=.625$

vertex $-16(.625)^2+20(.625)+26$

$\boxed{32.25\text{ ft}}$

When does the diver hit the water? Set $=0$

$h=0$ $20^2-4(-16)(26)$

$0=-16t^2+20t+26$

$t=\dfrac{-20\pm\sqrt{2064}}{-32}$

$t=\dfrac{-20+45.4}{-32}$ $t=\dfrac{-20-45.4}{-32}=\boxed{2.04\text{ sec}}$

$=-.79$