Chapter 4 Part I Review Worksheet

Name: KEY

Identify the graph's axis of symmetry, vertex, *y*-intercept, whether the graph opens up or down, and its maximum/minimum value. Then graph the function by completing the table.

1.) $y = x^2 + 2x + 1$

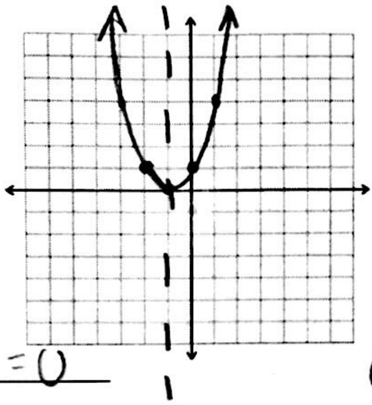
AOS: $x = -1$

vertex: $(-1, 0)$

y-int: $(0, 1)$

opens: up

max./min. value: $y = 0$



x	-3	-2	-1	0	1
y	4	1	0	1	4

work:

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

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

$y = 0$

2.) $y = -2x^2 + 4x + 1$

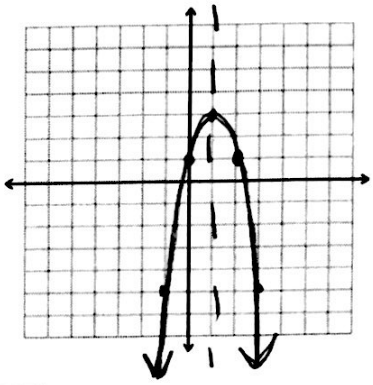
AOS: $x = 1$

vertex: $(1, 3)$

y-int: $(0, 1)$

opens: down

max./min. value: $y = 3$



x	-1	0	1	2	3
y		1	3	1	-5

work:

$x = \frac{-b}{2a} = \frac{-4}{2(-2)} = \frac{-4}{-4} = 1$

$y = -2(1)^2 + 4(1) + 1$

$y = 3$

Identify the graph's axis of symmetry, vertex, *y*-intercept, whether the graph opens up or down, and its maximum/minimum value. Then graph the function by completing the table.

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

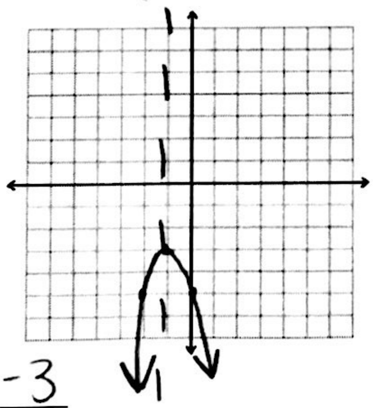
AOS: $x = -1$

vertex: $(-1, -3)$

y-int: $(0, -5)$

opens: down

max./min. value: $y = -3$



x	-3	-2	-1	0	1
y	-11	-5	-3	-5	-11

work:

$y = -2(0+1)^2 - 3$

$y = -5$

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

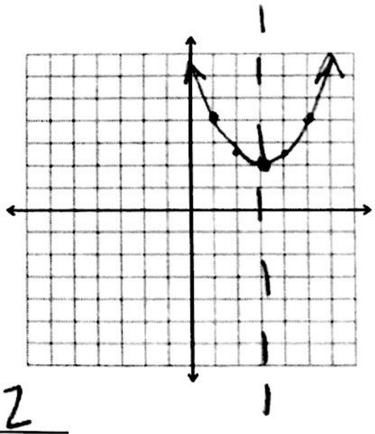
AOS: $x = 3$

vertex: $(3, 2)$

y-int: $(0, 6.5)$

opens: up

max./min. value: $y = 2$



x	1	2	3	4	5
y	4	2.5	2	2.5	4

work:

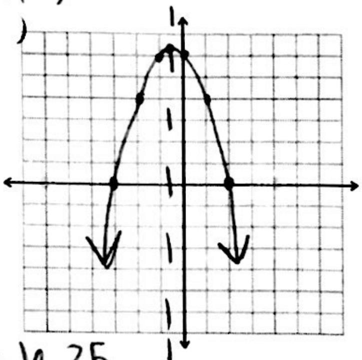
$y = \frac{1}{2}(0-3)^2 + 2$

$y = 6.5$

Identify the graph's axis of symmetry, vertex, *y*-intercept, whether the graph opens up or down, and its maximum/minimum value. Then graph the function by completing the table.

(2,0) (−3,0)

5.) $y = -(x - \ \ )(x + \ \ )$



AOS: $x = -\frac{1}{2}$

vertex: $(-\frac{1}{2}, 6.25)$

y-int: $(0, 6)$

opens: down

max/min. value: $y = 6.25$

x	−2	−1	$-\frac{1}{2}$	0	1
y	4	6	6.25	6	4

work:

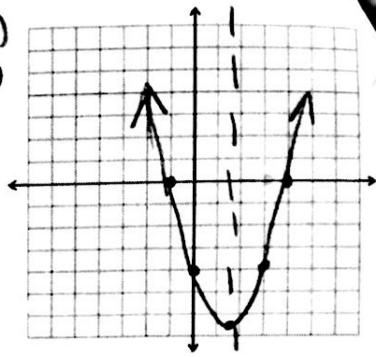
$x = \frac{p+q}{2} = \frac{2+-3}{2} = \frac{-1}{2}$

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

$y = 6.25$

(4,0) (−1,0)

6.) $f(x) = 2(x - 4)(x + 1)$



AOS: $x = 1.5$

vertex: $(1.5, -12.5)$

y-int: $(0, -8)$

opens: up

max./min. value: ____________

y-axis by 2

x	−1	0	1.5	3	4
y	0	−8	−12.5	−8	0

work:

$x = \frac{p+q}{2} = \frac{4+-1}{2} = \frac{3}{2} = 1.5$

$y = 2(1.5 - 4)(1.5 + 1)$

$y = -12.5$

Factor the expression completely, if possible.

7.) $x^2 - 11x + 28$

28

$-7 - 4 = -11$

$\boxed{(x-7)(x-4)}$

8.) $t^2 + 6t + 5$

5

$5 + 1 = 6$

$\boxed{(t+5)(t+1)}$

9.) $4b^2 - 400$

$4(b^2 - 100)$

$\boxed{4(b+10)(b-10)}$

10.) $4t^2 + 8t + 3$

$4 \cdot 3 = 12$

$6 + 2 = 8$

$4t^2 + 6t \mid + 2t + 3$

$2t(2t+3) + 1(2t+3)$

$\boxed{(2t+3)(2t+1)}$

11.) $3r^2 + 9r - 4$

$3 \cdot -4 = -12$

~~−10 2~~

~~−6 2~~

~~−4 3~~

$\boxed{\text{cannot be factored}}$

12.) $6x^2 + x - 15$

$6 \cdot -15 = -90$

$1 = -9 + 10$

$6x^2 - 9x \mid + 10x - 15$

$3x(2x-3) + 5(2x-3)$

$\boxed{(2x-3)(3x+5)}$

Write the quadratic in function form.

13.) $y = -(x+1)^2 - 4$

$y = -1(x+1)(x+1) - 4$

$y = -1(x^2 + 2x + 1) - 4$

$y = -x^2 - 2x - 1 - 4$

$\boxed{y = -x^2 - 2x - 5}$

14.) $y = 2(x+5)(x-3)$

$y = 2(x^2 + 2x - 15)$

$\boxed{y = 2x^2 + 4x - 30}$

Solve the equation using factoring.

15.) $8t^2 + 38t - 10 = 0$

$\frac{2(4t^2+19t-5)}{2} = \frac{0}{2}$

$4t^2+19t-5=0$ $\quad 4\cdot -5 = -20$, $20 + -1 = 19$

$4t^2+20t \mid -1t-5=0$

$4t(t+5)-1(t+5)=0$

$(t+5)(4t-1)=0$

$\boxed{t=-5}$ $\boxed{t=1/4}$

16.) $25x^2 - 80x + 64 = 0$

$(5x)^2 \quad 2(5x\cdot 8) \quad (8)^2$

$(5x-8)^2=0$

$\sqrt{(5x-8)^2}=\sqrt{0}$

$5x-8=0$

$5x=8$

$\boxed{x=8/5}$

17.) $4 = x^2 + 5x - 10$

$-4 \qquad -4$ $\quad -14$: $7 + -2 = 5$

$0 = x^2+5x-14$

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

$\boxed{x=-7}$ $\boxed{x=2}$

Find the zeros of the quadratic function.

18.) $y = x^2 - 11x + 24$

24: $-8 + -3 = -11$

$0=x^2-11x+24$

$0=(x-8)(x-3)$

$\boxed{x=8}$ $\boxed{x=3}$

19.) $f(x) = -16n^2 + 12n$

$0=-16n^2+12n$

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

$-4n=0 \quad 4n-3=0$

$\boxed{n=0}$ $\boxed{n=3/4}$

20.) $y = 16x^2 - 1$

$(4x)^2 \quad (1)^2$

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

$4x+1=0 \quad 4x-1=0$

$\boxed{x=-1/4}$ $\boxed{x=1/4}$

Write the expression in simplest radical form.

21.) $\sqrt{98}$

$\sqrt{49}\cdot\sqrt{2}$

$\boxed{7\sqrt{2}}$

22.) $\sqrt{27}$

$\sqrt{9}\cdot\sqrt{3}$

$\boxed{3\sqrt{3}}$

23.) $\sqrt{10} \bullet \sqrt{15}$

$\sqrt{150}$

$\sqrt{25}\cdot\sqrt{6}$

$\boxed{5\sqrt{6}}$

24.) $3\sqrt{8} \bullet \sqrt{28}$

$3\sqrt{224}$

$3\sqrt{16}\cdot\sqrt{14}$

$3\cdot 4\sqrt{14}$

$\boxed{12\sqrt{14}}$

25.) $\sqrt{\frac{11}{25}}$

$\frac{\sqrt{11}}{\sqrt{25}}$

$\boxed{\frac{\sqrt{11}}{5}}$

26.) $\sqrt{\frac{17}{12}}$

$\frac{\sqrt{17}}{\sqrt{12}}\cdot\frac{\sqrt{12}}{\sqrt{12}}$

$\frac{\sqrt{204}}{12} \rightarrow \frac{\sqrt{51}\cdot\sqrt{4}}{12} \rightarrow \frac{2\sqrt{51}}{12}$

$\boxed{\frac{\sqrt{51}}{6}}$

27.) $\sqrt{\frac{6}{5}}$

$\frac{\sqrt{6}}{\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}} \rightarrow \boxed{\frac{\sqrt{30}}{5}}$

28.) $\frac{2}{4+\sqrt{11}}\cdot\frac{4-\sqrt{11}}{4-\sqrt{11}}$

$\frac{8-2\sqrt{11}}{16-11} \rightarrow \boxed{\frac{8-2\sqrt{11}}{5}}$

29.) $\frac{4}{8-\sqrt{3}}\cdot\frac{8+\sqrt{3}}{8+\sqrt{3}}$

$\frac{32+4\sqrt{3}}{64-3} \rightarrow \boxed{\frac{32+4\sqrt{3}}{61}}$

Solve the equation for x. Write your answer in simplest radical form.

30.) $5x^2 = 80$

$\frac{5x^2}{5} = \frac{80}{5}$

$x^2 = 16$

$\boxed{x = \pm 4}$

31.) $x^2 = 84$

$x = \pm\sqrt{84}$

$x = \pm\sqrt{4}\cdot\sqrt{21}$

$\boxed{x = \pm 2\sqrt{21}}$

32.) $7x^2 - 10 = 25$

$7x^2 = 35$

$x^2 = 5$

$\boxed{x = \pm\sqrt{5}}$

33.) $3\cdot\left[\frac{1}{3}(x-4)^2\right] = 11\cdot 3$

$(x-4)^2 = 33$

$x - 4 = \pm\sqrt{33}$

$\boxed{x = 4 \pm \sqrt{33}}$

34.) $2(x+2)^2 - 5 = 8$

$2(x+2)^2 = 13$

$(x+2)^2 = \frac{13}{2}$

$x + 2 = \pm\sqrt{\frac{13}{2}}$

$x = -2 \pm \sqrt{\frac{13}{2}}$

$x = -2 \pm \frac{\sqrt{13}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

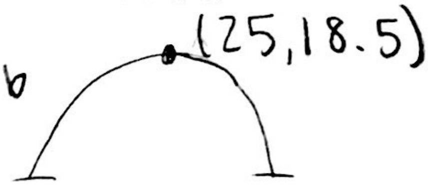
$\boxed{x = -2 \pm \frac{\sqrt{26}}{2}}$

35.) The path of a basketball thrown at an angle of 45° can be modeled by $y = -.02x^2 + x + 6$.

a.) What is the maximum height of the basketball? (vertex)

$x = \frac{-b}{2a} = \frac{-1}{2(-.02)} = 25$ $\quad y = -.02(25)^2 + (25) + 6$

$y = \boxed{18.5\text{ ft}}$

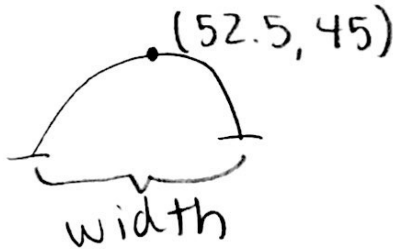


b.) What height is the basketball thrown from?

$\boxed{6\text{ ft}}$

(y-int)

36.) The arch of the Gateshead Millennium Bridge forms a parabola with equation $y = -0.016(x - 52.5)^2 + 45$ where x is the horizontal distance (in meters) from the arch's left end and y is the distance (in meters) from the base of the arch.



a.) What is the width of the arch?

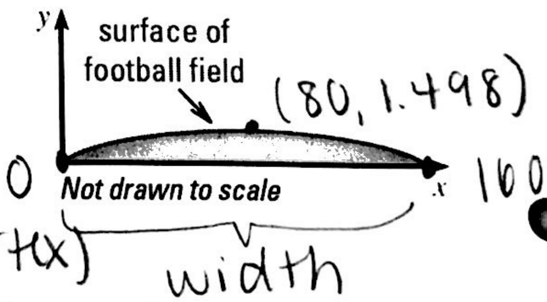
$52.5 + 52.5$

$\boxed{105\text{ meters}}$

37.) Although a football field appears to be flat, its surface is actually shaped like a parabola so that rain runs off to both sides. The cross section of a field with synthetic turf can be modeld by

$y = -0.000234x(x - 160)$

where x and y are measured in feet.



a.) What is the field's width?

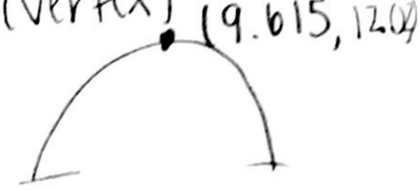
$\boxed{160\text{ ft}}$

b.) What is the maximum height of the field's surface? (vertex)

$x = \frac{0+160}{2} = 80$ $\quad y = -0.000234(80)(8-160)$

$y = \boxed{1.498\text{ ft}}$

.) An arch to the entrance of the library can be modeled by $y = -0.13x^2 + 2.5x$ where x and y are measured in feet. To the nearest foot, what is the height of the highest point of the arch? (vertex)



$x = \frac{-b}{2a} = \frac{-2.5}{2(-0.13)} \approx 9.615$

$y = -0.13(9.615)^2 + 2.5(9.615)$

$y \approx 12.019 \rightarrow \boxed{12 \text{ feet}}$

39.) **When an object is dropped, its height *h* (in feet) above the ground after *t* seconds can be modeled by the function.**

$$h = -16t^2 + h_0$$

where h_0 is the objects initial height (in feet). ↳ 40

initial height

A cliff diver dives off a cliff 40 feet above water.

a.) Write and equation giving the diver's height h (in feet) above the water after t seconds.

$h = -16t^2 + 40$

b.) How long is the diver in the air? (Round answers to the nearest tenth of a second)

$0 = -16t^2 + 40$

$-40 = -16t^2$

$t^2 = 2.5$

$t = \pm 1.58 \approx \boxed{1.6 \text{ seconds}}$