

unit 5 Review Practice

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① Describe how the graph of the parent function was transformed to create the given function.

a) $y = -3x^2 + 5$

b) $y = (-x+6)^2 - 1$

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

② For each quadratic, find the vertex, AOS, extrema, y-intercept, average rate of change, x-intercepts + zeros.

a) $y = x^2 + 7x + 6$
(ROC, $-1 \leq x \leq 0$)

b) $y = -2(x+1)^2 + 6$
(ROC, $1 \leq x \leq 3$)

c) $y = 2(x+1)(x-2)$
(ROC, $4 \leq x \leq 7$)

③ Convert each quadratic to the stated form.

a) $y = 4x^2 - 8x - 24$
to vertex form

b) $y = 5x^2 + 19x + 12$
to intercept form

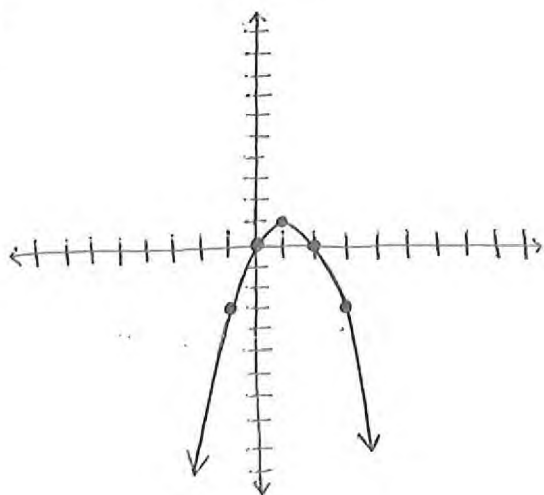
c) $y = -3(x+4)(x-2)$
to standard form

d) $y = 2(x+8)^2 - 5$
to standard form

④ Use the table to identify the vertex, AOS, extrema, y-intercept, x-intercepts, zeros, and ROC, $-3 \leq x \leq -1$.

x	-4	-3	-2	-1	0	1	2	3
y	-5	0	3	4	3	0	-5	-12

⑤



For the graph of the quadratic on the left, identify the vertex, AOS, extrema, y-intercept, zeros, x-intercept, interval of increase/decrease, ROC ($-1 \leq x \leq 1$) and end behavior.

⑥ A ball is thrown into the air. The height, h , in feet, of the ball can be modeled by the equation $h = -16t^2 + 20t + 6$, where t is the time, in seconds, that the ball is in the air.

- When will the ball hit the ground?
- What is the greatest height that the ball will reach?
- When will the ball reach its greatest height?
- When will the ball reach 11 feet?

BONUS: unit 6 and 7 Practice Problems

⑦ Write the equation of the circle with the given info:

a) center: $(5, -7)$
radius = 12

b) center: $(0, 0)$
radius = $\sqrt{5}$

c) center: $(2, 0)$
radius = 16

d) center: $(0, 0)$
Point on circle: $(5, 8)$

e) center: $(5, -3)$
Point: $(-1, 2)$

f) center: $(-4, 2)$
Point: $(2, -2)$

⑧ Convert the equation to general form.

a) ~~$(x+3)^2 + (y-4)^2 = 15$~~

b) $(x-8)^2 + y^2 = 9$

⑨ Convert the equation to standard form.

a) $x^2 + y^2 - 6y - 11 = 0$

b) $x^2 + y^2 + 8x - 20y + 78 = 0$

⑩ The numbers 1-12 are written on cards and placed in a bag. Find the probability of:

a) picking a number less than 8 given the number is odd.

b) picking a 3 or ~~an~~ an odd number.

c) picking a number greater than 4, leaving it out of the bag, and then picking a 2.

d) picking a multiple of 3 or a 5.

e) picking an even number, putting it back in the bag, and then picking a number less than 6.

ANSWERS
① a) reflect over x-axis
vertical stretch by 3
up 5

b) reflect over y-axis
left 6
down 1

c) horizontal
stretch by 2
right 2

② a) $y = x^2 + 7x + 6$

$$\frac{-7}{2(1)} = \frac{-7}{2} = -3.5$$
$$= (-3.5)^2 + 7(-3.5) + 6$$
$$= -6.25$$

$V: (-3.5, -6.25)$
AOS: $x = -3.5$
ext: min at -6.25
y-int: $(0, 6)$
ROC, $-1 \leq x \leq 0: 6$
sol/zeros: $-1, -6$
x-int: $(-1, 0), (-6, 0)$

$$y = 0^2 + 7(0) + 6$$
$$= 6$$

$$a = -1$$
$$b = 0$$
$$f(a) = 0$$
$$f(b) = 6$$
$$\frac{6-0}{0-(-1)}$$
$$\frac{6}{1} = 6$$

$$\frac{-7 \pm \sqrt{7^2 - 4(1)(6)}}{2(1)}$$
$$\frac{-7 \pm \sqrt{25}}{2} = \frac{-7 \pm 5}{2}$$
$$-1, -6$$

b) $y = -2(x+1)^2 + 6$

$V: (-1, 6)$
AOS: $x = -1$
ext: max at 6
y-int: $(0, 4)$
ROC, $1 \leq x \leq 3: -12$
zeros: $-1 \pm \sqrt{3}$
x-int: $(-1 + \sqrt{3}, 0)$
 $(-1 - \sqrt{3}, 0)$

$$-2(0+1)^2 + 6$$
$$-2(1)^2 + 6$$
$$-2 + 6$$
$$4$$

$$0 = -2(x+1)^2 + 6$$
$$-6 = -2(x+1)^2$$
$$\frac{-6}{-2} = \frac{-2(x+1)^2}{-2}$$
$$3 = (x+1)^2$$
$$\pm\sqrt{3} = x+1$$
$$-1 = -1$$
$$-1 \pm \sqrt{3} = x$$

$$a = 1$$
$$b = 3$$
$$f(a) = -2(1+1)^2 + 6 = -2$$
$$f(b) = -2(3+1)^2 + 6 = -26$$

$$\frac{-26 - (-2)}{3-1} = \frac{-24}{2} = -12$$

ANSWERS

c) $y = 2(x+1)(x-2)$

zeros: $-1, 2$
 x-int: $(-1, 0), (2, 0)$
 AOS: $x = 0.5$
 V: $(0.5, -4.5)$
 ext: min at -4.5
 y-int: $(0, -4)$
 ROC, $4 \leq x \leq 7: 20$



$$\begin{aligned}
 a &= 4 & & = 2(0.5+1)(0.5-2) \\
 b &= 7 & & = 2(1.5)(-1.5) \\
 f(a) &= 2(4+1)(4-2) = -4.5 \\
 &= 20 \\
 f(b) &= 2(7+1)(7-2) = 2(0+1)(0-2) \\
 &= 80 & & = 2(1)(-2) \\
 \frac{80-20}{7-4} &= \frac{60}{3} = -4 \\
 &= 20
 \end{aligned}$$

③ a) $y = 4x^2 - 8x - 24$

$$\begin{aligned}
 \frac{-(-8)}{2(4)} &= \frac{8}{8} = 1 \\
 &= 4(1)^2 - 8(1) - 24 \\
 &= -28
 \end{aligned}$$

$a = 4, h = 1, k = -28$

$y = 4(x-1)^2 - 28$

b) $y = 5x^2 + 19x + 12$

$$\begin{aligned}
 \frac{4 \cdot 15}{4 + 15} &= 60 & y &= 5x^2 + 4x + 15x + 12 \\
 & & & \quad \quad \quad \begin{matrix} 5x & 4 \\ \hline 15x & 12 \end{matrix}
 \end{aligned}$$

$(y = (5x+4)(x+3)) \times$

$5x^2$	$4x$
$15x$	12

c) $y = 3(x+4)(x-2)$
 $= -3(x^2 - 2x + 4x - 8)$
 $= -3(x^2 + 2x - 8)$

$y = -3x^2 - 6x + 24$

d) $y = 2(x+8)^2 - 5$
 $= 2(x+8)(x+8) - 5$
 $= 2(x^2 + 8x + 8x + 64) - 5$
 $= 2(x^2 + 16x + 64) - 5$
 $= 2x^2 + 32x + 128 - 5$

$y = 2x^2 + 32x + 123$

④ vertex: $(-1, 4)$
 AOS: $x = -1$
 ext: max at 4

y-int: $(0, 3)$
 x-int: $(-3, 0), (1, 0)$
 zeros: $-3, 1$

ROC, $-3 \leq x \leq -1:$

$$\begin{aligned}
 a &= -3 & \frac{4-0}{-1-(-3)} &= \frac{4}{2} = 2 \\
 b &= -1 \\
 f(a) &= 0 \\
 f(b) &= 4
 \end{aligned}$$

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ANSWERS

$$\textcircled{5} \quad V: (1, 1)$$

$$\text{AOS: } x=1$$

ext: max at 1

$$y\text{-int: } (0, 0)$$

$$\text{zeros: } 0, 2$$

$$x\text{-int: } (0, 0), (2, 0)$$

int of inc: $x < 1$

int of dec: $x \geq 1$

$$\text{ROC, } -1 \leq x \leq 1: \frac{4}{2} = 2$$

EB, as $x \rightarrow -\infty: y \rightarrow -\infty$
as $x \rightarrow \infty: y \rightarrow -\infty$

$$\textcircled{7} \text{ a) } (x-5)^2 + (y+7)^2 = 144$$

$$\text{b) } x^2 + y^2 = 5$$

$$\text{c) } (x-2)^2 + y^2 = 256$$

$$\text{d) } x^2 + y^2 = r^2$$

$$(5)^2 + (8)^2 = r^2$$

$$89 = r^2$$

$$(x^2 + y^2 = 89)$$

$$\text{e) } (x-5)^2 + (y+3)^2 = r^2$$

$$(-1-5)^2 + (2+3)^2 = r^2$$

$$36 + 25 = r^2$$

$$61 = r^2$$

$$(x-5)^2 + (y+3)^2 = 61$$

$$\textcircled{6} \text{ a) } 0 = -16t^2 + 20t + 6$$

$$\frac{-20 \pm \sqrt{20^2 - 4(-16)(6)}}{2(-16)}$$

$$\frac{-20 \pm \sqrt{784}}{-32} = \frac{-20 \pm 28}{-32}$$

$$= -0.25, 1.5$$

(at 1.5 sec)

$$\text{b) } \frac{-20}{2(-16)} = \frac{-20}{-32} = 0.625$$

$$= -16(0.625)^2 + 20(0.625) + 6$$

$$= (12.25 \text{ ft})$$

$$\text{c) } 0.625 \text{ sec}$$

$$\text{d) } 11 = -16t^2 + 20t + 6$$

$$0 = -16t^2 + 20t - 5$$

$$\frac{-20 \pm \sqrt{(20)^2 - 4(-16)(-5)}}{2(-16)}$$

$$\frac{-20 \pm \sqrt{80}}{-32} = 0.35, 0.90$$

(0.35 sec)

$$\text{f) } (x+4)^2 + (y-2)^2 = r^2$$

$$(2+4)^2 + (-2-2)^2 = r^2$$

$$36 + 16 = r^2$$

$$52 = r^2$$

$$(x+4)^2 + (y-2)^2 = 52$$

ANSWERS

⑧ a) $(x+3)^2 + (y-4)^2 = 15$
 $(x+3)(x+3) + (y-4)(y-4) = 15$
 $x^2 + 6x + 9 + y^2 - 8y + 16 = 15$
 $x^2 + y^2 + 6x - 8y + 10 = 0$

b) $(x-8)^2 + y^2 = 9$
 $(x-8)(x-8) + y^2 = 9$
 $x^2 - 16x + 64 + y^2 = 9$
 $x^2 + y^2 - 16x + 55 = 0$

⑨ a) $x^2 + y^2 - 6y - 11 = 0$
 $x^2 + (y^2 - 6y + 9) = 11 + 9$
 $(\frac{-6}{2})^2 = (-3)^2 = 9$
 $x^2 + (y-3)^2 = 20$

b) $x^2 + y^2 + 8x - 20y + 78 = 0$
 $(x^2 + 8x + 16) + (y^2 - 20y + 100) = -78 + 16 + 100$
 $(\frac{8}{2})^2 = (4)^2 = 16$ $(\frac{-20}{2})^2 = (-10)^2 = 100$
 $(x+4)^2 + (y-10)^2 = 38$

⑩ a) ① 2 ③ 4 ⑤ 6 ⑦ 8 ⑨ 10 ⑪ 12
 $\frac{4}{6}$

b) $\frac{1}{12} + \frac{6}{12} - \frac{1}{12} = \frac{6}{12}$

c) $\frac{8}{12} \cdot \frac{1}{11} = \frac{8}{132}$

d) $\frac{4}{12} + \frac{1}{12} = \frac{5}{12}$

e) $\frac{5}{12} \cdot \frac{5}{12} = \frac{25}{144}$