Year 9 Worksheet 10:
Quadratic equations and Graphs of Parabolas

Question 1: Answer the following.

(1) Which curve that point (1,2) lies on?

A. $y = x^2 - 2x + 3$ B. $y = x^2 - 2$ C. $y = 9 - x^2$

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

(2) Find the factor(s) of the equation $3x.(x + 5) = 0.$

A. $x = 5$ B. $x = -5$ C. $x = 0 \; or \; x = 5$

D. $x = 0$ E. $x = 0 \; or \; x = -5$

(3) Write the standard form of the equation $3y = 14 - y^2$

A. $y^2 + 3y = 14$ B. $y^2 = 3y - 14$ C. $y^2 = 14 - 3y$

D. $y^2 + 3y - 14 = 0$ E. $y^2 - 3y + 14 = 0$

(4) Find the factor(s) of the equation $2x.(x + 2) = x + 2.$

A. $x = 0$ B. $x = -2$ C. $x = 0 \; or \; x = -2$

D. $x = ½$ E. $x = ½ \; or \; x = -2$

(5) Find the turning points of the function $f(x) = x^3 - 3x^2 + 2x$.

A. (1,0) and (2,0) B. (1,0) and (-2,0) C. (-1,0) and (2,0)

D. (-1,0) and (-2,0) E. (-3,0) and (2,0)

(6) Describe the transformation of the graph $y = x^2$ to $y = x^2 + 5$.

A. 5 units to the right B. 5 units to the left C. 5 units up

D. 5 units down E. 5 units to the right and 5 units down

(7) The graph appears the narrowest to $y = x^2$ is:

A. $y = 0.1\,x^2$ B. $y = ½\,x^2$ C. $y = 4\,x^2$

D. $y = 1.2\,x^2$ E. $y = 10\,x^2$

Use this equation for questions 8 and 9.

The height, h meters, of a ball thrown vertically into the air is given by the equation $h = 20t - 5t^2$, where t is the time in seconds.

(8) The ball reaches the ground when h = 0. Calculate the time it takes for the ball to return to the ground.

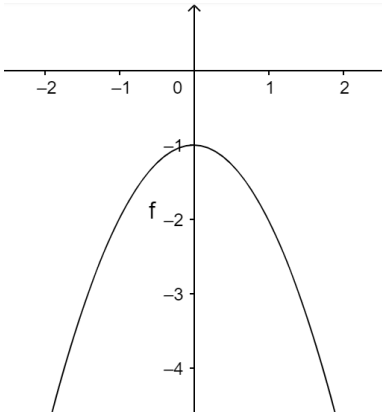
A. 2s B. 4s C. 5s D. 8s E. 10s

(9) Find the time it takes for the ball to reach its maximum height.

A. 2s B. 4s C. 5s D. 8s E. 10s

(10) The graph $f(x) = (x + 2)^2 - 2$ is:

A.



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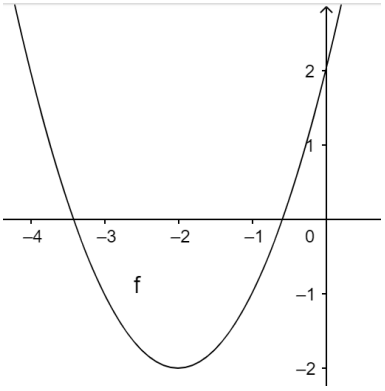

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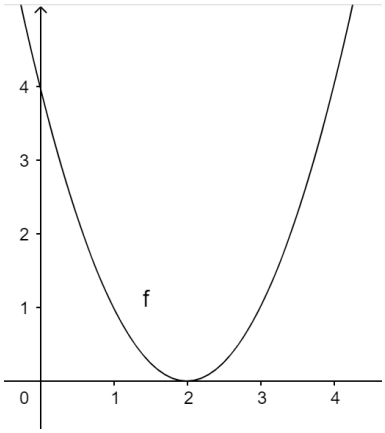

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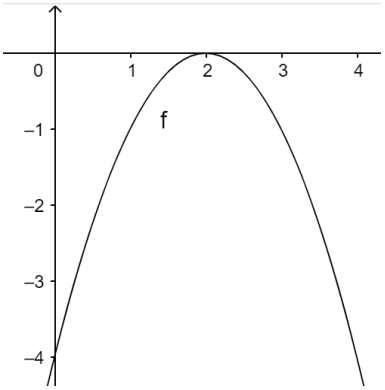

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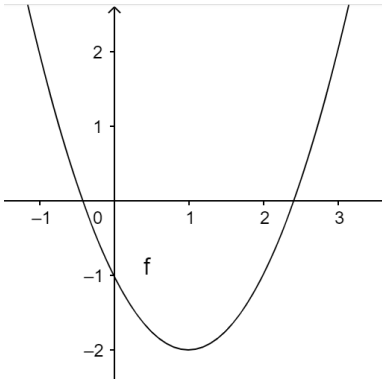


Question 2: Answer the following.

1

Give the quadratic $y = -x^2 + 2x + 2$. Complete the table of values and plot the graph on a Cartesian plane.

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

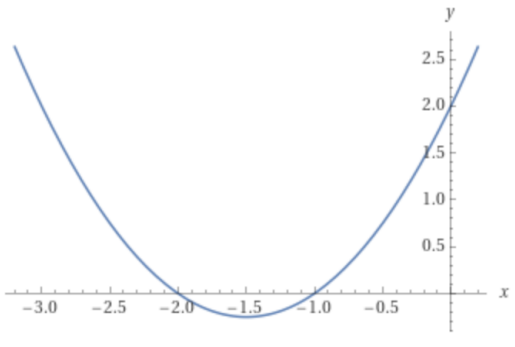
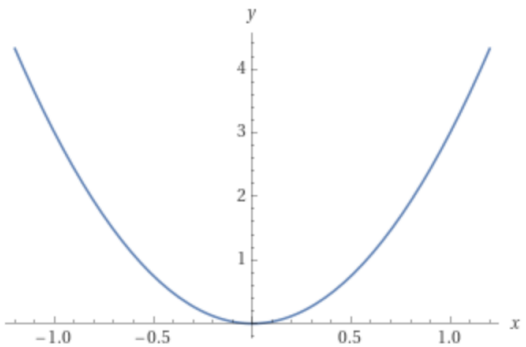
2

Solve for x by using the Null Factor Law.

a. $3x.(x - 5) = 0$

b. $(x + 4).(x - 3) = 0$

	c. $(3x - 6).(x + 7) = 0$ d.$(2x - 5).(5x + 1) = 0$
3	By first factoring, solve the following quadratic equations. a. $2x^2 - 12x = 0$ b. $x^2 - 49 = 0$ c. $4x^2 - 64 = 0$ d. $x^2 - x - 30 = 0$

4	Rearrange the equations in standard form and solve for x. a. $6x^2 = 24x$ b. $x^2 + 9 = 6x$ c. $x^2 + 10 = 7x$ d. $x^2 = 14 + 5x$
5	Find the graph for the following equations: A. $y = 3x^2$ B. $y = (x - 3)^2$ C. $y = x^2 + 3x + 2$ D. $y = x^2 - 9$ E. $y = (2x + 1)^2$ F. $y = 4 - x^2$ a.  b. 

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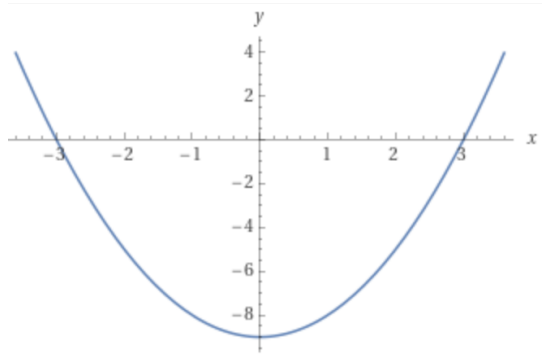

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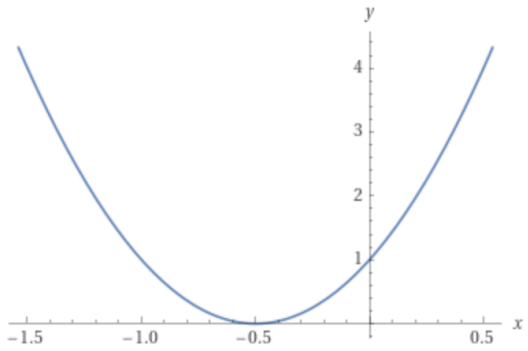

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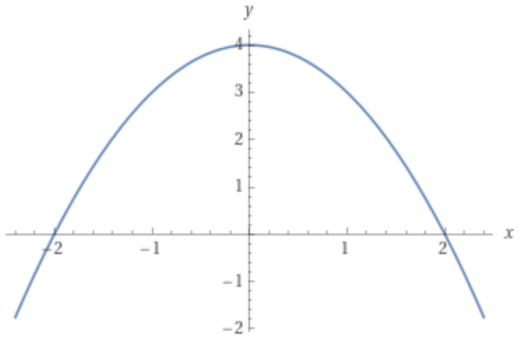

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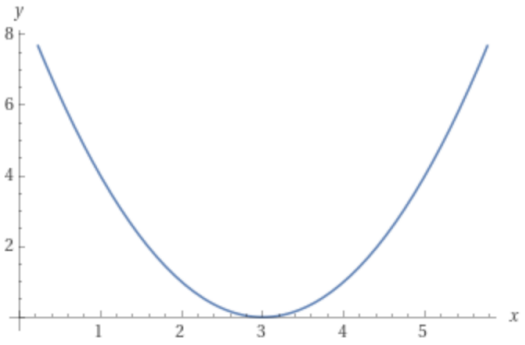

6 Sketch the following graphs, including the labeling the y-intercept, turning point, and x-intercepts.

a. $y = x^2 + 5$

b. $y = -x^2 - 3$

	c. $y = -(x + 7)^2$ d. $y = -(x - 6)^2$ e. $y = (x + 1)^2 - 4$ f. $y = 2(x - 2)^2 + 5$
7	State the transformations that take $y = x^2$ to each of the graphs in Question 6.

8	Sketch the following graphs, including the labeling the y-intercept, turning point, and x-intercepts. a. $y = -x^2 + 6x - 9$ b. $y = 2x^2 - 4x + 2$ c. $y = -0.5x^2 + 3x + 5$ d. $y = 3x^2 - 12x + 12$

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Answer Key

Question 1: Answer the following.

(1) Which curve that point (1,2) lies on?

A. $y = x^2 - 2x + 3$ B. $y = x^2 - 2$ C. $y = 9 - x^2$

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

Answer: A

(2) Find the factor(s) of the equation $3x.(x + 5) = 0.$

A. $x = 5$ B. $x = -5$ C. $x = 0 \; or \; x = 5$

D. $x = 0$ E. $x = 0 \; or \; x = -5$

Answer: E. x=0 or x=-5

(3) Write the standard form of the equation $3y = 14 - y^2$

A. $y^2 + 3y = 14$ B. $y^2 = 3y - 14$ C. $y^2 = 14 - 3y$

D. $y^2 + 3y - 14 = 0$ E. $y^2 - 3y + 14 = 0$

Answer: D. $y^2 + 3y - 14 = 0$

(4) Find the factor(s) of the equation $2x.(x + 2) = x + 2.$

A. $x = 0$ B. $x = -2$ C. $x = 0 \; or \; x = -2$

D. $x = ½$ E. $x = ½ \; or \; x = -2$

Answer: E. x= ½ or x=-2

(5) Find the turning points of the function $f(x) = x^3 - 3x^2 + 2x$.

A. (1,0) and (2,0) B. (1,0) and (-2,0) C. (-1,0) and (2,0)

D. (-1,0) and (-2,0) E. (-3,0) and (2,0)

Answer: A. (1,0) and (2,0)

(6) Describe the transformation of the graph $y = x^2$ to $y = x^2 + 5$.

A. 5 units to the right B. 5 units to the left C. 5 units up

D. 5 units down E. 5 units to the right and 5 units down

Answer: C. 5 units up

(7) The graph appears the narrowest to $y = x^2$ is:

A. $y = 0.1\,x^2$ B. $y = ½\,x^2$ C. $y = 4\,x^2$

D. $y = 1.2\,x^2$ E. $y = 10\,x^2$

Answer: D

Use this equation for questions 8 and 9.
The height, h meters, of a ball thrown vertically into the air is given by the equation $h = 20t - 5t^2$, where t is the time in seconds.

(8) The ball reaches the ground when h = 0. Calculate the time it takes for the ball to return to the ground.

A. 2s B. 4s C. 5s D. 8s E. 10s

Answer: B. 4s

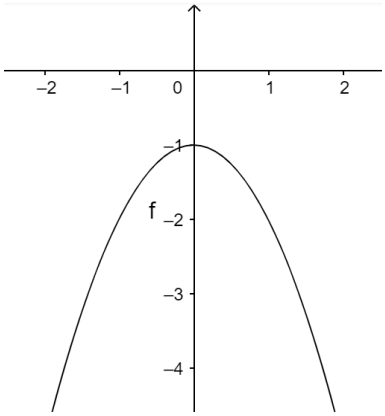
(9) Find the time it takes for the ball to reach its maximum height.

A. 2s B. 4s C. 5s D. 8s E. 10s

Answer: A. 2s

(10) The graph $f(x) = (x + 2)^2 - 2$ is:

A.



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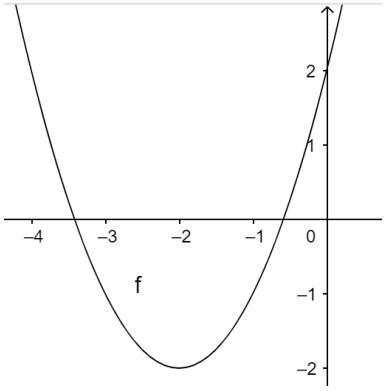

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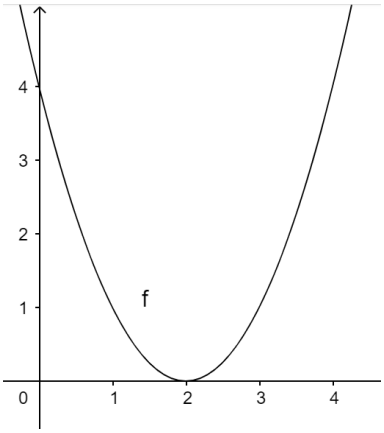
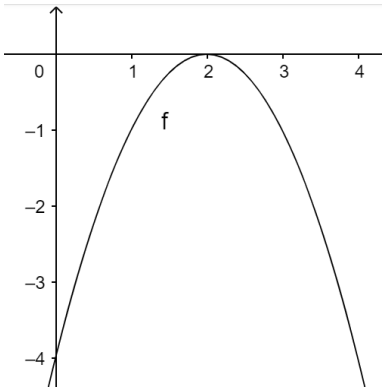


D.



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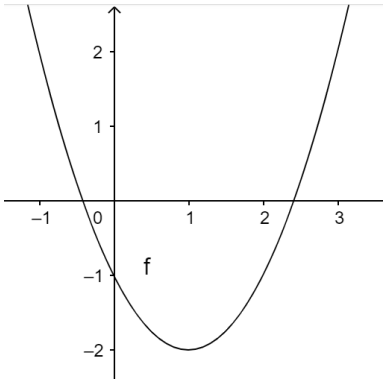


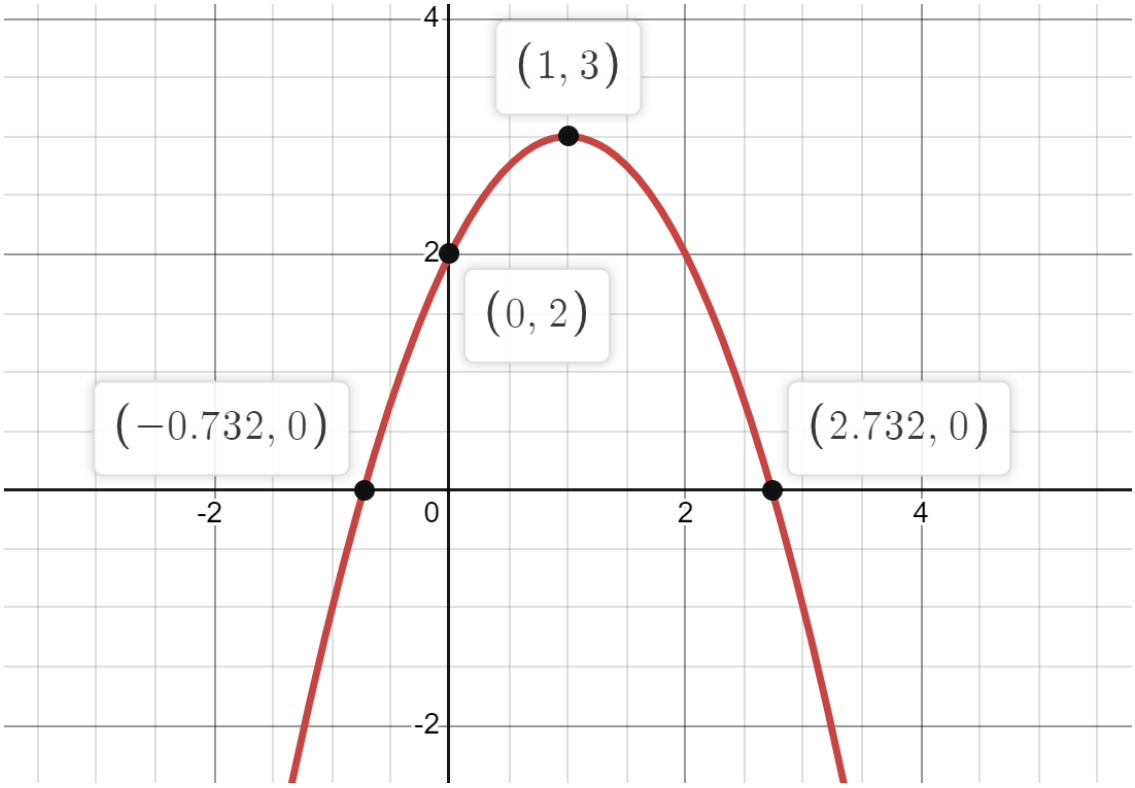
Answer: B

Question 2: Answer the following.

1

Give the quadratic $y = -x^2 + 2x + 2$. Complete the table of values and plot the graph on a Cartesian plane.

x	-3	-2	-1	0	1	2	3
y	-13	-6	-1	2	3	2	-1



2

Solve for x by using the Null Factor Law.

a. $3x.(x - 5) = 0$

-> x = 0 or x = 5

b. $(x + 4).(x - 3) = 0$

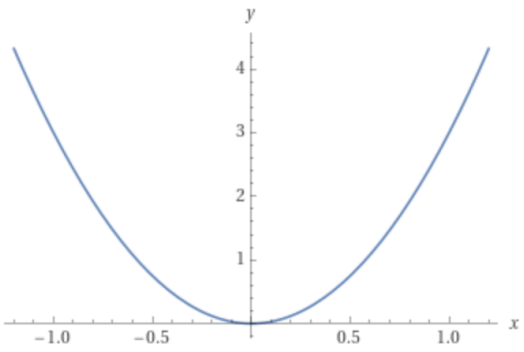
-> x = -4 or x = 3

c. $(3x - 6).(x + 7) = 0$

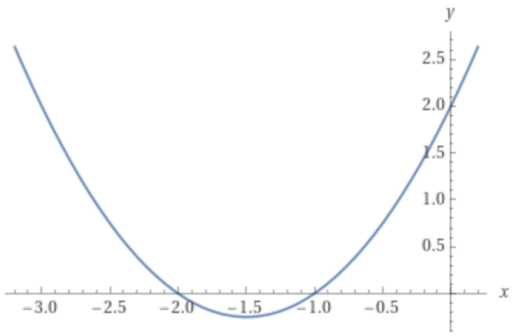
-> x = 2 or x = -7

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

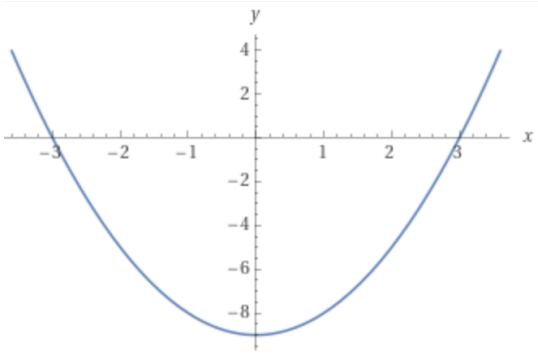
-> x = 5/2 or x = -1/5

3	By first factoring, solve the following quadratic equations. a. $2x^2 - 12x = 0$ 2x . (x − 6) = 0 x = 0 or x = 6 b. $x^2 - 49 = 0$ (x−7)(x+7)=0 x = 7 or x = -7 c. $4x^2 - 64 = 0$ 4 (x−4) (x+4) = 0 x = 4 or x = -4 d. $x^2 - x - 30 = 0$ (x−6) (x+5) = 0 x = 6 or x = -5
4	Rearrange the quadratic equations in standard form and solve for x. a. $6x^2 = 24x$ $x^2 - 4x = 0$ $x(x - 4) = 0$ $x = 0 \text{ or } 4$ b. $x^2 + 9 = 6x$ $x^2 - 6x + 9 = 0$ $(x - 3)^2 = 0$ $x = 3$ c. $x^2 + 10 = 7x$ $x^2 - 7x + 10 = 0$ $(x - 5)(x - 2) = 0$ $x = 5 \text{ or } 2$ d. $x^2 = 14 + 5x$ $x^2 - 5x - 14 = 0$ $(x - 7)(x + 2) = 0$ $x = 7 \text{ or } -2$
5	Find the graph for the following equations: A.  B. 

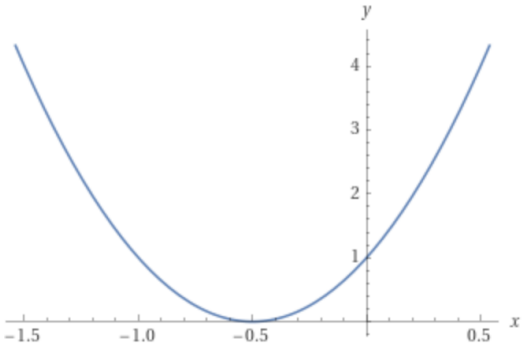
C.



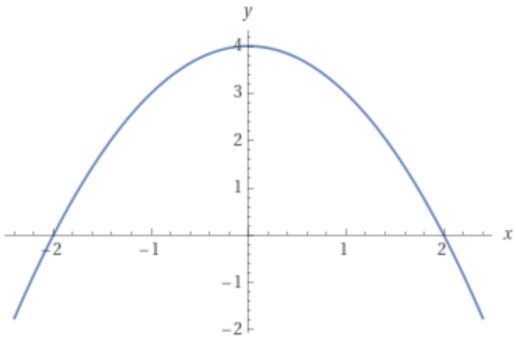
D.



E.

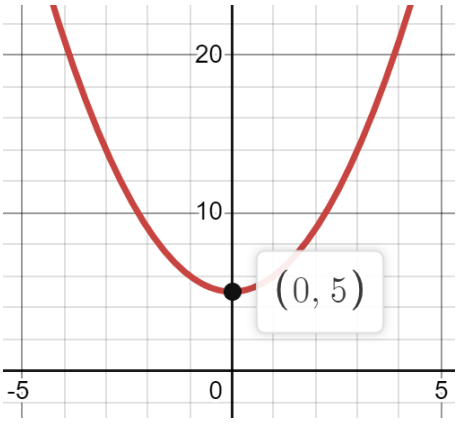


F.

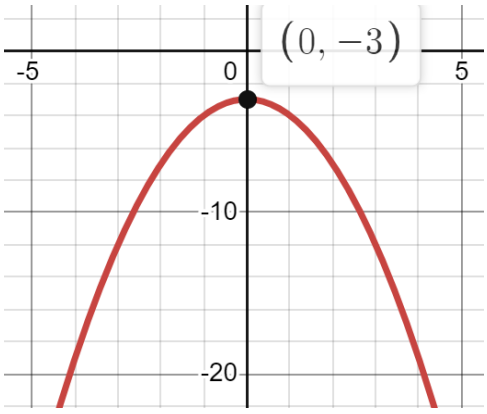


6 Sketch the following graphs, including the labeling the y-intercept, turning point.

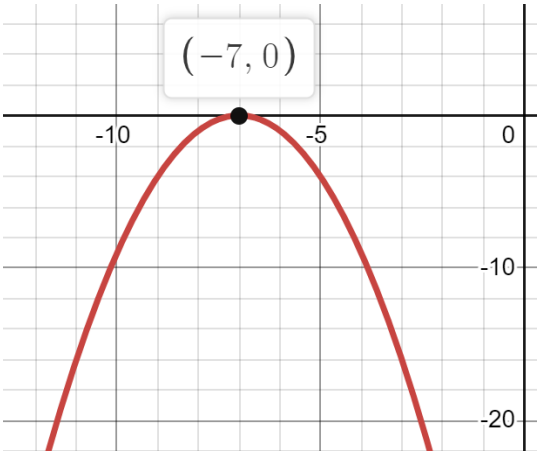
a. $y = x^2 + 5$



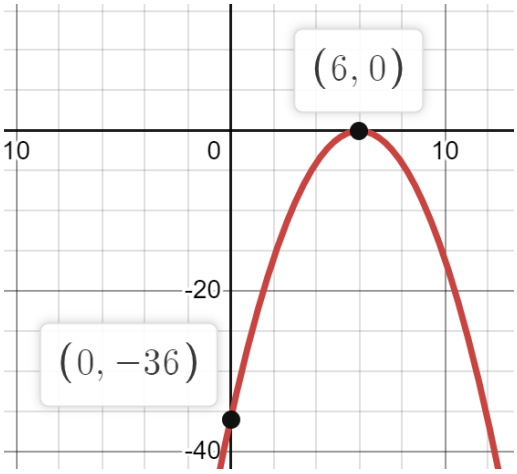
b. $y = -x^2 - 3$



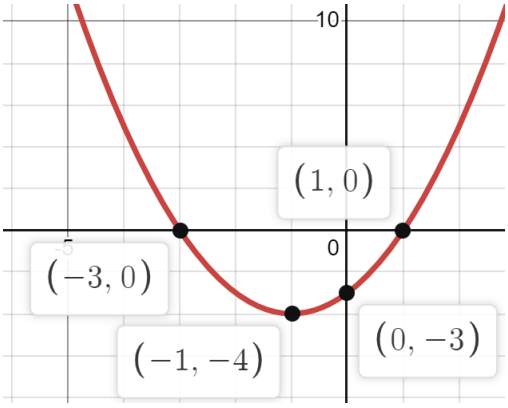
c. $y = -(x + 7)^2$



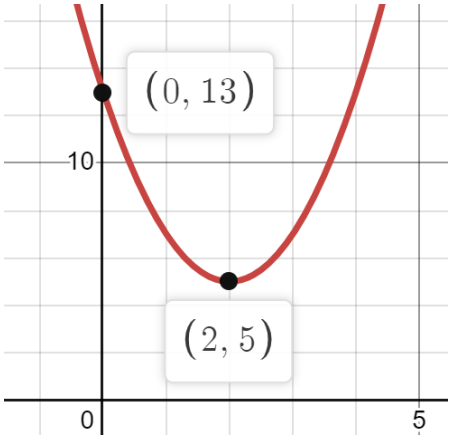
d. $y = -(x - 6)^2$



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



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



7

a. $y = x^2 + 5$

Upward by 5 units

b. $y = -x^2 - 3$

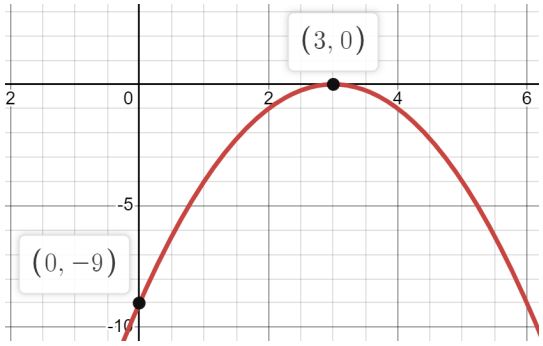
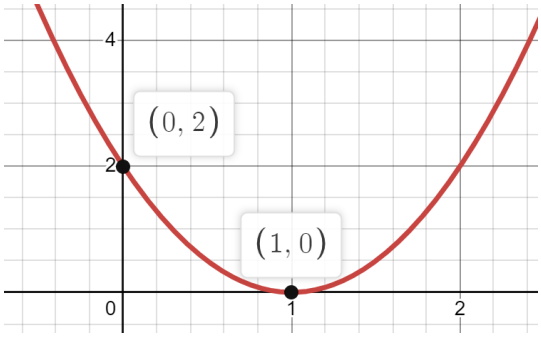
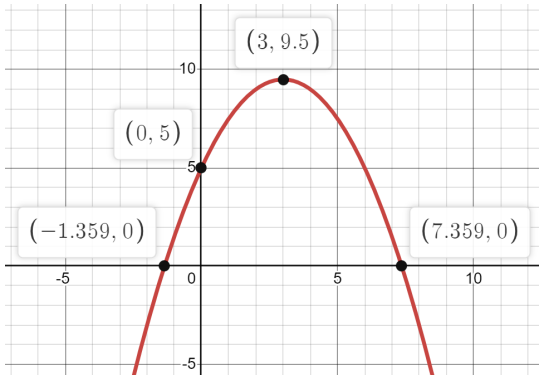
Downward by 3 units
Vertical reflection (x-axis)

c. $y = -(x + 7)^2$

Left by 7 units
Vertical reflection (x-axis)

d. $y = -(x - 6)^2$

Right by 6 units
Vertical reflection (x-axis)

	e. $y = (x + 1)^2 - 4$ Left by 1 unit Downward by 4 units f. $y = 2(x - 2)^2 + 5$ Right by 2 units Upward by 5 units
8	Sketch the following graphs, including the labeling the y-intercept, turning point, and x-intercepts. a. $y = -x^2 + 6x - 9$  b. $y = 2x^2 - 4x + 2$  c. $y = -0.5x^2 + 3x + 5$  d. $y = 3x^2 - 12x + 12$