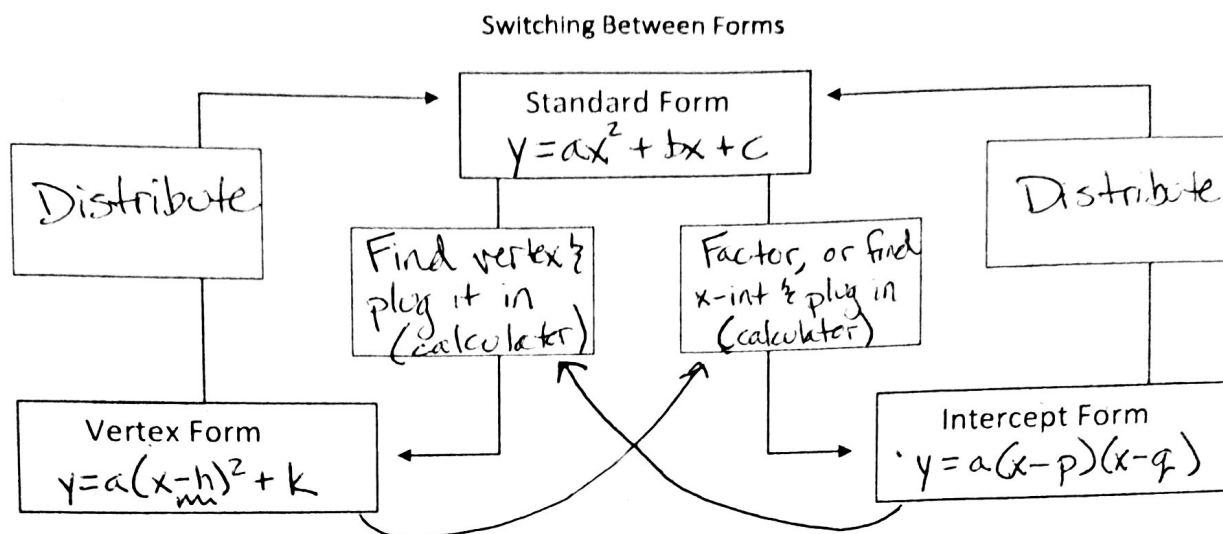


6.2 Switching Forms and Quadratic Applications



1) Write the equation in all three forms.

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

Standard Form

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

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

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

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

Intercept Form

Vertex Form

Vertex: $(-1, 8)$ $a = -2$
 h k

Max



2nd

Trace

4: Maximum

$$y = -2(x+1)^2 + 8$$

b. $y = x^2 - 8x + 15$

Standard Form

Intercept Form

x-int: 3, 5

a=1 p q

2nd

Trace

2: zero

$$y = 1(x-3)(x-5)$$

$$y = (x-3)(x-5)$$

Vertex Form

Vertex: $(4, -1)$ $a = 1$

U
Min

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

c. $y = 2(x + 1)^2 + 4$
Standard Form

Intercept Form

Vertex Form

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

No x-intercepts

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

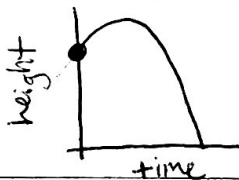
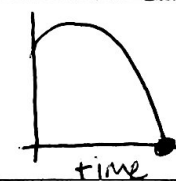
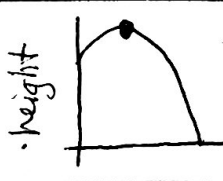
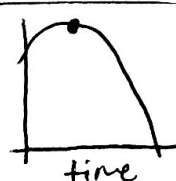
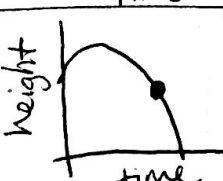
$$y = 2(x^2 + 2x + 1) + 4$$

$$y = 2x^2 + 4x + 2 + 4$$

$$y = 2x^2 + 4x + 6$$

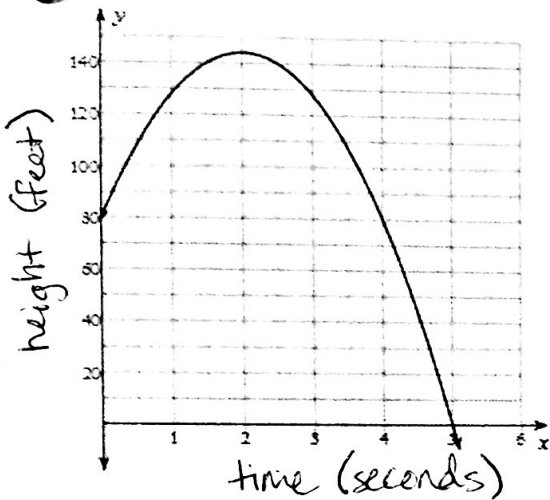
Quadratic Applications

Different parts of the parabola can tell you certain pieces of information, and you will need to know each of these to be able to interpret the graph.

Critical Part	Graph	Key words
y-intercept		Starting height, initial height
x-intercepts		Time it hits ground/lands
y-part of vertex		Max/min height
x-part of vertex		Time of max/min height
Random coordinate point		When is the object — high? How high is it after — seconds?

Example 1: Use the graphs to make predictions and estimate key features of a given scenario.

1) A rocket carrying fireworks is launched from a hill above the lake. The rocket will fall into the lake after exploding at its maximum height. The rocket's height above the surface is modeled by the parabola below.



i) At what height does the rocket start?

80 ft

ii) How high is the rocket after 1.5 seconds?

140 ft

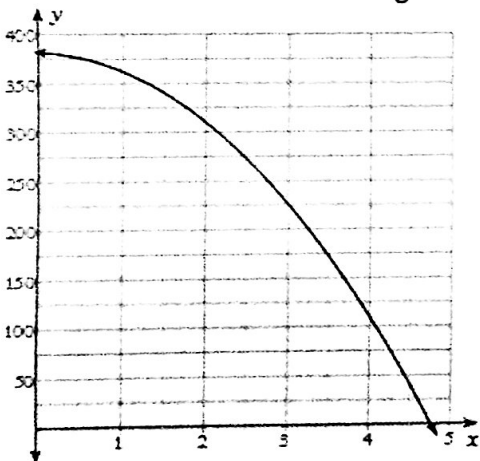
iii) At what height will the rocket explode?

145 ft

iv) How long will it take the rocket to hit the lake?

5 seconds

2) A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground t seconds after it is thrown is modeled by the parabola below.



i) At what height is the rock thrown?

ii) How long after the rock is thrown is it 370 feet off the ground?

iii) How high is the rock after 3 seconds?

iv) If a person is walking under the building 4 seconds after the rock is thrown, will the rock hit the person?

v) How long does it take for the rock to hit the ground?

3) The path of an arrow shot in the air can be modeled by the function: $y = -3(x - 4)^2 + 142$, where y is the height, in feet, of the arrow above ground x seconds after it is released.

i) What is the maximum height the arrow reaches?

142 ft

(y of vertex) $V = (4, 142)$

↑
use to decide window

ii) After how many seconds does it reach that height?

4 seconds

(x of vertex)

iii) How high will the arrow be at 6 seconds? At 8 seconds?

$x = 6$ 130 ft $x = 8$ 94 ft

2nd

Trace

□: Value

iv) At about what time will the arrow land on the ground?

10.88 seconds

(x-int)