Section 3.5 Model With Quadratic Equations

1. Write an equation for each graph.

a)

b)

c)
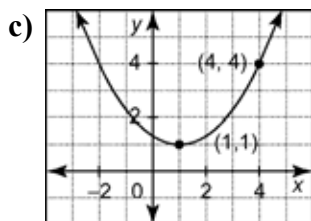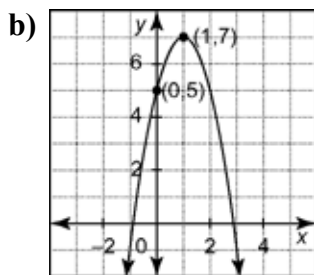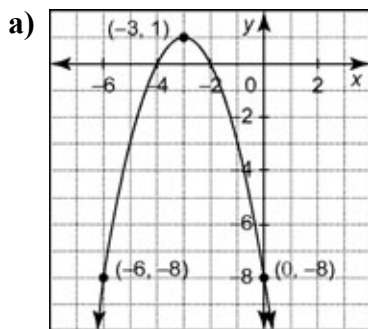
2. Jenn threw a football. The football followed the path of a parabola, according to the data in the table. The height of the football is h metres at a horizontal distance d metres from Jenn.

d (m)	h (m)
0	1.1
4	3.0
7	3.6
9	3.9
12	3.5
18	1.2
20	0.1

a) Make a scatter plot of the data and draw a curve of best fit.

b) Estimate the coordinates of the vertex.

c) Write an equation that approximately models the data.

3. Jessi ran a 4-km race. The racecourse is a loop so the start line is also the finish line. The table shows the distance, d, in kilometres Jessi is from the start/finish line at time, t, in hours.

t (h)	d (km)
0	0
0.2	1.3
0.4	1.9
0.5	2
0.7	1.7
0.9	0.7
1	0

a) Draw a scatter plot of the data.
b) What are the coordinates of the vertex?
c) Write an equation that models the data.

4. Carrie rides *The Drop of Terror* at an amusement park. The ride begins by launching vertically upward, and after reaching the top, drops back down. The table shows Carrie's height, h, above ground, in metres t seconds after the ride begins.

t (s)	h (m)
7	0
8	14
10	45
11	52
13	60
15	54
16	45
18	14

a) Draw a scatter plot of the data.
b) What are the coordinates of the vertex?
c) Write an equation that models the data.

5. a) Draw a scatter plot of the data in the table.

x	y
−7.8	−3.5
−6.5	−0.5
−5.2	−0.1
−4.5	−0.4
−3.4	−0.9
−2.7	−2.3
−1.8	−4.1
−0.6	−7.1
0	−10

b) Estimate the coordinates of the vertex.
c) Write an equation that models the data.

6. A motion sensor is attached to a model rocket and the rocket is launched from ground level. The following data is recorded.

Time (s)	Height (m)
1	225
2	315
3	350
4	362
5	350
6	305
7	224

a) Draw a scatter plot of the data and sketch a curve of best fit.
b) Predict the maximum height reached by the rocket to the nearest metre.
c) Predict the height of the rocket at 8 s to the nearest metre.
d) Determine the quadratic regression equation. What do the variables x and y represent?
e) At what time will the rocket land to the nearest tenth of a second?

7. Jayne opened a clothing accessories kiosk in the local shopping mall. During the first month of business, her business lost $750 for a profit of –$750. At the end of the second month, her business lost $650 for a net worth of –$1400 after two months. The business performance over 20 months is shown.

Month	Profit ($)	Net Worth ($)
1	−750	−750
2	−650	−1400
3	−550	−1950
4	−450	−2400
5	−350	−2750
6	−250	−3000
7	−150	−3150
8	−50	−3200
9	50	−3150
10	150	−3000
11	250	−2750
12	350	−2400
13	450	−1950
14	550	−1400
15	650	750
16	750	0
17	850	850
18	950	1800
19	1050	2850
20	1150	4000

a) Draw a scatter plot of the data for Month vs Net Worth.
b) In which month did the net worth first become positive?
c) Write a quadratic function that describes the net worth in terms of the number of months.
d) If profits continue to increase, approximately after how many months will the net worth of the business be $5000?