

Functions

T1

On the grid are eight points from two different functions.

A certain linear function passes through exactly four of the points shown.

A certain quadratic function passes through the remaining four points.

For the **linear** function:

1. Write the coordinate pairs of its four points.

(2, 9)

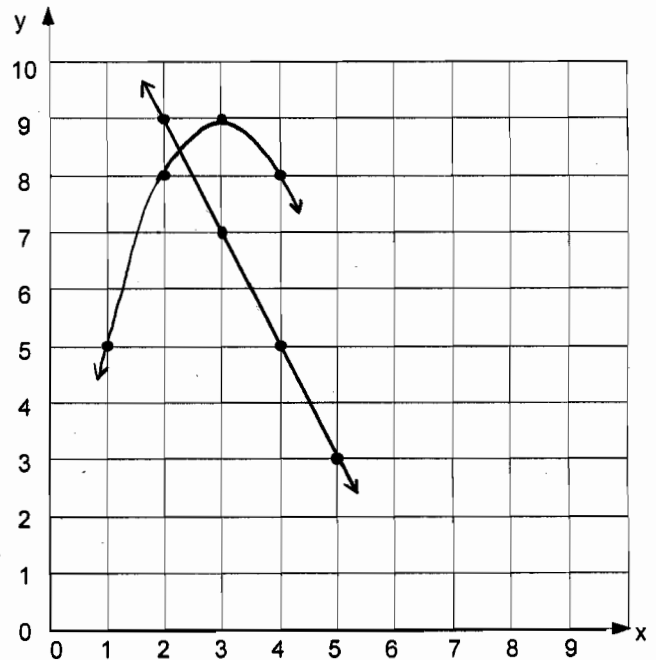
(3, 7)

(4, 5)

(5, 3)



Draw the line on the grid.



2. Write an equation for the function.

Show your work.

$$m \rightarrow \text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 3}{4 - 5} = \frac{2}{-1} = -2$$

$$y = -2x + 13 \quad \text{or} \quad 2x + y = 13$$

Point-Slope Formula:

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -2(x - 5)$$

$$y - 3 = -2x + 10$$

$$y = -2x + 13 \quad \text{or} \quad 2x + y = 13$$



For the **quadratic** function:

3. Write the coordinate pairs of its four points.

(1,5) (2,8) (3,9) (4,8) ✓ 1

Draw the graph of the function on the grid.

✓ 1

4. Write an equation that fits the quadratic function.
Show your work.

$y = -x^2 + 6x$ ✓ 2

vertex = (3, 9) (-h, k)

$$y = a(x+h)^2 + k$$

$$y = -1(x-3)^2 + 9$$

$$y = -1(x^2 - 6x + 9) + 9$$

$$y = -x^2 + 6x - 9 + 9$$

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

✓ 1

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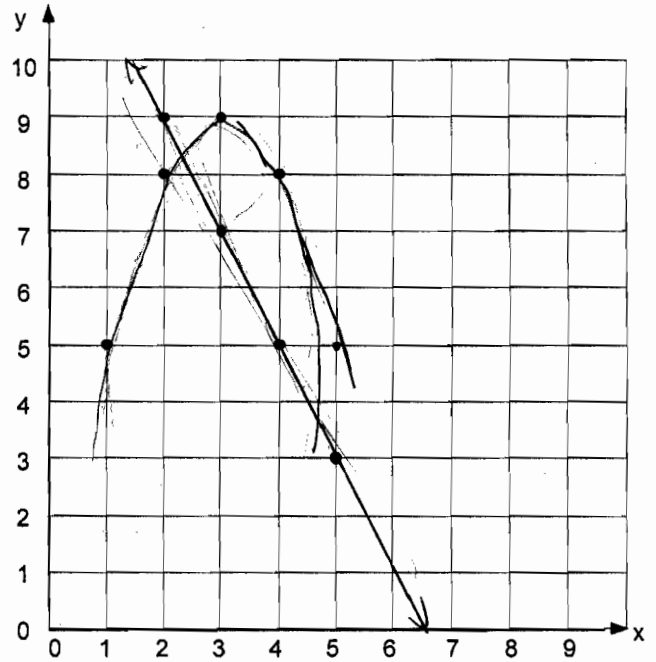
For the **linear** function:

1. Write the coordinate pairs of its four points.

- (2, 9)
- (3, 7)
- (4, 5)
- (5, 3)



Draw the line on the grid.



2. Write an equation for the function.

Show your work.

$$m = \left(\frac{y_1 - y_2}{x_1 - x_2} \right) \rightarrow \frac{9 - 7}{2 - 3} \rightarrow \frac{2}{-1}$$

y-intercept = 13

$$y = mx + b \rightarrow y = \frac{2}{-1}x + 13 \rightarrow y = -2x + 13$$

$$\rightarrow 2x + y = 13$$

2x + y = 13 ✓ 2

For the **quadratic** function:

3. Write the coordinate pairs of its four points.

(3, 9)

(4, 8)

(2, 8)

(1, 5) ✓

1

✓

1

Draw the graph of the function on the grid.

4. Write an equation that fits the quadratic function.
Show your work.

$y = ax^2 + bx + c \rightarrow y = -x^2 + 6x$ ✓

2

$y = ?x^2 + ?x + ?$

(3, 9)

(4, 8)

(2, 8)

(1, 5)

$y = ax^2 + bx + c$

$8 = a(4)^2 + b(4) + c$

$8 = a(2)^2 + 2b + c$

$5 = a(1)^2 + b + c$

$9 = a(3)^2 + b(3) + c$

$8 = 16a + 4b + c$

$8 = 4a + 2b + c$

$5 = a + b + c$

$9 = 9a + 3b + c$

$16a + 4b + c = 8$
 $- 4a + 2b + c = 8$

$12a + 2b = 0$

$24a + 4b = 0 \rightarrow 4b = -24a \rightarrow b = -6a$

$24 = 12a + 6b + 3c$

$0 = 12a + 2b$

$24 = 4b + 3c$

$0 = 4b + 24a$

$24 = 3c + 24a \rightarrow 8 = c + 8a \rightarrow c = 8 - 8a$

Final

$5 = a + b + c$

$5 = a - 6a + 8a + 8$

$5 = -3a + 8$

$\rightarrow -3 = -3a$

$-1 = -a$

$b = 6$

$8a + 8 \rightarrow c = 0$

On the grid are eight points from two different functions.

A certain linear function passes through exactly four of the points shown.

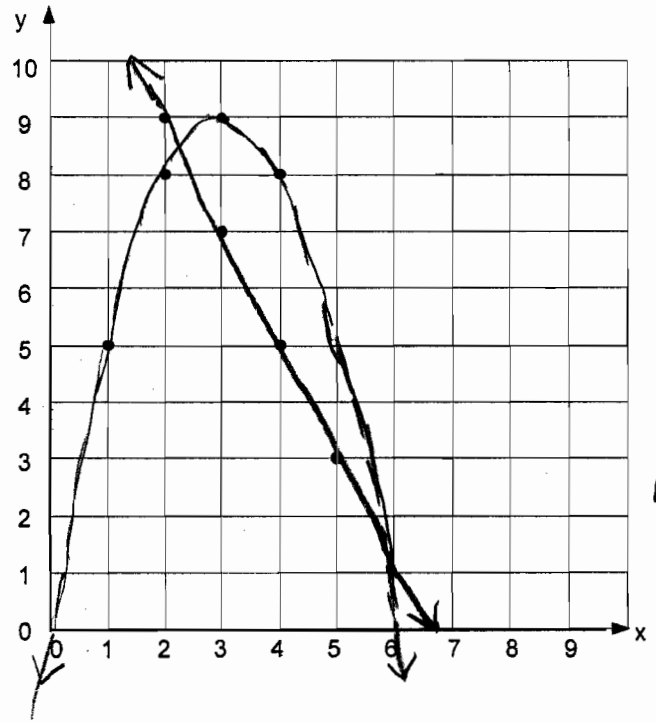
A certain quadratic function passes through the remaining four points.

For the **linear** function:

1. Write the coordinate pairs of its four points.

- _____ (2, 9)
- _____ (3, 7)
- _____ (4, 5)
- _____ (5, 3)

Draw the line on the grid.



2. Write an equation for the function.

Show your work.

$y = -2x + 13$ / $2x + y = 13$ ✓

slope = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 7}{3 - 2} = \frac{2}{1} = 2$ [$y = -2x + ?$]

$-2x - y + 13 = 0$ ✓
 $-2x - y = -13$
 $2x + y = 13$

$9 = -2(2) + ?$ ✓
 $9 = -4 + ?$
 $13 = ?$

$y = -2x + 13$ ✓

check $7 = -2(3) + 13$ ✓

For the **quadratic** function:

3. Write the coordinate pairs of its four points.

(1,5) (2,8) (3,9) (4,8) 1

Draw the graph of the function on the grid.

✓ 1

4. Write an equation that fits the quadratic function.
Show your work.

$-x^2 + 6x = y$ ✓ 2

$-x^2 + ?x + 0 = 0$ \swarrow y-intercept

$(x)(x-6) = 0$ ✓

$-(x^2 - 6x) = 0$ 1

check

$x^2 - 6x = y$

$1^2 - 6(1) = 5$

$1 - 6 = 5 \quad x$

$-x^2 + 6x = y$

$-(1^2) + 6(1) = 5$

$-1 + 6 = 5 \quad \checkmark$

On the grid are eight points from two different functions.

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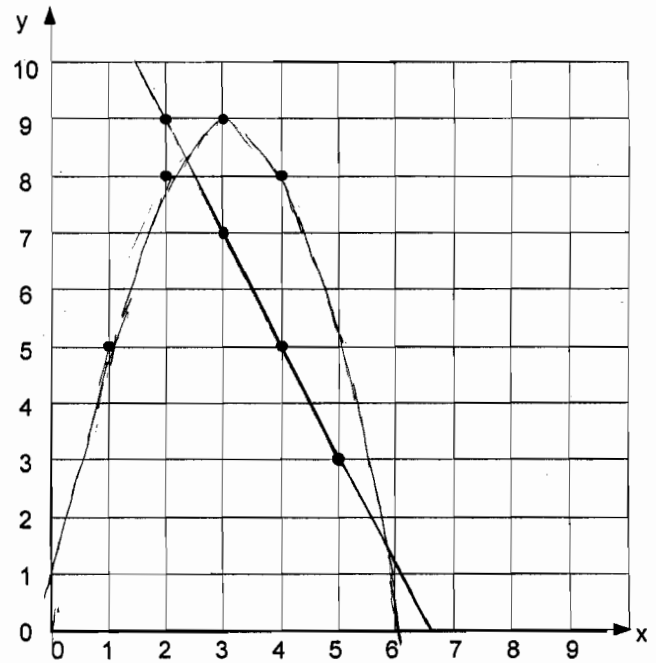
For the **linear** function:

1. Write the coordinate pairs of its four points.

- (5, 3)
- (4, 5)
- (3, 7)
- (2, 9)



Draw the line on the grid.



2. Write an equation for the function.

Show your work.

$y = -2x + 13$ ✓ 2

$y = mx + b$

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

$\frac{5 - 3}{4 - 5} = \frac{+2}{-1} = -2$

$3 = -2(5) + b$

$3 = -10 + b$

$+10 \quad +10$

$13 = b$

$y = -2x + 13$

$5 = -8 + 13$

$5 = 5$ ✓ 1

$7 = -2(3) + 13$

$7 = -6 + 13$

$7 = 7$

For the quadratic function:

3. Write the coordinate pairs of its four points.

(1, 5) (2, 8) (3, 9) (4, 8)

Draw the graph of the function on the grid.

4. Write an equation that fits the quadratic function.

Show your work.

$A -x^2 + 6x + 0$ (1)

$$ax^2 + bx + c = y$$

$$a(1)^2 + b(1) + c = 5$$

$$a + b + c = 5$$

x	Formula	y
1	$a + b + c$	5
2	$4a + 2b + c$	8
3	$9a + 3b + c$	9
4	$16a + 4b + c$	8

$$\begin{array}{r} 16a + 4b + c = 8 \\ - 4a - 2b - c = -8 \\ \hline \end{array}$$

$$\begin{array}{r} 12a + 2b = 0 \\ -12a \quad -12a \end{array}$$

$$\frac{2b}{2} = \frac{-12a}{2}$$

$$b = -6a$$

$$b = 6$$

$$-1 + 6 + 0 = 5$$

$$c = 0$$

$$-4 + 12 + 0 = 8$$

$$-9 + 18 = 9$$

$$-16 + 24 = 8$$

$$9a + 3b + c = 9$$

$$- a + b + 0 = 5$$

$$8a + 2b = 4$$

$$8a + 2(-6a) = 4$$

$$8a - 12a = 4$$

$$-4a = 4$$

$$\frac{-4a}{-4} = \frac{4}{-4}$$

$$a = -1$$

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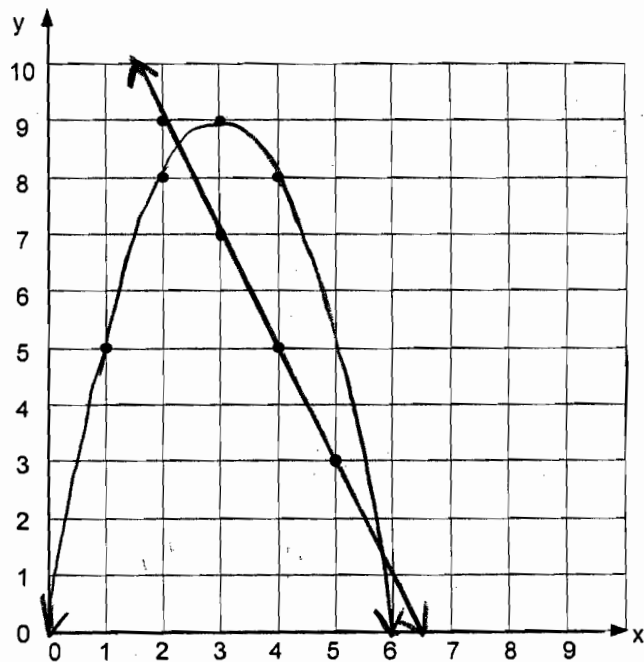
For the **linear** function:

1. Write the coordinate pairs of its four points.

- (2,9)
- (3,7)
- (4,5)
- (5,3)



Draw the line on the grid.



2. Write an equation for the function.

Show your work.

$y = -2x + 13$ ✓ 2

$y = mx + b$
 $m = -2$ ✓
 $b = 13$

- (6,1) (5,3) (4,5) (3,7) (2,9) (1,11) (0,13)

For the **quadratic** function:

3. Write the coordinate pairs of its four points.

(1,5) (2,8) (3,9) (4,8) 1

Draw the graph of the function on the grid. ✓ 1

4. Write an equation that fits the quadratic function.
Show your work.

$y = -x^2 + 6x$ ✓ 2

$$ax^2 + bx + c = y$$

$$x=0 \Rightarrow y=c$$

$$c=0$$

Vertex of curve is (3,9)

$$-\frac{b}{2a} = 3$$

$$\frac{-b^2 + 4ac}{4a} = 9 \quad c=0$$

$$\frac{b}{2a} = -3$$

$$\frac{-b^2}{4a} = 9$$

$$b = -6a$$

$$\frac{-(-6a)^2}{4a} = 9$$

$$b = -6(-1)$$

$$\frac{-36a^2}{4a} = 9$$

$$-36a^2 = 36a$$

$$\frac{a^2}{a} = \frac{-a}{a}$$

$$a = -1$$