

Creating Quadratic Equations – Day 2

Unit 3: Comparing Functions - Modeling & Transformations

Find the QUADRATIC equation of the line that best describes the provided information.
Emphasis on SUBSTITUTION.

1. $(-2, 4)$, $(0, 5)$, & $(1, -11)$

$$\begin{aligned} 4 &= a(-2)^2 + b(-2) + c \\ 4 &= 4a - 2b + c \\ 5 &= 4a + 2b + c \\ -11 &= 4a - 2b - 11c \end{aligned}$$

$$\begin{aligned} 5 &= a(0)^2 + b(0) + c \\ 5 &= c \end{aligned}$$

Answer

$$y = \frac{1}{3}x^2 - \frac{2}{3}x - \frac{11}{3}$$

2. $(-6, -1)$, $(-3, -4)$, & $(3, 8)$

$$\begin{aligned} -1 &= a(-6)^2 + b(-6) + c \\ -1 &= 36a - 6b + c \\ -4 &= 36a - 6b - 4c \\ 8 &= 36a - 6b + 8c \end{aligned}$$

Answer

$$y = \frac{1}{3}x^2 + 2x - 1$$

$$\begin{aligned} -1 &= a(-6)^2 + b(-6) + c \\ -1 &= 36a - 6b + c \\ -4 &= 36a - 6b - 4c \\ 8 &= 36a - 6b + 8c \end{aligned}$$

$$\begin{aligned} -1 &= 36a - 6b + c \\ -4 &= 36a - 6b - 4c \\ 8 &= 36a - 6b + 8c \end{aligned}$$

$$\begin{aligned} -1 &= 36a - 6b + c \\ -4 &= 36a - 6b - 4c \\ 8 &= 36a - 6b + 8c \end{aligned}$$

$$\begin{aligned} -1 &= 36a - 6b + c \\ -4 &= 36a - 6b - 4c \\ 8 &= 36a - 6b + 8c \end{aligned}$$

3. (-5, 45), (2, -32), & (5, -35)

$$\begin{aligned} 45 &= a(-5)^2 + b(-5) + c \\ 45 &= 25a - 5b + c \\ 45 &= 25a - 5b - 4a - 2b - 32 \\ &+ 32 \\ \hline 77 &= 21a - 7b - 7 \\ -7 &= -3a + b \\ +3a &+ 3a \\ \hline 3a - 11 &= b \\ 3(1) - 11 &= b \\ 3 - 11 &= b \\ \hline -8 &= b \end{aligned}$$

Answer

$$y = x^2 - 8x - 20$$

$$\begin{aligned} -32 &= a(2)^2 + b(2) + c \\ -32 &= 4a + 2b + c \\ -4a - 2b &- 4a - 2b - 32 = c \\ \hline -4(1) - 2(-8) - 32 &= c \\ -4 + 16 - 32 &= c \\ 12 - 32 &= c \\ \hline -20 &= c \end{aligned}$$

(5, -35)

$$\begin{aligned} -35 &= a(5)^2 + b(5) + c \\ -35 &= 25a + 5b + c \\ -35 &= 25a + 5b - 4a - 2b - 32 \\ &+ 32 \\ \hline -3 &= 21a + 3b \\ -1 &= 7a + b \\ -1 &= 7a + 3a - 11 \\ +11 &+ 11 \\ \hline 10 &= 10a \\ \frac{10}{10} &\frac{10}{10} \\ \hline 1 &= a \end{aligned}$$

4. (-8, -182), (-2, -56), & (6, 0)

$$\begin{aligned} -182 &= a(-8)^2 + b(-8) + c \\ -182 &= 64a - 8b + c \\ -182 &= 64a - 8b - 4a + 2b - 56 \\ &+ 56 \\ \hline -126 &= 60a - 6b - c \\ -6 &= 6a - b - c \\ 21 &= -10a + b \\ +10a &+ 10a \\ \hline 10a + 21 &= b \\ 10(-1) + 21 &= b \\ -10 + 21 &= b \\ \hline 11 &= b \end{aligned}$$

Answer

$$y = -x^2 + 11x - 30$$

$$\begin{aligned} 0 &= a(6)^2 + b(6) + c \\ 0 &= 36a + 6b + c \\ 0 &= 36a + 6b - 4a + 2b - 56 \\ &+ 56 \\ \hline 56 &= 32a + 8b \\ \frac{56}{8} &= \frac{32a + 8b}{8} \\ 7 &= 4a + b \\ 7 &= 4a + 10a + 21 \\ -21 &- 21 \\ \hline -14 &= 14a \\ \frac{-14}{14} &= \frac{14a}{14} \\ \hline -1 &= a \end{aligned}$$

(-2, -56)

$$\begin{aligned} -56 &= a(-2)^2 + b(-2) + c \\ -56 &= 4a - 2b + c \\ -4a + 2b &- 4a + 2b - 56 = c \\ \hline -4(-1) + 2(11) - 56 &= c \\ 4 + 22 - 56 &= c \\ 26 - 56 &= c \\ \hline -30 &= c \end{aligned}$$

(6, 0)

(-8, -182)