ANSWER PRESENTATION TOOL

Algebra 2 - Student Edit 4 8 - Practice 1-39 ALL EVEN Show Solı

ODD

1. D; The graph has x-intercepts 1 (repeated) and -2.

3. A; The graph has x-intercepts 1, 2, and -2.

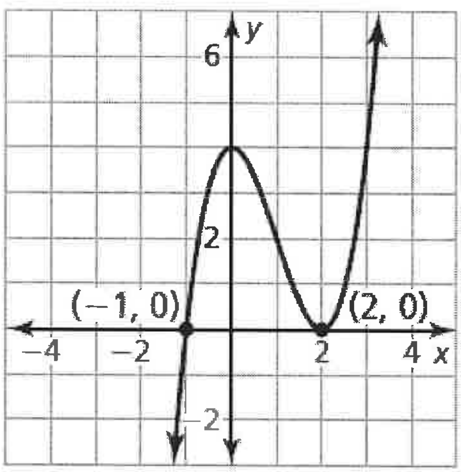
5. Step 1 Plot the x-intercepts. Because -1 and 2 are zeros of f, plot $(-1, 0)$ and $(2, 0)$.

Step 2 Plot points between and beyond the x-intercepts.

x	-2	0	1	3	4
y	-16	4	2	4	20

Step 3 Determine end behavior. Because f has three factors of the form $x - k$, it is a cubic function with a positive leading coefficient. So, $f(x) \to -\infty$ as $x \to -\infty$ and $f(x) \to +\infty$ as $x \to +\infty$.

Step 4 Draw the graph so that it passes through the plotted points and has the appropriate end behavior.



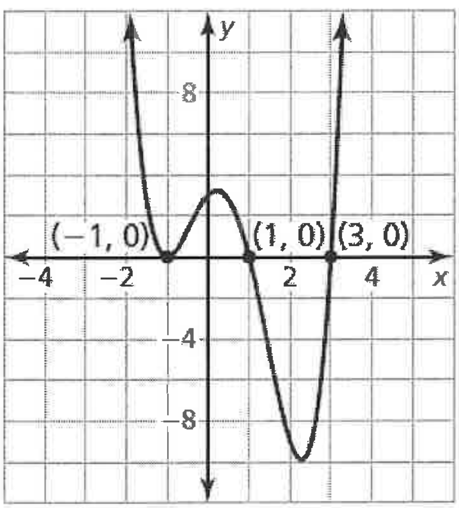
7. Step 1 Plot the x-intercepts. Because -1, 1, and 3 are zeros of h, plot $(-1, 0)$, $(1, 0)$, and $(3, 0)$.

Step 2 Plot points between and beyond the x-intercepts.

x	-2	0	2	4
y	13	3	-9	75

Step 3 Determine end behavior. Because h has four factors of the form $x - k$, it is a quartic function with a positive leading coefficient. So, $h(x) \to +\infty$ as $x \to -\infty$ and $h(x) \to +\infty$ as $x \to +\infty$.

Step 4 Draw the graph so that it passes through the plotted points and has the appropriate end behavior.



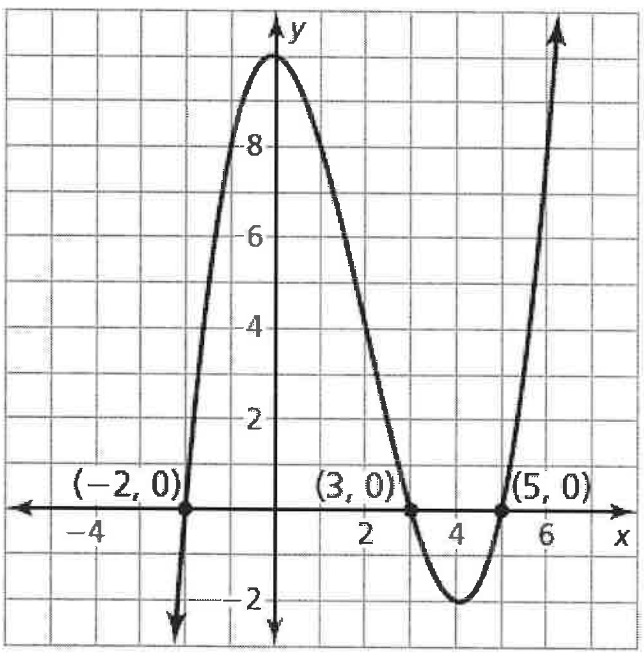
9. Step 1 Plot the x-intercepts. Because 5, −2, and 3 are zeros of h, plot (5, 0), (−2, 0), and (3, 0).

Step 2 Plot points between and beyond the x-intercepts.

x	−3	0	2	4	6
y	−16	10	4	−2	8

Step 3 Determine end behavior. Because h has three factors of the form $x - k$ and a constant factor $\frac{1}{3}$, it is a cubic function with a positive leading coefficient. So, $h(x) \to -\infty$ as $x \to -\infty$ and $h(x) \to +\infty$ as $x \to +\infty$.

Step 4 Draw the graph so that it passes through the plotted points and has the appropriate end behavior.



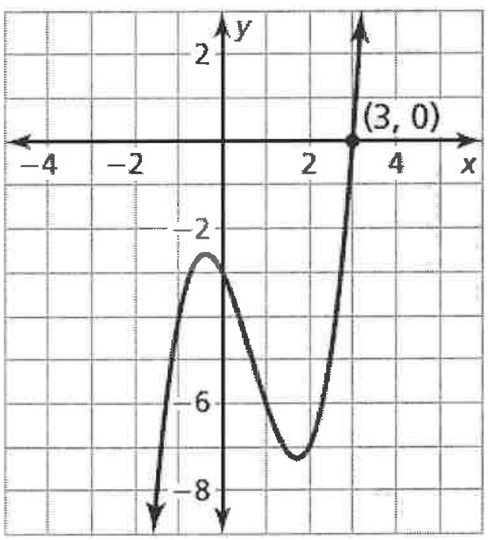
11. Step 1 Plot the x-intercepts. Because 3 is the zero of h, plot (3, 0).

Step 2 Because there is only one x-intercept, plot a few additional points.

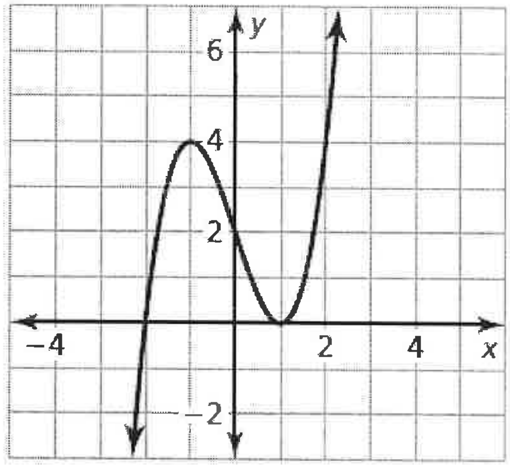
x	-1	$-\frac{1}{2}$	0	1	2
y	-4	-2.625	-3	-6	-7

Step 3 Determine end behavior. Because $h(x) = x^3 - 2x^2 - 2x - 3$, it is a cubic function with a positive leading coefficient. So, $h(x) \to -\infty$ as $x \to -\infty$ and $h(x) \to +\infty$ as $x \to +\infty$.

Step 4 Draw the graph so that it passes through the plotted points and has the appropriate end behavior.



13. The x-intercepts have the incorrect signs; They should be -2 and 1.



15. Step 1 Use a graphing calculator to make a table.

Step 2 Use the Location Principle. From the table, $f(0) > 0$ and $f(2) < 0$. So, by the Location Principle, f has a zero between 0 and 2. Because f is a polynomial function of degree 3, it has three zeros. The only possible rational zero between 0 and 2 is 1. Using synthetic division, you can confirm that 1 is a zero.

Step 3 Write $f(x)$ in factored form. Dividing $f(x)$ by its known factor $x - 1$ gives a quotient of $x^2 - 3x - 4$. So, you can factor f as

$$f(x) = (x - 1)(x^2 - 3x - 4)$$
$$= (x - 1)(x - 4)(x + 1).$$

From the factorization, there are three zeros. The zeros of f are 1, 4, and -1.

17. Step 1 Use a graphing calculator to make a table.

Step 2 Use the Location Principle. From the table, $h(-1) > 0$ and $h(0) < 0$. So, by the Location Principle, h has a zero between -1 and 0. Because h is a polynomial function of degree 3, it has three zeros. The only possible rational zero between -1 and 0 is $-\frac{1}{2}$. Using synthetic division, you can confirm that $-\frac{1}{2}$ is a zero.

Step 3 Write $h(x)$ in factored form. Dividing $h(x)$ by its known factor $x + \frac{1}{2}$ gives a quotient of $2x^2 + 6x - 8$. So, you can factor h as

$$\begin{aligned} h(x) &= \left(x + \tfrac{1}{2}\right)(2x^2 + 6x - 8) \\ &= 2\left(x + \tfrac{1}{2}\right)(x^2 + 3x - 4) \\ &= 2\left(x + \tfrac{1}{2}\right)(x - 1)(x + 4). \end{aligned}$$

From the factorization, there are three zeros. The zeros of h are $-\frac{1}{2}$, 1, and -4.

19. Step 1 Use a graphing calculator to make a table.

Step 2 Use the Location Principle. From the table, $g(2) < 0$ and $g(4) > 0$. So, by the Location Principle, g has a zero between 2 and 4. Because g is a polynomial function of degree 3, it has three zeros. The only possible rational zeros between 2 and 4 are $\frac{9}{4}$ and 3. Using synthetic division, you can confirm that 3 is a zero.

Step 3 Write $g(x)$ in factored form. Dividing $g(x)$ by its known factor $x - 3$ gives a quotient of $4x^2 + 13x - 12$. So, you can factor g as

$$\begin{aligned} g(x) &= (x - 3)(4x^2 + 13x - 12) \\ &= (x - 3)(x + 4)(4x - 3). \end{aligned}$$

From the factorization, there are three zeros. The zeros of g are 3, -4, and $\frac{3}{4}$.

21. Step 1 Use technology to make a table.

Step 2 Use the Location Principle. From the table, $f(3) < 0$ and $f(4) > 0$. So, by the Location Principle, f has a zero between 3 and 4. Because f is a polynomial function of degree 4, it has 4 zeros. The only possible rational zero between 3 and 4 is $\frac{7}{2}$. Using synthetic division, you can confirm that $\frac{7}{2}$ is a zero.

Step 3 Write $f(x)$ in factored form. Dividing $f(x)$ by its known factor $x - \frac{7}{2}$ gives a quotient of $2x^3 + 12x^2 + 24x + 16$. So, you can factor f as

$$f(x) = \left(x - \frac{7}{2}\right)(2x^3 + 12x^2 + 24x + 16)$$

$$= 2\left(x - \frac{5}{2}\right)(x^3 + 6x^2 + 12x + 8)$$

Using synthetic division, you can confirm that -2 is a zero.

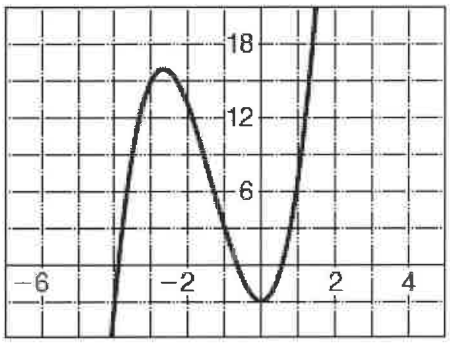
$$f(x) = 2\left(x - \frac{5}{2}\right)(x^3 + 6x^2 + 12x + 8)$$

$$= 2\left(x - \frac{5}{2}\right)(x + 2)(x^2 + 4x + 4)$$

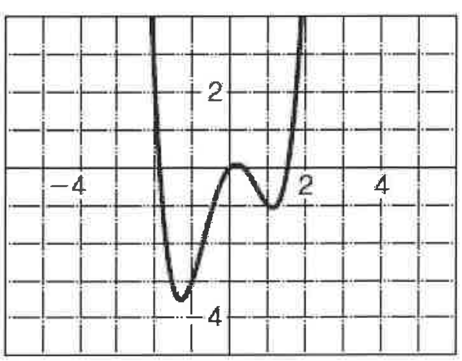
$$= 2\left(x - \frac{5}{2}\right)(x + 2)^3$$

From the factorization, there are 4 zeros. The zeros of f are $\frac{7}{2}$ and -2.

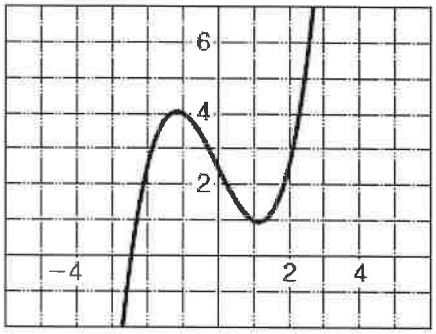
23. Use a graphing calculator to graph the function. The graph of g has three x-intercepts and two turning points. Use the graphing calculator's *zero*, *maximum*, and *minimum* features to approximate the coordinates of the points. The x-intercepts of the graph are $x \approx -3.90$, $x \approx -0.67$, and $x \approx 0.57$. The function has a local maximum at $(-2.67, 15.96)$ and a local minimum at $(0, -3)$. The function is increasing when $x < -2.67$ and $x > 0$ and decreasing when $-2.67 < x < 0$.



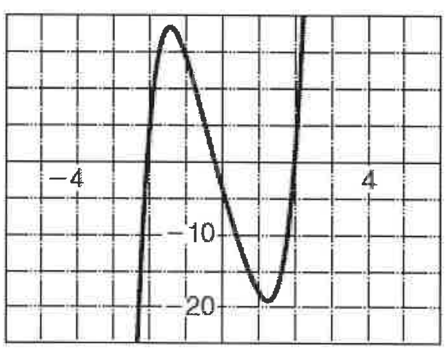
25. Use a graphing calculator to graph the function. The graph of h has four x-intercepts and three turning points. Use the graphing calculator's *zero*, *maximum*, and *minimum* features to approximate the coordinates of the points. The x-intercepts of the graph are $x \approx -1.88$, $x = 0$, $x \approx 0.35$, and $x \approx 1.53$. The function has a local maximum at $(0.17, 0.08)$ and local minimums at $(-1.30, -3.51)$ and $(1.13, -1.07)$. The function is increasing when $-1.30 < x < 0.17$ and $x > 1.13$, and decreasing when $x < -1.30$ and $0.17 < x < 1.13$.



27. Use a graphing calculator to graph the function. The graph of f has one x-intercept and two turning points. Use the graphing calculator's *zero*, *maximum*, and *minimum* features to approximate the coordinates of the points. The x-intercept of the graph is $x \approx -2.46$. The function has a local maximum at $(-1.15, 4.04)$ and a local minimum at $(1.15, 0.96)$. The function is increasing when $x < -1.15$ and $x > 1.15$ and decreasing when $-1.15 < x < 1.15$.



29. Use a graphing calculator to graph the function. The graph of h has three x-intercepts and two turning points. Use the graphing calculator's *zero*, *maximum*, and *minimum* features to approximate the coordinates of the points. The x-intercepts of the graph are $x \approx -2.10$, $x \approx -0.23$, and $x \approx 1.97$. The function has a local maximum at $(-1.46, 18.45)$ and a local minimum at $(1.25, -19.07)$. The function is increasing when $x < -1.46$ and $x > 1.25$, and decreasing when $-1.46 < x < 1.25$.

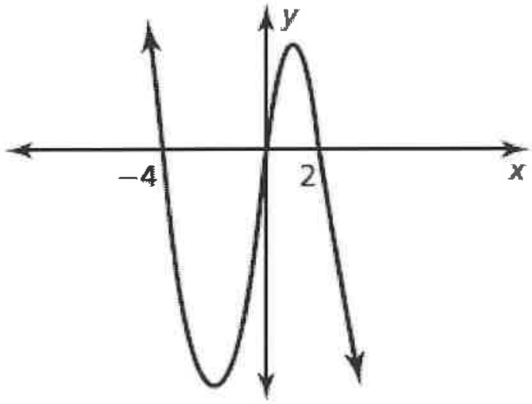


31. The graph of f has 2 turning points, so the least possible degree of f is 3.

33. The graph of f has 3 turning points, so the least possible degree of f is 4.

35. First plot the x-intercepts, then at $x = 1$, plot a point that is higher than all nearby points. Next, at $x = -2$, plot a point that is lower than all nearby points. Finally, draw the graph so that it passes through the plotted points.

Sample answer:



37. Replace x with $-x$ in the equation for h.

$h(-x) = 4(-x)^7 = -4x^7 = -h(x)$

Because $h(-x) = -h(x)$, the function is odd.

39. Replace x with $-x$ in the equation for f.

$f(-x) = (-x)^4 + 3(-x)^2 - 2 = x^4 + 3x^2 - 2 = f(x)$

Because $f(-x) = f(x)$, the function is even.