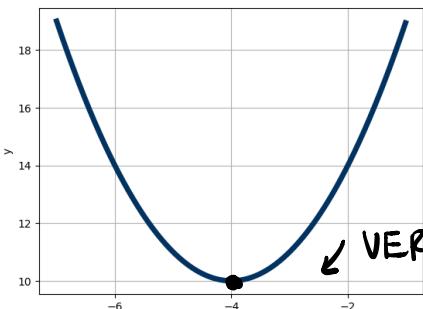


16. Write the equation of the graph presented below in the form $f(x) = ax^2 + bx + c$, assuming $a = 1$ or $a = -1$. Then, choose the intervals that a , b , and c belong to.

★PARABOLA OPENS UP

$$\Rightarrow a > 0$$

$$\Rightarrow a = 1$$



$$\text{IS } (h, k) = (-4, 10)$$

$$f(x) = a(x-h)^2 + k$$

$$a = 1$$

$$b = 8$$

$$c = 26$$

A. $a \in [0, 2]$, $b \in [-9, -3]$, and $c \in [2, 8]$

B. $a \in [-5, 0]$, $b \in [-9, -3]$, and $c \in [24, 27]$

C. $a \in [-3, 5]$, $b \in [-9, -3]$, and $c \in [24, 27]$

D. $a \in [0, 2]$, $b \in [6, 9]$, and $c \in [2, 8]$

E. $a \in [0, 2]$, $b \in [6, 9]$, and $c \in [24, 27]$

$$f(x) = 1(x - (-4))^2 + 10$$

$$f(x) = (x+4)^2 + 10$$

$$f(x) = (x+4)(x+4) + 10$$

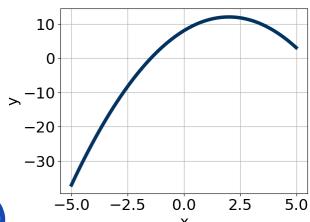
$$f(x) = x^2 + 4x + 4x + 16 + 10$$

$$f(x) = x^2 + 8x + 26$$

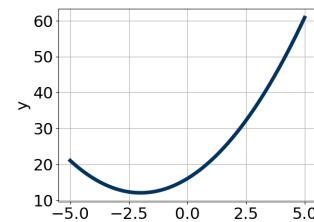
17. Graph the equation $f(x) = -(x - 2)^2 + 12$.

$$f(x) = a(x-h)^2 + k$$

A.

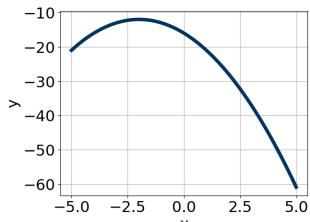


\uparrow
 $a = -1$
 $\Rightarrow a < 0$
 \Rightarrow PARABOLA
 OPENS
 DOWN

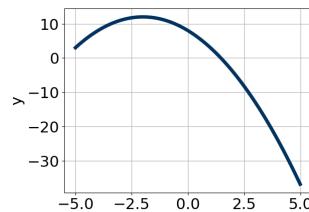


VERTEX IS
 (h, k)
 \Rightarrow VERTEX IS
 $(2, 12)$

X



X



X

18. Factor the quadratic below. Then, choose the intervals that contain the constants in the form $(ax + b)(cx + d)$; $b \leq d$. ***PERFECT SQUARE TRINOMIAL**

$$a^2 + 2ab + b^2 = (a+b)^2$$

$$a = \boxed{8}$$

$$b = \boxed{3}$$

$$c = \boxed{8}$$

$$d = \boxed{3}$$

$$64x^2 + 48x + 9 = (8x)^2 + 2(8x)(3) + 3^2$$

$$= (8x + 3)^2$$

- A. $a \in [0.5, 3.5]$, $b \in [2.5, 4.5]$, $c \in [63, 65]$, and $d \in [2, 4.5]$ OR $(8x+3)(8x+3)$
 B. $a \in [0.5, 3.5]$, $b \in [-3.5, -2]$, $c \in [63, 65]$, and $d \in [-4, -2.5]$
 C. $a \in [3, 5]$, $b \in [2.5, 4.5]$, $c \in [15, 17.5]$, and $d \in [2, 4.5]$
 D. $a \in [15.5, 17]$, $b \in [2.5, 4.5]$, $c \in [3.5, 5]$, and $d \in [2, 4.5]$
 E. $a \in [7.5, 8.5]$, $b \in [2.5, 4.5]$, $c \in [7, 8.5]$, and $d \in [2, 4.5]$

19. Solve the quadratic equation below. Then, choose the intervals that the solutions x_1 and x_2 belong to, with $x_1 \leq x_2$.

FACTORS THAT MULTIPLY

TO $(144)(-10) = -1440$

AND ADD TO -36 :

$$\underline{-1440} \quad | \quad \underline{-36}$$

- A. $x_1 \in [-2.02, -1.98]$ and $x_2 \in [-0.06, 0.16]$

$$\underline{-160, 9} \quad | \quad X$$

- B. $x_1 \in [-0.05, 0.02]$ and $x_2 \in [4.82, 5.05]$

$$\underline{-40, 36} \quad | \quad X$$

- C. $x_1 \in [-0.14, -0.07]$ and $x_2 \in [0.82, 0.86]$

$$\underline{-48, 20} \quad | \quad X$$

- D. $x_1 \in [-0.34, -0.3]$ and $x_2 \in [0.09, 0.21]$

$$\underline{-120, 12} \quad | \quad X$$

- E. $x_1 \in [-0.21, -0.16]$ and $x_2 \in [0.37, 0.59]$

$$\underline{-80, 18} \quad | \quad X$$

$$\underline{-90, 16} \quad | \quad X$$

$$\underline{-60, 24} \quad | \quad \checkmark$$

$$144x^2 - 36x - 10 = 0$$

$$x_1 = \boxed{-0.16}$$

$$144x^2 - 60x + 24x - 10 = 0$$

$$12x(12x - 5) + 2(12x - 5) = 0$$

$$(12x - 5)(12x + 2) = 0$$

$$12x - 5 = 0$$

$$12x = 5$$

$$x = \frac{5}{12} = 0.41\bar{6}$$

$$12x + 2 = 0$$

$$12x = -2$$

$$x = -\frac{2}{12} = -0.1\bar{6}$$

20. Solve the quadratic equation below. Then, choose the intervals that the solutions belong to, with $x_1 \leq x_2$ (if they exist).

***QUADRATIC FORMULA:**

$$4x^2 - 5x - 3 = 0$$

$$x_1 = \boxed{-0.443}$$

$$x_2 = \boxed{1.693}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- A. $x_1 \in [-0.5, -0.4]$ and $x_2 \in [1.65, 1.7]$

- B. $x_1 \in [-1.81, -1.7]$ and $x_2 \in [6.63, 6.82]$

- C. $x_1 \in [-1.75, -1.59]$ and $x_2 \in [0.35, 0.47]$

- D. $x_1 \in [-6.84, -6.67]$ and $x_2 \in [1.76, 1.78]$

- E. There are no Real solutions.

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(4)(-3)}}{2(4)}$$

$$x = \frac{5 \pm \sqrt{25 + 48}}{8}$$

$$x = \frac{5 \pm \sqrt{73}}{8}$$

$$x = 1.693, x = -0.443$$

22. What is the domain of the function below?

- A. $(-\infty, \infty)$
- B. $(-\infty, a]$, where $a \in [-1.7, 1.3]$
- C. $(-\infty, a]$, where $a \in [1.3, 4.1]$
- D. $[a, \infty)$, where $a \in [-1.8, 1.8]$
- E. $[a, \infty)$, where $a \in [1.9, 3.8]$

★ EVEN ROOT FUNCTION \Rightarrow RESTRICTED DOMAIN!

$$f(x) = \sqrt[8]{-3x + 8}$$

$$\begin{array}{r} -3x + 8 \geq 0 \\ -8 \quad -8 \\ \hline -3x \geq -8 \end{array}$$

$\frac{-3x}{-3} \geq \frac{-8}{-3}$ DIVIDE BY NEGATIVE
 $x \leq \frac{8}{3}$ \Rightarrow FLIP SIGN
 $\Rightarrow x \leq 2.\overline{6}$

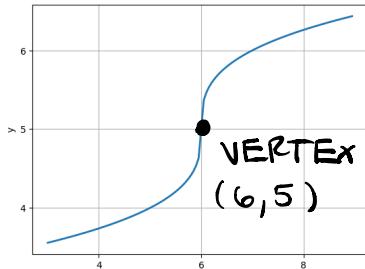
23. Choose the equation of the function graphed below.

★ ODD ROOT FUNCTION

★ $a > 0 \Rightarrow a = 1$

★ VERTEX IS $(h, k) = (6, 5)$

$$f(x) = \sqrt[3]{x - h} + k = \sqrt[3]{x - 6} + 5$$



A. $f(x) = \sqrt[3]{x + 6} + 5$

B. $f(x) = -\sqrt[3]{x - 6} + 5$

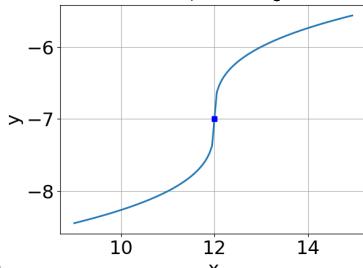
C. $f(x) = \sqrt[3]{x - 6} + 5$

D. $f(x) = -\sqrt[3]{x + 6} + 5$

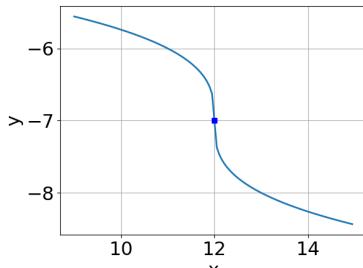
$(-\infty, 2.\overline{6}]$

★ $a > 0 \Rightarrow a = 1$

★ VERTEX IS $(h, k) = (12, -7)$



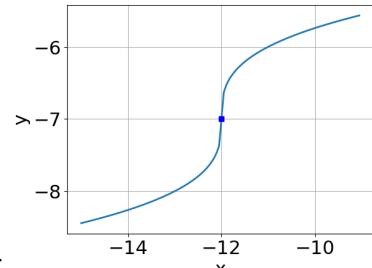
A.



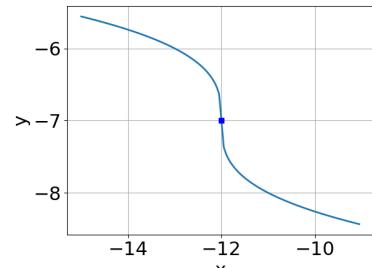
B.

X CORRESPONDS TO $a = -1$

$$f(x) = a \sqrt[3]{x - h} + k$$



C.



D.

X

25. Solve the radical equation below. Then, choose the interval(s) that the solution(s) belongs to.

$$\sqrt{9x-8} - \sqrt{6x+6} = 0 \quad (\sqrt{9x-8})^2 = (\sqrt{6x+6})^2$$

A. All solutions lead to invalid or complex values in the equation.

B. $x \in [1, 8]$

C. $x \in [-10, -3]$

D. $x_1 \in [1, 8]$ and $x_2 \in [-1, 4]$

E. $x_1 \in [1, 8]$ and $x_2 \in [-5, -2]$

★ CHECK SOLUTION

$x = 4.6$

$\sqrt{9(4.6)-8} - \sqrt{6(4.6)+6} ? = 0$

$\sqrt{34} - \sqrt{34} = 0 \checkmark$

$$\begin{cases} 9x-8 = 6x+6 \\ -6x = -6x \end{cases}$$

$$3x-8 = 6$$

$$3x = 14$$

$$x = \frac{14}{3}$$

$$x = 4.6$$

26. Solve the radical equation below. Then, choose the interval(s) that the solution(s) belongs to.

$$\sqrt{32x^2 - 63} - \sqrt{44x} = 0$$

A. $x \in [1.3, 2.5]$

$$(\sqrt{32x^2 - 63})^2 = (\sqrt{44x})^2$$

B. All solutions lead to invalid or complex values in the equation.

C. $x_1 \in [3.2, 7.4]$ and $x_2 \in [-2, 2]$

$$32x^2 - 63 = 44x$$

D. $x_1 \in [3.2, 7.4]$ and $x_2 \in [-9, -3]$

$$32x^2 - 44x - 63 = 0$$

E. $x \in [-1.4, -0.4]$

★ TWO FACTORS THAT MULTIPLY TO $(32)(-63) = -2016$ AND ADD TO -44 :

-72 AND 28 WORK!

$$32x^2 - 44x - 63 = 0$$

$$32x^2 + 28x \left\{ -72x - 63 = 0 \right.$$

$$4x(8x+7) - 9(8x+7) = 0$$

$$(8x+7)(4x-9) = 0$$

★ CHECK SOLUTIONS:

1. $x = -0.875$:

$$\sqrt{32(-0.875)^2 - 63} - \sqrt{44(-0.875)} ? = 0$$

$$\sqrt{-38.5} - \sqrt{-38.5} ? = 0$$

★ CANNOT TAKE SQUARE ROOT OF A NEGATIVE

★ $x = -0.875$ IS NOT A SOLUTION

2. $x = 2.25$:

$$\sqrt{32(2.25)^2 - 63} - \sqrt{44(2.25)} ? = 0$$

$$\sqrt{99} - \sqrt{99} ? = 0$$

$$0 = 0 \checkmark$$

★ $x = 2.25$ IS A SOLUTION

ZEROS: 26. Which of the following equations could be of the graph presented below?

1. $x = -3$, TOUCHES X-AXIS
 $\Rightarrow (x - (-3)) = (x + 3)$ IS A FACTOR WITH EVEN MULTIPLICITY

2. $x = -2$, TOUCHES X-AXIS
 $\Rightarrow (x - (-2)) = x + 2$ IS A FACTOR WITH EVEN MULTIPLICITY

3. $x = 2$, TOUCHES X-AXIS $\Rightarrow (x - 2)$ IS A FACTOR WITH EVEN MULTIPLICITY

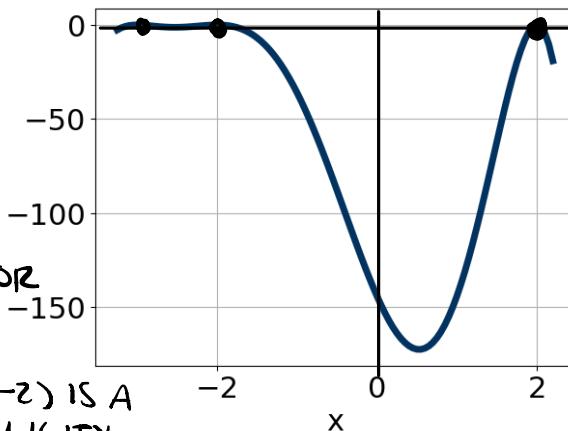
A. $-(x - 2)^2(x + 2)(x + 3)$

B. $-(x - 2)^2(x + 2)^2(x + 3)$

C. $(x - 2)^2(x + 2)^2(x + 3)^2$

D. $-(x - 2)^2(x + 2)^2(x + 3)^2$

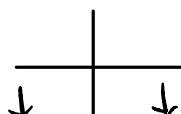
E. $(x - 2)^2(x + 2)^2(x + 3)$



END BEHAVIOR:

* DEGREE OF POLYNOMIAL IS $2+2+2=6$
 \Rightarrow EVEN

* END BEHAVIOR IS



\Rightarrow NEGATIVE LEADING COEFFICIENT

27. Choose the end behavior of the polynomial below.

* LEADING COEFFICIENT

IS -7

\Rightarrow NEGATIVE LEADING COEFFICIENT

$$f(x) = -7(x - 6)^3(x - 3)^2(x + 3)^5(x + 6)^4$$

* DEGREE OF POLYNOMIAL IS $3+2+5+4=14$

\Rightarrow EVEN DEGREE

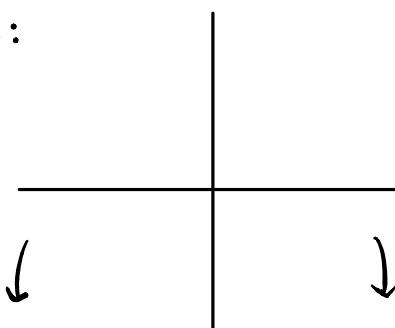
A.

B.

C.

D.

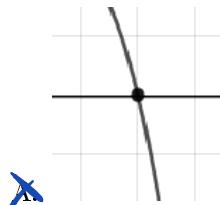
END BEHAVIOR:



ZEROS:

28. Describe the zero behavior of the zero 3 of the polynomial below.

1. $x=6$,
ODD MULTIPLICITY
 \Rightarrow CROSSES X-AXIS

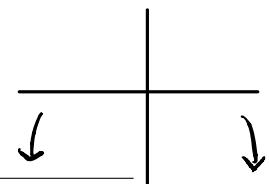
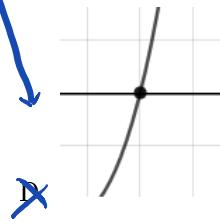
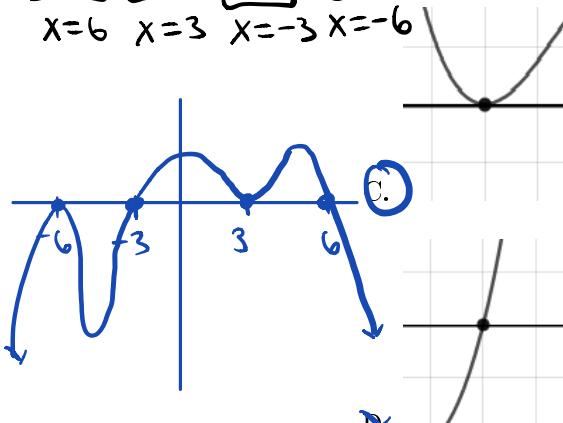
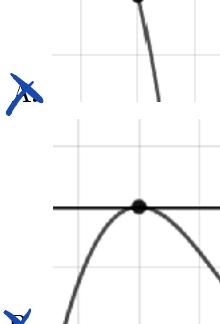


$$f(x) = -7(x-6)^3(x-3)^2(x+3)^5(x+6)^4$$

$x=6 \quad x=3 \quad x=-3 \quad x=-6$

END BEHAVIOR

★ NEGATIVE LEADING COEFFICIENT
★ DEGREE IS $3+2+5+4=14$
 \Rightarrow EVEN DEGREE



29. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$-4, -5, \frac{7}{2}$$

- A. $a \in [0, 5], b \in [-26, -16], c \in [102, 104]$, and $d \in [-152, -139]$
 B. $a \in [0, 5], b \in [-18, -6], c \in [-32, -20]$, and $d \in [135, 145]$
 C. $a \in [0, 5], b \in [8, 12], c \in [-32, -20]$, and $d \in [135, 145]$
 D. $a \in [0, 5], b \in [8, 12], c \in [-32, -20]$, and $d \in [-152, -139]$
 E. $a \in [0, 5], b \in [-6, -2], c \in [-48, -44]$, and $d \in [135, 145]$

30. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

5i and -3 ★ 5i IS A ZERO \Rightarrow -5i IS ALSO A ZERO

- A. $b \in [-1, 2], c \in [-2.8, 1.7]$, and $d \in [-18, -13]$
 B. $b \in [-1, 2], c \in [0.5, 3.5]$, and $d \in [-6, 3]$
 C. $b \in [-8, -1], c \in [22.5, 28.3]$, and $d \in [-84, -74]$
 D. $b \in [2, 9], c \in [22.5, 28.3]$, and $d \in [73, 79]$
 E. $b \in [-8, -1], c \in [-27.4, -23.6]$, and $d \in [-84, -74]$

FACTORS:

1. $(x-5i)$

2. $(x-(-5i)) = (x+5i)$

3. $(x-(-3)) = (x+3)$

$$\Rightarrow f(x) = (x-5i)(x+5i)(x+3)$$

$$f(x) = (x^2 + (-5)^2)(x+3)$$

$$f(x) = (x^2 + 25)(x+3)$$

$$f(x) = x^3 + 3x^2 + 25x + 75$$

↓

29.

FACTORS:

1. $(x - (-4)) = (x + 4)$ IS A FACTOR

2. $(x - (-5)) = (x + 5)$ IS A FACTOR

3. $(x - \frac{7}{2}) \Rightarrow$ GET RID OF FRACTIONS: $(x - \frac{7}{2} = 0)^2$

$2x - 7 = 0$

$\Rightarrow 2x - 7$ IS A FACTOR

$f(x) = (x + 4)(x + 5)(2x - 7)$

$f(x) = (x^2 + 5x + 4x + 20)(2x - 7)$

$f(x) = (x^2 + 9x + 20)(2x - 7)$

$f(x) = (x^2)(2x) + (x^2)(-7) + (9x)(2x) + (9x)(-7) + (20)(2x) + (20)(-7)$

$f(x) = 2x^3 - 7x^2 + 18x^2 - 63x + 40x - 140$

$f(x) = 2x^3 + 11x^2 - 23x - 140$