

Directions: Answer the following question(s).

- 1 A construction worker throws a water bottle out of the basement to his friend, who did not catch it. The equation below can be used to determine h , the height of the bottle in feet, based on t , the time in seconds since the bottle was thrown.

$$h = -16t^2 + 56t - 24$$

Based on the equation, when is the height of the thrown bottle equal to zero? Solve by factoring. Show your work.

Type your answer in the box below.

Web Only Interaction

Master ID: 2114848 Revision: 3

Rubric: 1 Point(s)

See Rubric.

- 2 The response is correct and complete. A level 2 response is characterized by:

- A correct answer with a correct explanation.

Sample Correct Answer:

$$0 = -16t^2 + 56t - 24$$

First, factor out -8 .

$$0 = -8(2t^2 - 7t + 3)$$

Then factor the expression inside the parentheses.

$$0 = -8(2t - 1)(t - 3)$$

Then set each parenthetical term equal to zero, and solve.

$$2t - 1 = 0; 2t = 1; t = 0.5$$

OR

$$t - 3 = 0; t = 3$$

- 1 The response is partially correct. A level 1 response is characterized by:

- A correct answer with an explanation that is incomplete or contains multiple minor errors, or
- A correct explanation with an incorrect or incomplete answer.

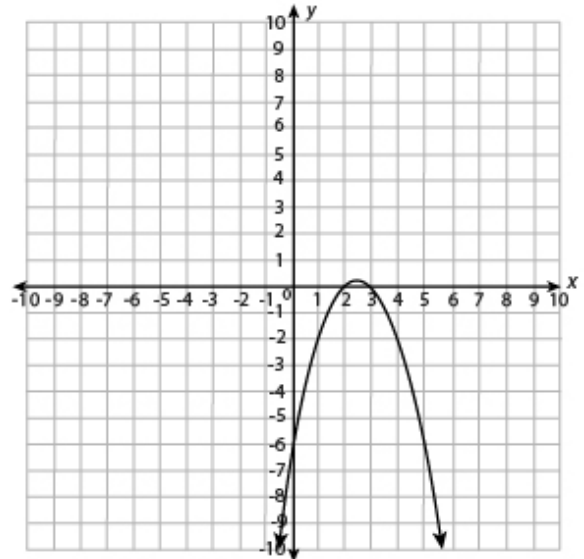
- 0 The response is completely incorrect, there is no response, or the response is off topic.

Standards:

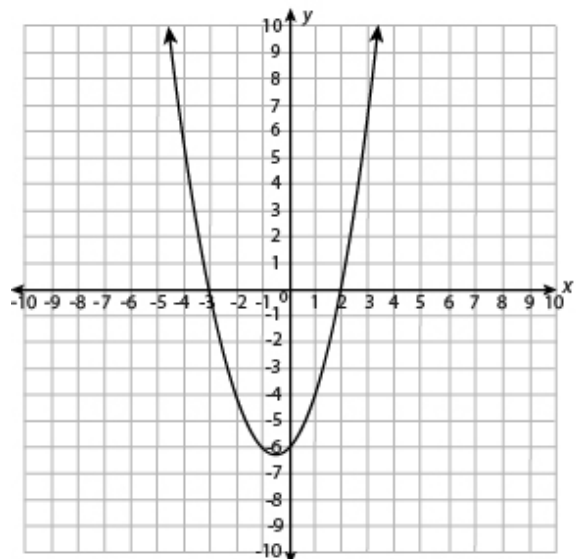
CCSS.Math.Content.HSA-SSE.B.3.a

- 2 Given the function $f(x) = (2 - x)(x - 3)$, which of these correctly identify a zero and a sketch of the graph of the function?

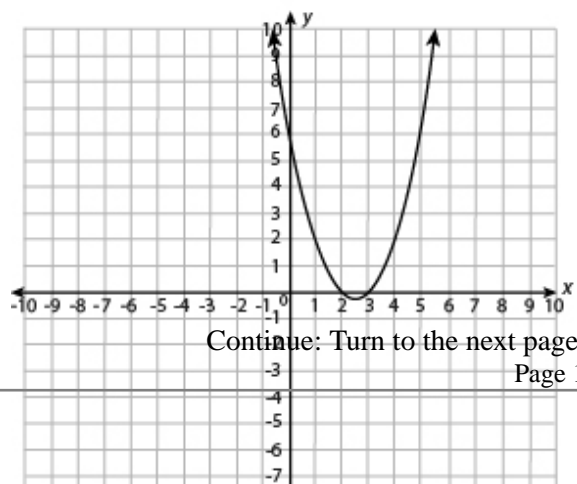
- A. $x = 3$,



- B. $x = -3$,



- C. $x = 3$,



Directions: Answer the following question(s).

Master ID: 2557944 Revision: 1
 Correct: A
 Rationale:
 A. The zeros of the function are 2 and 3 and the parabola opens down.
 B. This answer has a root at -3 instead of 3, and the parabola opens up instead of down.
 C. This answer has the correct roots, but the parabola should open down, not up.
 D. This answer has a root at -3 instead of 3.
 Standards:
 CCSS.Math.Content.HSA-APR.B.3

- 3 Miguel launches his model rocket. He times the rocket's flight from launch to landing. Miguel believes the function representing the relationship between the time in seconds and the rocket's height in feet is $h(t) = -50t^2 + 150t$. Use the zeros of the polynomial to determine the flight time of Miguel's rocket.
- A. 1.5 seconds
 B. 2.5 seconds
 C. 3.0 seconds
 D. 5.0 seconds

Master ID: 308063 Revision: 3
 Correct: C
 Rationale:
 A. The common factor of -50 is factored from the two terms, but the zeros are then found by mistakenly completing the square: $-50(t^2 + 3t + 9/4) = -50(t + 3/2)^2$. This is also the time when the rocket reaches its maximum height.
 B. This is the result of making an error when factoring the coefficients of the polynomial. The factored form is thought to be $-50(t^2 - 2.5t)$.
 C. The value of $h(t)$ at the beginning of the flight and at the end of the flight is 0. The duration of the flight can be found by determining the zeros of the polynomial $-50t^2 + 150t$. The polynomial can be factored to $-50(t^2 - 3t)$ or $-50t(t - 3)$. The rocket launched at 0 seconds and landed at 3 seconds, so the duration of the flight was 3 seconds.
 D. This is the result of not factoring the polynomial to find the zeros, but instead finding that 5 is a common factor of the coefficients and guessing it to be a reasonable flight duration.
 Standards:
 CCSS.Math.Content.HSA-APR.B.3

Directions: Answer the following question(s).

4 What are the zeros of this function?

$$f(x) = x^2 - 10x + 24$$

- A. $x = 2$ and $x = -12$
- B. $x = 4$ and $x = 6$
- C. $x = -4$ and $x = -6$
- D. $x = -2$ and $x = 12$

Master ID:	307972	Revision:	3
Correct:	B		
Rationale:			
A.	This is the result of factoring incorrectly to get $f(x) = (x - 2)(x + 12)$.		
B.	The trinomial can be factored to get $f(x) = (x - 4)(x - 6)$. Setting $(x - 4)(x - 6) = 0$ and solving gives the x -intercepts: $x = 4$ and $x = 6$.		
C.	This is the result of factoring correctly, but making sign errors when solving $(x - 4)(x - 6) = 0$.		
D.	This is the result of factoring incorrectly to get $f(x) = (x + 2)(x - 12)$.		
Standards:			
CCSS.Math.Content.HSA-SSE.B.3.a			

5 Josh graphed the function $f(x) = 4x^2 - 12x - 40$. What are the x -intercepts of the graph?

- A. $(4, 0)$ and $(5, 0)$
- B. $(2, 0)$ and $(-5, 0)$
- C. $(-2, 0)$ and $(4, 0)$
- D. $(-2, 0)$ and $(5, 0)$

Master ID:	307969	Revision:	4
Correct:	D		
Rationale:			
A.	This results from factoring correctly to get $f(x) = 4(x + 2)(x - 5)$, but using the 4 as one of the solutions and ignoring $x = -2$.		
B.	This results from factoring incorrectly to get $f(x) = 4(x - 2)(x + 5)$, or factoring correctly but making sign errors when solving for x .		
C.	This results from factoring correctly to get $f(x) = 4(x + 2)(x - 5)$, but using the 4 as one of the solutions and ignoring $x = 5$.		
D.	The function can be factored to get $f(x) = 4(x^2 - 3x - 10) = 4(x + 2)(x - 5)$. Setting this equal to 0 and solving gives the x -intercepts: $x = -2$ and $x = 5$.		
Standards:			
CCSS.Math.Content.HSA-SSE.B.3.a			

Directions: Answer the following question(s).

6 What are the zeros of the function below?

$$h(x) = 2x^2 - 12x + 18$$

- A. only $x = 3$
- B. only $x = -3$
- C. $x = -3$ and $x = 3$
- D. $x = 2$ and $x = 3$

Master ID:	307968	Revision:	3
Correct:	A		
Rationale:			
A.	The function can be factored to get $h(x) = 2(x^2 - 6x + 9) = 2(x - 3)(x - 3)$. Setting this equal to 0 and solving produces only one zero: $x = 3$.		
B.	This is the result of factoring correctly to get $h(x) = 2(x - 3)(x - 3)$, but making a sign error when solving for x .		
C.	This results from factoring incorrectly to get $h(x) = 2(x + 3)(x - 3)$.		
D.	This is the result of factoring correctly to get $h(x) = 2(x - 3)(x - 3)$, but using the 2 as a solution in addition to $x = 3$.		
Standards:			
CCSS.Math.Content.HSA-SSE.B.3.a			

7 What are the zeros of the function below?

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

- A. -2 and 8
- B. -4 and 2
- C. -8 and 2
- D. -2 and 4

Master ID:	307966	Revision:	3
Correct:	B		
Rationale:			
A.	This results from using the opposites of the constants in the expression $x^2 + 2x - 8$.		
B.	Set the function equal to zero and solve by factoring as follows: $(x + 4)(x - 2) = 0 \rightarrow x + 4 = 0$ or $x - 2 = 0 \rightarrow x = -4$ or $x = 2$.		
C.	This results from using the constants in the expression $x^2 + 2x - 8$.		
D.	This answer results from making sign errors when solving the equations $x + 4 = 0$ and $x - 2 = 0$, or from factoring incorrectly as $(x - 4)(x + 2)$.		
Standards:			
CCSS.Math.Content.HSA-SSE.B.3.a			

Directions: Answer the following question(s).

- 8 A faucet takes 6 minutes longer to fill an empty bathtub than a drain takes to empty the full bathtub. When the faucet is on and the drain is open, the full tub empties in 36 minutes. The quadratic equation below can be used to find t , the number of minutes the drain takes to empty the full bathtub when the faucet is on.

$$t^2 + 6t - 216 = 0$$

Which equation is equivalent to the above equation and BEST reveals the number of minutes the drain takes to empty the full bathtub?

- A. $(t + 18)(t - 12) = 0$
B. $(t + 3)^2 - 207 = 0$
C. $(t + 3)^2 - 225 = 0$
D. $(t + 12)(t - 18) = 0$

Master ID: 549001 Revision: 3

Correct: A

Rationale:

- A. $t^2 + 6t - 216 = 0$ is equivalent to $(t + 18)(t - 12) = 0$, and this last equation reveals that the drain takes 12 minutes to empty the bathtub (discard -18 minutes since time is positive).
B. This is the result of incorrectly completing the square by adding 9 to -216 , instead of subtracting 9 from -216 , for the constant term.
C. This is the result of correctly completing the square but choosing a form that does not best reveal the number of minutes the drain takes to empty the full bathtub.
D. This is the result of switching the signs in the factors. Although this equation reveals the 12, it is not equivalent to the given equation.

Standards:

CCSS.Math.Content.HSA-SSE.B.3.a