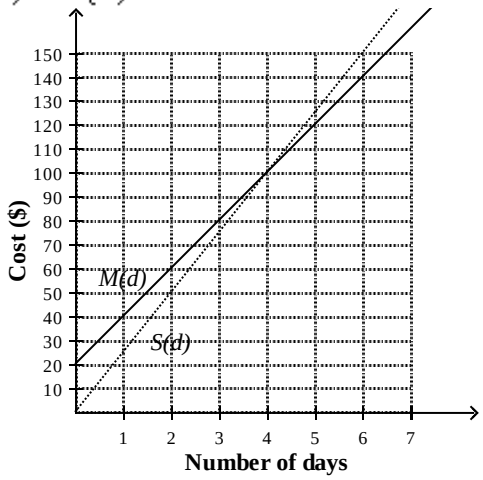
F.IF.4 and A.CED.2

Multiple Choice
Identify the choice that best completes the statement or answers the question.

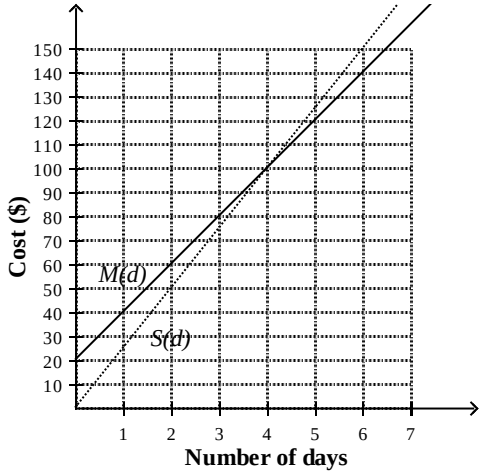
____ 1. The Ybarra family is renting a car for a few days. Meinke Rentals charges $20 per day, plus a fixed cleaning fee of $20. The function $M(d) = 20d + 20$ represents the cost to rent a car from Meinke Rentals for *d* days. SmartRent charges $25 per day. The function $S(d) = 25d$ represents the cost to rent a car from SmartRent for *d* days. Graph $M(d)$ and $S(d)$ on the same coordinate plane and describe the transformation that takes $M(d)$ to $S(d)$.

a.



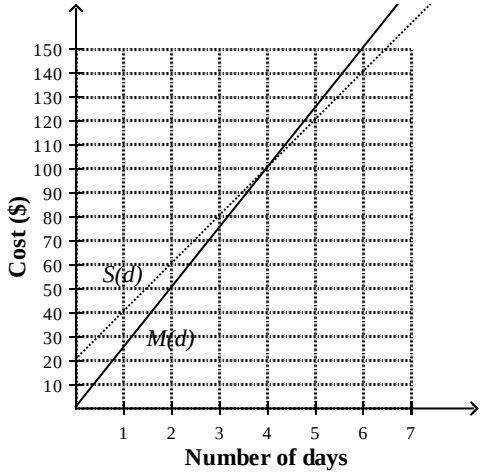
A vertical shift down 20 units, followed by a vertical stretch by a factor of 1.25.

b.



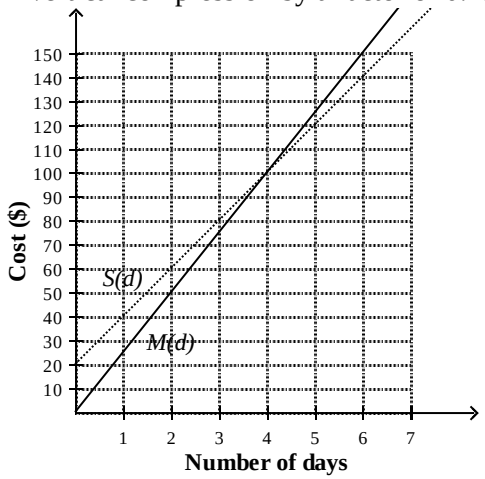
A vertical stretch by a factor of 1.25, followed by a vertical shift down 20 units.

c.



A vertical compression by a factor of 0.75, followed by a vertical shift up 20 units.

d.



A vertical shift up 20 units, followed by a vertical compression by a factor of 0.75.

____ 2. The water level of a river is 34 feet and is receding at a rate of 0.5 foot per day. Write an equation that represents the water level, *w*, after *d* days. Identify the slope and *y*-intercept and describe their meanings. In how many days will the water level be 26 feet?

a. $w = 34d + 0.5$
The slope is 34, and this is the rate at which the water level is receding. The *y*-intercept is 0.5, and this is the water level after 0 days. In 16 days, the water level will be 26 feet.

b. $w = -0.5d - 34$
The slope is -0.5, and this is the rate at which the water level is receding. The *y*-intercept is -34, and this is the water level after 0 days. In 120 days, the water level will be 26 feet.

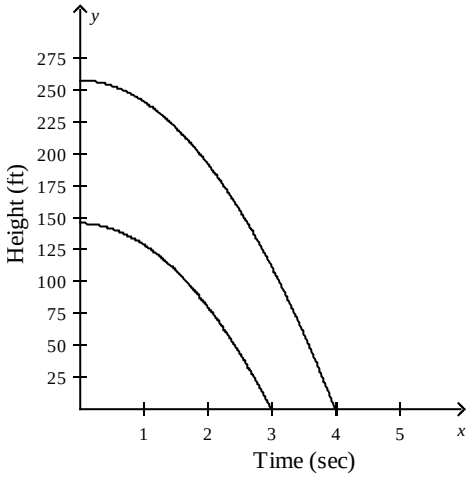
c. $w = 34d - 0.5$
The slope is 34, and this is the rate at which the water level is receding. The *y*-intercept is -0.5, and this is the water level after 0 days. In 120 days, the water level will be 26 feet.

d. $w = -0.5d + 34$
The slope is -0.5, and this is the rate at which the water level is receding. The *y*-intercept is 34, and this is the water level after 0 days. In 16 days, the water level will be 26 feet.

____ 3. Two identical rubber balls are dropped from different heights. Ball 1 is dropped from a height of 144 feet, and the ball 2 is dropped from a height of 256 feet. Write and graph a function for the height of each ball. Then use the graphs to tell when each ball will reach the ground.

a. Ball 1: $h_1(t) = -16t^2 + 144$

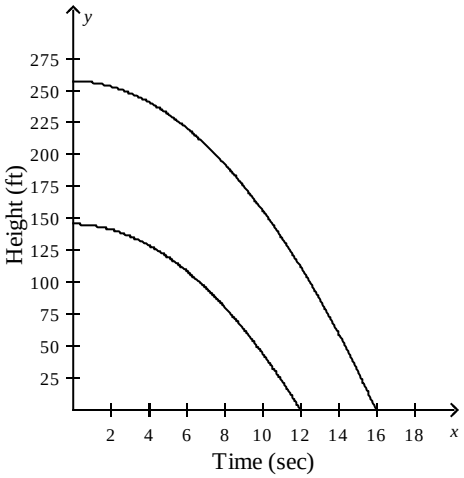
Ball 2: $h_2(t) = -16t^2 + 256$



Ball 1 reaches the ground in 3 sec.
Ball 2 reaches the ground in 4 sec.

b. Ball 1: $h_1(t) = 144 - t^2$

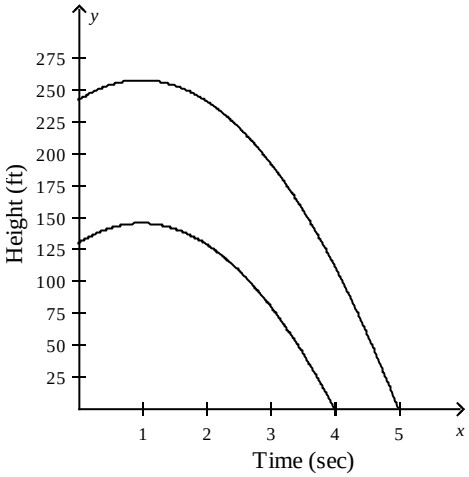
Ball 2: $h_2(t) = 256 - t^2$



Ball 1 reaches the ground in 12 sec.
Ball 2 reaches the ground in 16 sec.

c. Ball 1: $h_1(t) = -16t^2 + 144$

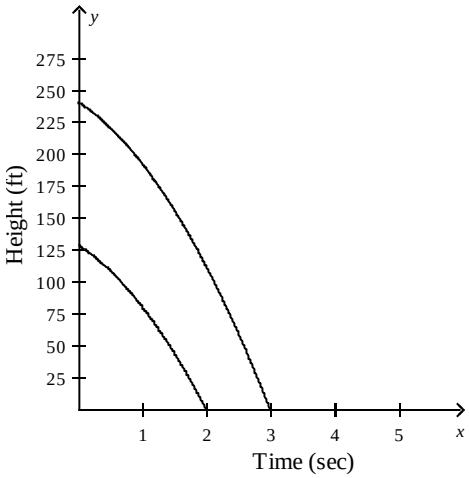
Ball 2: $h_2(t) = -16t^2 + 256$



Ball 1 reaches the ground in 4 sec.
Ball 2 reaches the ground in 5 sec.

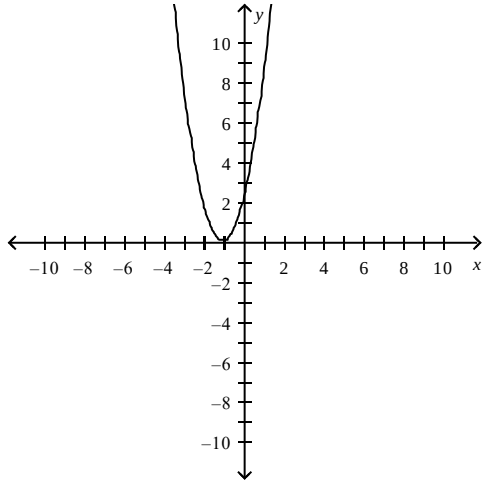
d. Ball 1: $h_1(t) = -16t^2 + 144$

Ball 2: $h_2(t) = -16t^2 + 256$



Ball 1 reaches the ground in 2 sec.
Ball 2 reaches the ground in 3 sec.

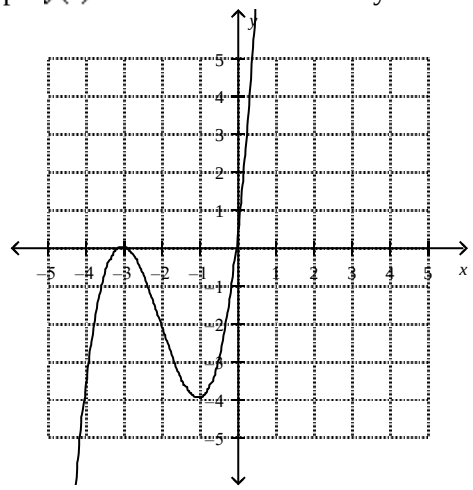
____ 4. Find the axis of symmetry of the parabola.



a. $x = -1$
b. $x = 0$
c. $y = -1$
d. $y = 0$

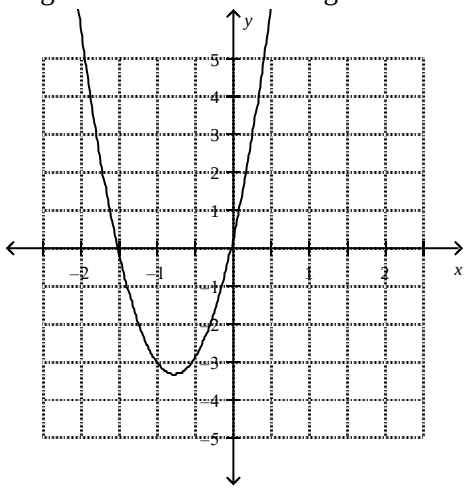
____ 5. Graph $f(x) = x^3 + 6x^2 + 9x$. Identify the intercepts and give the domain and range.

a.



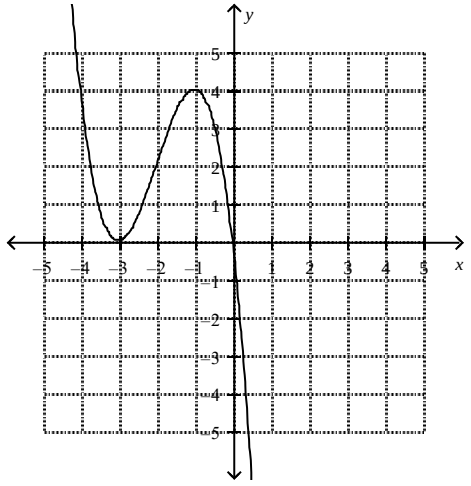
The *x*-intercepts are -3 and 0. The *y*-intercept is 0. The domain and range are all real numbers.

c.



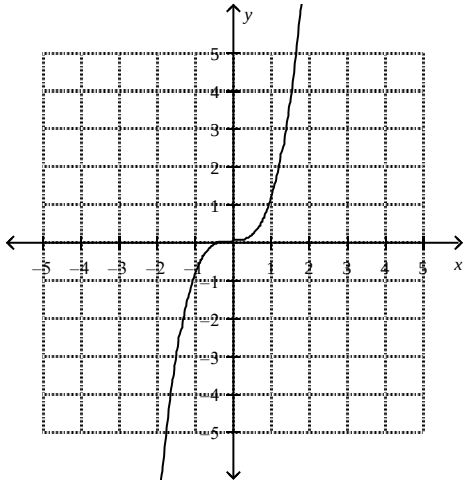
The *x*-intercepts are -1.5 and 0. The *y*-intercept is 0. The domain is all real numbers. The range is approximately $y \geq -3.25$.

b.



The x-intercepts are -3 and 0. The y-intercept is 0. The domain and range are all real numbers.

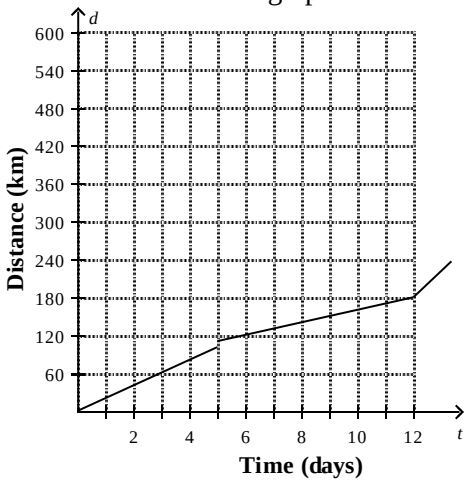
d.



The x- and y-intercepts are both zero. The domain and range are all real numbers.

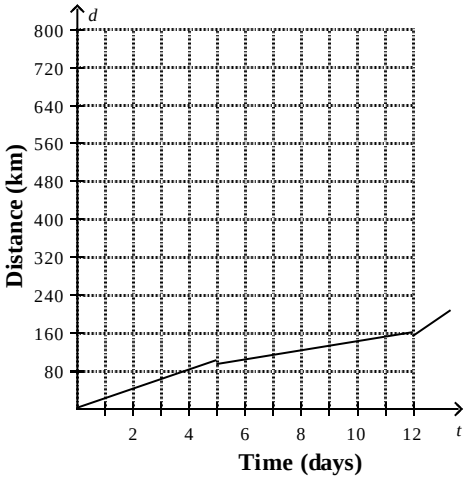
____ 6. Sydney participated in a cross-country skiing race of 250 kilometers. He covered 100 kilometers in the first 5 days. Due to a storm, he only covered 70 kilometers in the next week. A burst of good weather allowed him to finish the race in just 2 more days. Sketch a graph of distance versus time for Sydney's race. Then, write a piecewise function for the graph.

a.



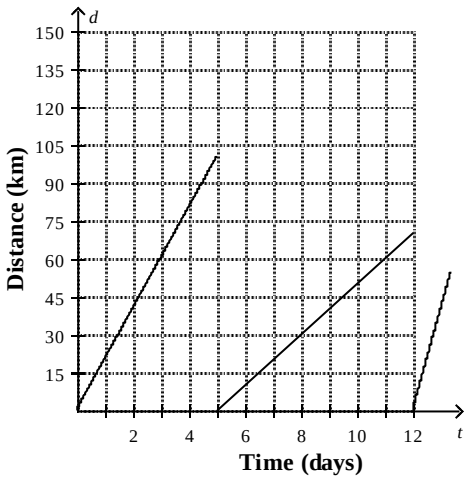
$$f(t) = \begin{cases} 20t & 0 \le t \le 5 \\ 10t & 5 < t \le 12 \\ 40t & 12 < t \le 14 \end{cases}$$

c.



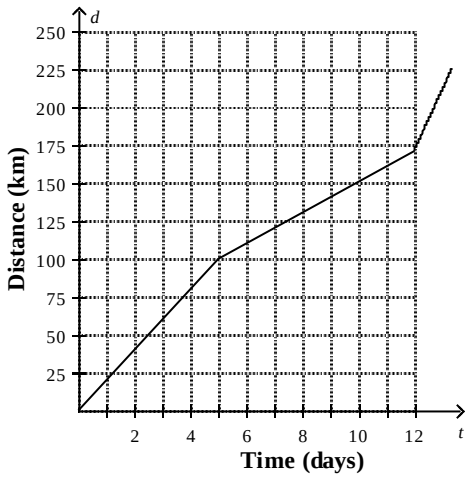
$$f(t) = \begin{cases} 20t & 0 \le t \le 5 \\ 10t + 100 & 5 < t \le 12 \\ 40t + 170 & 12 < t \le 14 \end{cases}$$

b.



$$f(t) = \begin{cases} 20t & 0 \le t \le 5 \\ 10(t-5) & 5 < t \le 12 \\ 40(t-12) & 12 < t \le 14 \end{cases}$$

d.



$$f(t) = \begin{cases} 20t & 0 \le t \le 5 \\ 10t + 50 & 5 < t \le 12 \\ 40t - 310 & 12 < t \le 14 \end{cases}$$

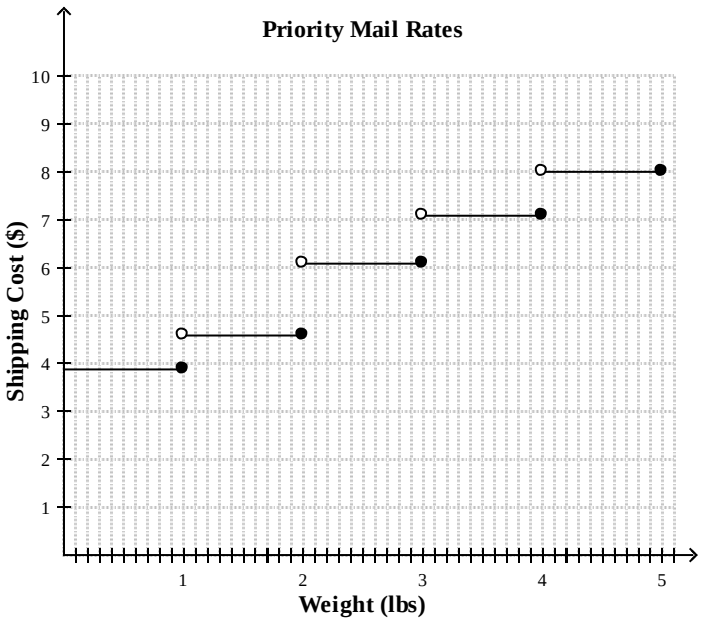
____ 7. The distance *d* in meters traveled by a skateboard on a ramp is related to the time traveled *t* in seconds. This is modeled by the function: $d(t) = 4.9t^2 - 2.3t + 5$. What is the maximum distance the skateboard can travel, and at what time would it achieve this distance? Round your answers to the nearest hundredth.

a. 5.00 meters in 0 seconds
b. 0.23 meters at 4.73 seconds
c. 4.73 meters at 0.23 seconds
d. 5.00 meters at 0.47 seconds

____ 8. Write the function $f(x) = -5x^2 - 60x - 181$ in vertex form, and identify its vertex.

a. $f(x) = (x + 12)^2 - 181$;
vertex: (–12, –181)
c. $f(x) = (x + 6)^2 - 1$;
vertex: (–6, –1)
b. $f(x) = -5(x + 6)^2 - 1$;
vertex: (–6, –1)
d. $f(x) = -5(x + 12)^2 - 181$;
vertex: (–12, –181)

____ 9. Create a table and a verbal description to represent the graph.



a.

Weight (lb)	Shipping Cost ($)
0 – 1.0	3.85
1.0 – 2.0	4.55
2.0 – 3.0	6.05
3.0 – 4.0	7.05
4.0 – 5.0	8.00

The cost to ship a package Priority Mail is $3.85 for packages not over 1 pound, $4.55 for packages weighing 1.0 to 2.0 pounds, $6.05 for packages weighing 2.0 to 3.0 pounds, $7.05 for packages weighing 3.0 to 4.0 pounds, and $8.00 for packages weighing 4.0 to 5.0 pounds.

b.

Weight (lb)	Shipping Cost ($)
0 – 1.0	3.85
1.1 – 2.0	4.55
2.1 – 3.0	6.05
3.1 – 4.0	7.05
4.1 – 5.0	8.00

The cost to ship a package Priority Mail is $3.85 for packages not over 1.0 pound, $4.55 for packages weighing 1.1 to 2.0 pounds, $6.05 for packages weighing 2.1 to 3.0 pounds, $7.05 for packages weighing 3.1 to 4.0 pounds, and $8.00 for packages weighing 4.1 to 5.0 pounds.

c.

Weight (lb)	Shipping Cost ($)
0 – 1.1	3.85
1.1 – 2.1	4.55
2.1 – 3.1	6.05
3.1 – 4.1	7.05
4.1 – 5.1	8.00

The cost to ship a package Priority Mail is $3.85 for packages under 1.1 pounds, $4.55 for packages weighing 1.1 to 2.1 pounds, $6.05 for packages weighing 2.1 to 3.1 pounds, $7.05 for packages weighing 3.1 to 4.1 pounds, and $8.00 for packages weighing 4.1 to 5.1 pounds.

d.

Weight (lb)	Shipping Cost ($)
0 – 0.9	3.85
1.0 – 1.9	4.55
2.0 – 2.9	6.05
3.0 – 3.9	7.05
4.0 – 4.9	8.00

The cost to ship a package Priority Mail is $3.85 for packages under 1 pound, $4.55 for packages weighing 1.0 to 1.9 pounds, $6.05 for packages weighing 2.0 to 2.9 pounds, $7.05 for packages weighing 3.0 to 3.9 pounds, and $8.00 for packages weighing 4.0 to 4.9 pounds.

____ 10. During the eruption of Mount St. Helens in 1980, debris was ejected at a speed of over 440 feet per second (300 miles per hour). The height in feet of a rock ejected at angle of 75° is given by the equation $y(t) = -16t^2 + 425t + 8200$, where *t* is the time in seconds after the eruption. The rock's horizontal distance in feet from the point of ejection is given by $x(t) = 113t$. Assuming the elevation of the surrounding countryside is 0 feet, what is the horizontal distance from the point of ejection to the where the rock would have landed? Round your answer to the nearest foot.

a. 2,234 ft
b. 8,932 ft
c. 4,467 ft.
d. 1,117 ft

F.IF.4 and A.CED.2
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1 REF: 14787272-4683-11df-9c7d-001185f0d2ea
   OBJ: Application NAT: NT.CCSS.MTH.10.9-12.A.CED.2 | NT.CCSS.MTH.10.9-12.F.BF.3
   TOP: Transforming Linear Functions KEY: transform linear functions
   DOK: DOK 2
2. ANS: D PTS: 1 REF: 10d8fca6-4683-11df-9c7d-001185f0d2ea
   OBJ: Application NAT: NT.CCSS.MTH.10.9-12.F.IF.6 | NT.CCSS.MTH.10.9-12.A.CED.2
   STA: CA.CACS.MTH.97.AL1.AI.6.0 LOC: MTH.C.10.07.02.02.01.002 | MTH.C.10.07.02.02.01.003
   TOP: Slope-Intercept Form KEY: slope | intercept | application
   DOK: DOK 2
3. ANS: A PTS: 1 REF: 121f78d2-4683-11df-9c7d-001185f0d2ea
   OBJ: Application
   NAT: NT.CCSS.MTH.10.9-12.A.CED.2 | NT.CCSS.MTH.10.9-12.F.IF.4 |
   NT.CCSS.MTH.10.9-12.F.IF.7 | NT.CCSS.MTH.10.9-12.F.BF.1TOP: Transforming Quadratic Functions
   KEY: quadratic | projectile | free fall DOK: DOK 2
4. ANS: A PTS: 1 REF: 12112aaa-4683-11df-9c7d-001185f0d2ea
   OBJ: Finding the Axis of Symmetry by Using Zeros NAT: NT.CCSS.MTH.10.9-12.F.IF.4
   TOP: Characteristics of Quadratic Functions KEY: quadratic
   DOK: DOK 2
5. ANS: A PTS: 1 REF: 12459e92-4683-11df-9c7d-001185f0d2ea
   OBJ: Graphing Cubic Functions
   NAT: NT.CCSS.MTH.10.9-12.F.IF.4 | NT.CCSS.MTH.10.9-12.F.IF.7.c
   LOC: MTH.C.10.07.07.008 | MTH.C.10.07.07.009 | MTH.C.10.07.07.03.002 | MTH.C.10.07.07.03.011
   TOP: Cubic Functions and Equations KEY: cubic | domain and range | intercepts
   DOK: DOK 2
6. ANS: D PTS: 1 REF: 1713e002-4683-11df-9c7d-001185f0d2ea
   OBJ: Application NAT: NT.CCSS.MTH.10.9-12.F.IF.4 | NT.CCSS.MTH.10.9-12.A.CED.2
   LOC: MTH.C.10.07.04.01.006 | MTH.C.10.07.04.01.008 TOP: Piecewise Functions
   DOK: DOK 2
7. ANS: C PTS: 1 REF: 156b7c0a-4683-11df-9c7d-001185f0d2ea
   OBJ: Application NAT: NT.CCSS.MTH.10.9-12.F.IF.4 LOC: MTH.C.10.07.06.01.006
   TOP: Properties of Quadratic Functions in Standard Form KEY: maximum | minimum
   DOK: DOK 2
8. ANS: B PTS: 1 REF: 1579f142-4683-11df-9c7d-001185f0d2ea
   OBJ: Writing a Quadratic Function in Vertex Form NAT: NT.CCSS.MTH.10.9-12.F.IF.4
   STA: CA.CACS.MTH.97.AL2.AII.9.0 LOC: MTH.C.10.07.06.02.003 | MTH.C.10.07.06.04.002
   TOP: Completing the Square DOK: DOK 2
9. ANS: B PTS: 1 REF: 170f1b4a-4683-11df-9c7d-001185f0d2ea
   OBJ: Application NAT: NT.CCSS.MTH.10.9-12.F.IF.4 TOP: Piecewise Functions
   DOK: DOK 3
10. ANS: C PTS: 1 REF: 15883f6a-4683-11df-9c7d-001185f0d2ea
    OBJ: Application NAT: NT.CCSS.MTH.10.9-12.A.REI.4 | NT.CCSS.MTH.10.9-12.F.IF.4
    STA: CA.CACS.MTH.97.AL2.AII.8.0 LOC: MTH.C.10.06.04.01.005
    TOP: The Quadratic Formula KEY: quadratic formula
    DOK: DOK 3