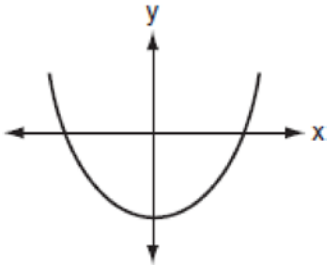
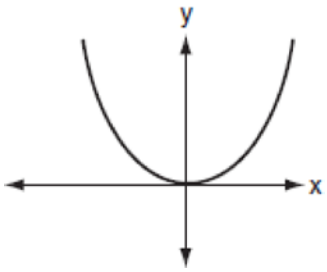
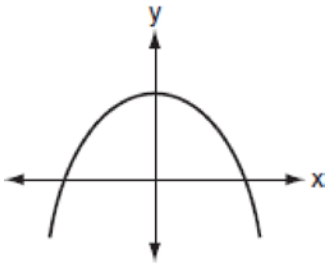
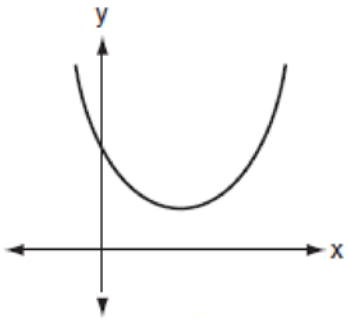
A.REI.B.4: Using the Discriminant 1

1 Which graph represents a quadratic function with a negative discriminant?

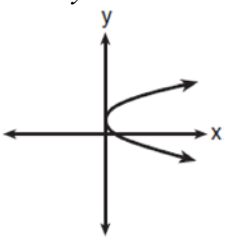
1) 

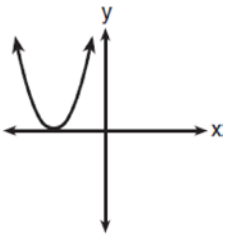
2) 

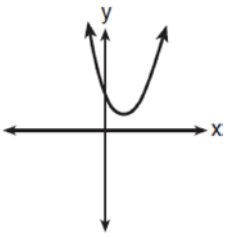
3) 

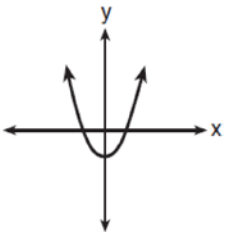
4) 

2 If zero is the value of the discriminant of the equation $ax^2 + bx + c = 0$, which graph best represents $y = ax^2 + bx + c$?

1) 

2) 

3) 

4) 

3 If the roots of $ax^2 + bx + c = 0$ are real, rational, and equal, what is true about the graph of the function $y = ax^2 + bx + c$?

1) It intersects the x-axis in two distinct points.
2) It lies entirely below the x-axis.
3) It lies entirely above the x-axis.
4) It is tangent to the x-axis.

4 Which statement must be true if a parabola represented by the equation $y = ax^2 + bx + c$ does *not* intersect the *x*-axis?
1) $b^2 - 4ac = 0$
2) $b^2 - 4ac < 0$
3) $b^2 - 4ac > 0$, and $b^2 - 4ac$ is a perfect square.
4) $b^2 - 4ac > 0$, and $b^2 - 4ac$ is not a perfect square.

5 Which is a true statement about the graph of the equation $y = x^2 - 7x - 60$?
1) It is tangent to the *x*-axis.
2) It does not intersect the *x*-axis.
3) It intersects the *x*-axis in two distinct points that have irrational coordinates.
4) It intersects the *x*-axis in two distinct points that have rational coordinates.

6 Jacob is solving a quadratic equation. He executes a program on his graphing calculator and sees that the roots are real, rational, and unequal. This information indicates to Jacob that the discriminant is
1) zero
2) negative
3) a perfect square
4) not a perfect square

7 If the roots of a quadratic equation are real, irrational, and unequal, the discriminant could have a value of
1) 1
2) 0
3) 8
4) –6

8 The roots of a quadratic equation are real, rational, and equal when the discriminant is
1) –2
2) 2
3) 0
4) 4

9 Which number is the discriminant of a quadratic equation whose roots are real, unequal, and irrational?
1) 0
2) –5
3) 7
4) 4

10 Which equation has real, rational, and unequal roots?
1) $x^2 + 10x + 25 = 0$
2) $x^2 - 5x + 4 = 0$
3) $x^2 - 3x + 1 = 0$
4) $x^2 - 2x + 5 = 0$

11 Which equation has roots that are real, rational, and unequal?
1) $x^2 + x + 1 = 0$
2) $x^2 - 4x + 4 = 0$
3) $x^2 - 4 = 0$
4) $x^2 - 2 = 0$

12 Which equation has rational roots?
1) $x^2 + 8x - 8 = 0$
2) $x^2 + 8x + 9 = 0$
3) $2x^2 + 4x + 5 = 0$
4) $3x^2 + 8x + 4 = 0$

13 How many real-number solutions does $4x^2 + 2x + 5 = 0$ have?
1) one
2) two
3) zero
4) infinitely many

14 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

15 Is the solution to the quadratic equation written below rational or irrational? Justify your answer.

$$0 = 2x^2 + 3x - 10$$

16 Given the function $y = f(x)$, such that the entire graph of the function lies above the *x*-axis. Explain why the equation $f(x) = 0$ has no real solutions.

A.REI.B.4: Using the Discriminant 1
Answer Section

1 ANS: 4 REF: 080620b
2 ANS: 2 REF: 011020b
3 ANS: 4
If the roots of the quadratic are equal, the graph of the function intersects the *x*-axis only once.

REF: 010313b
4 ANS: 2
If a parabola does not intersect the *x*-axis, the roots are imaginary, and the discriminant is less than 0.

REF: 010416b
5 ANS: 4
$b^2 - 4ac = (-7)^2 - 4(1)(-60) = 289$

REF: 010713b
6 ANS: 3 REF: 060103b
7 ANS: 3 REF: 061623a2
8 ANS: 3 REF: 010201b
9 ANS: 3 REF: 060717b
10 ANS: 2
$(-5)^2 - 4(1)(4) = 9$

REF: 011506a2
11 ANS: 3
$0^2 - 4(1)(-4) = 16$

REF: 010817b
12 ANS: 4 REF: 089828siii
13 ANS: 3
$b^2 - 4ac = 2^2 - 4(4)(5) = -76$

REF: 061822ai
14 ANS:
$b^2 - 4ac = (-2)^2 - 4(1)(5) = 4 - 20 = -16$ None

REF: 081529ai
15 ANS:
Irrational, as 89 is not a perfect square. $3^2 - 4(2)(-10) = 89$

REF: 081828ai

16 ANS:
Since the graph lies entirely above the x-axis, there is no point on the graph where $y = 0$.

REF: 080525b