A2.A.2: Use the discriminant to determine the nature of the roots of a quadratic equation

1. 010201b, P.I. A2.A.2
The roots of a quadratic equation are real, rational, and equal when the discriminant is
[A] -2 [B] 0 [C] 2 [D] 4

2. 060717b, P.I. A2.A.2
Which number is the discriminant of a quadratic equation whose roots are real, unequal, and irrational?
[A] -5 [B] 7 [C] 0 [D] 4

3. 060103b, P.I. A2.A.2
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
[A] negative [B] not a perfect square
[C] a perfect square [D] zero

4. 080106b, P.I. A2.A.2
The roots of the equation $x^2 - 3x - 2 = 0$ are
[A] real, rational, and unequal
[B] imaginary
[C] real, rational, and equal
[D] real, irrational, and unequal

5. 060910b, P.I. A2.A.2
The roots of the equation $x^2 - 5x + 1 = 0$ are
[A] real, irrational, and unequal
[B] imaginary
[C] real, rational, and equal
[D] real, rational, and unequal

6. 080814b, P.I. A2.A.2
The roots of the equation $5x^2 - 2x + 1 = 0$ are
[A] real, rational, and unequal
[B] imaginary
[C] real, rational, and equal
[D] real, irrational, and unequal

7. 010513b, P.I. A2.A.2
The roots of the equation $2x^2 - 8x - 4 = 0$ are
[A] real, rational, and unequal
[B] real, rational, and equal
[C] real, irrational, and unequal
[D] imaginary

8. 060219b, P.I. A2.A.2
The roots of the equation $2x^2 - x = 4$ are
[A] real, rational, and equal
[B] imaginary
[C] real, rational, and unequal
[D] real and irrational

9. 010614b, P.I. A2.A.2
The roots of the equation $2x^2 - 5 = 0$ are
[A] real, rational, and equal
[B] real and irrational
[C] real, rational, and unequal
[D] imaginary

10. 010817b, P.I. A2.A.2
Which equation has roots that are real, rational, and unequal?
[A] $x^2 - 2 = 0$ [B] $x^2 + x + 1 = 0$
[C] $x^2 - 4x + 4 = 0$ [D] $x^2 - 4 = 0$

11. 080211b, P.I. A2.A.2
Which equation has imaginary roots?

[A] $x^2 + x + 1 = 0$ [B] $x^2 - 2 = 0$

[C] $x^2 - 1 = 0$ [D] $x^2 - x - 1 = 0$

12. 060518b, P.I. A2.A.2
Which equation has imaginary roots?

[A] $x(x + 6) = -10$ [B] $(2x + 1)(x - 3) = 7$

[C] $x(5 + x) = 8$ [D] $x(5 - x) = -3$

13. 080516b, P.I. A2.A.2
For which positive value of m will the equation $4x^2 + mx + 9 = 0$ have roots that are real, equal, and rational?

[A] 9 [B] 12 [C] 3 [D] 4

14. 060307b, P.I. A2.A.2
The roots of the equation $ax^2 + 4x = -2$ are real, rational, and equal when a has a value of

[A] 3 [B] 4 [C] 2 [D] 1

15. 080320b, P.I. A2.A.2
In the equation $ax^2 + 6x - 9 = 0,$ imaginary roots will be generated if

[A] $a < 1$, only [B] a > -1, only

[C] $-1 < a < 1$ [D] $a < -1$

16. 080411b, P.I. A2.A.2
The equation $2x^2 + 8x + n = 0$ has imaginary roots when n is equal to

[A] 8 [B] 6 [C] 4 [D] 10

17. 060423b, P.I. A2.A.2
Find all values of k such that the equation $3x^2 - 2x + k = 0$ has imaginary roots.

18. 010416b, P.I. A2.A.2
Which statement must be true if a parabola represented by the equation $y = ax^2 + bx + c$ does not intersect the x-axis?

[A] $b^2 - 4ac = 0$ [B] $b^2 - 4ac < 0$

[C] $b^2 - 4ac > 0,$ and $b^2 - 4ac$ is a perfect square.

[D] $b^2 - 4ac > 0,$ and $b^2 - 4ac$ is not a perfect square.

19. 010313b, P.I. A2.A.2
If the roots of $ax^2 + bx + c = 0$ are real, rational, and equal, what is true about the graph of the function $y = ax^2 + bx + c$?

[A] It lies entirely above the x-axis.

[B] It lies entirely below the x-axis.

[C] It intersects the x-axis in two distinct points.

[D] It is tangent to the x-axis.

20. 010713b, P.I. A2.A.2
Which is a true statement about the graph of the equation $y = x^2 - 7x - 60$?

[A] It does not intersect the x-axis.

[B] It is tangent to the x-axis.

[C] It intersects the x-axis in two distinct points that have rational coordinates.

[D] It intersects the x-axis in two distinct points that have irrational coordinates.

A2.A.2: Use the discriminant to determine the nature of the roots of a quadratic equation

[1] B

[2] B

[3] C

[4] D

[5] A

[6] B

[7] C

[8] D

[9] B

[10] D

[11] A

[12] A

[13] B

[14] C

[15] D

[16] D

[2] $k > \frac{1}{3}$, and appropriate work is shown, such as the solution of $4 - 4(3)(k) < 0$.
[1] Appropriate work is shown, but one conceptual error or one computational error is made.
or [1] Appropriate work is shown, but the answer is written as $k < \frac{1}{3}$.
or [1] $k > \frac{1}{3}$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[17]

[18] B

[19] D

[20] C