MATHS

BOOKS - KAPLAN INC MATHS (ENGLISH)

QUADRATICS

How Much Do You Know

1. Which of the following linear expression divides evenly into $6x^2 + 7x - 20$?

A. $3x - 10$

B. $3x - 5$

C. $3x - 4$

D. $3x - 2$

Answer: C

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2. $x^2 - 10x - 7$

Which of the following expression is equivalent to the expression above ?

A. $(x - 5)^2 - 32$

B. $(x-5)^2+32$

C. $(x+5)^2-32$

D. $(x+5)^2+32$

Answer: A

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3. In the equation above, k is a constant. For which of the following values f k does the equation have at least one re3al solution ?

A. 2

B. 3

C. 4

D. 5

Answer: A

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4.

Which of the following could be the equation of the graph shown ?

A. $y = 2x + 10$

B. $y = -x^2 \frac{+3}{2} + 10$

C. $y = -(x-2)(x+5)$

D. $y = -(x+2)(x-5)$

Answer: D

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5. The x-coordinates of the solutions to a system of equations are 3.5 and 6. Which of the following could be the system ?

A. $\begin{cases} y = x + 3.5 \\ y = x^2 + 6 \end{cases}$

B. $\begin{cases} y = x - 7 \\ y = -(x-6)^2 \end{cases}$

C. $\begin{cases} y = \frac{1}{2}x + 3 \\ y = -(x-5)^2 + 7 \end{cases}$

D. $\begin{cases} y = \frac{1}{2}x + 7 \\ y = -(x-6)^2 + 3.5 \end{cases}$

Answer: C

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Try On Your Own

1. Which of the following equivalent form of the expression $(6-5x)(15x-11)$?

A. $-75x^2+35x-66$

B. $-75x^2+145x-66$

C. $90x^2-141x+35$

D. $90x^2+9x+55$

Answer: B

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2. Which of the following is equivalent to $\frac{x^2-10x+25}{3x^2-75}$?`

A. $\frac{3(x-5)}{(x+5)}$

B. $\frac{3(x+5)}{(x-5)}$

C. $\frac{(x-5)}{3(x+5)}$

D. $\frac{(x+5)}{3(x-5)}$

Answer: C

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3. For what positive value of x is the equation $\frac{3}{2x^2+4x-6}=0$ underfined ?

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4. $3x^2 + 9x = 54$

What is the sum of the roots of the equation above ?

A. -6

B. -3

C. 3

D. 6

Answer: B

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5. Which of the following functions is equivalent to thte function above ?

A. $f(x) = (x - 5)^2$

B. $f(x) = x^2 + 10.28x + 5.42$

C. $f(x) = 0.61x^2 + 0.14x + 25$

D.

$$f(x) = 1.3(x - 3)^2 = 0.69x^2 + 0.14x + 9.79$$

Answer: A

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6. For all a and b, what is the sum of $(a-b)^2$ and $(a+b)^2$?

A. $2a^2$

B. $2a^2 - 2b^2$

C. $2sa^2 + 2b^2$

D. $2a^2 + 4ab + 2b^2$

Answer: C

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7. What is the positive difference between the roots of the equation $y = \frac{1}{3}x^2 - 2x + 3$?

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8. $f(x)\frac{3}{(x-7)^2 + 6(x-7) + 9}$

For which value of x is the function f (x) underfined ?

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9. Suppose $a^2 + 2ab + b^2 = c^2$ and $c - b = 4$.

Assuming $c > 0$, which is the value of a ?

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10. $2x^2 - 28x + 98 = a(x - b)^2$

In the expression above, $a > 1$ and both a and b are constants. Which of the following could be the value of b ?

A. -7

B. 7

C. 14

D. 49

Answer: B

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11. Which of the following is a value of x that satisfies the equation $x^2 + 2x - 5 = 0$?

A. -1

B. $1 - \sqrt{6}$

C. $1 + \sqrt{6}$

D. $-1-\sqrt{6}$

Answer: D

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12. $a^4-12aa^2-72=0$

Which of the following is the greatest possible value of a ?

A. $\sqrt{6+\sqrt{3}}$

B. $\sqrt{6\left(1+\sqrt{3}\right)}$

C. 12

D. $6\left(1+\sqrt{3}\right)$

Answer: B

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13. $x^2-\left(6\sqrt{5}\right)x=-40$

What is the sum of the possible values of x given the above equation ?

A. 15

B. $5\sqrt{5}$

C. $6\sqrt{5}$

D. 60

Answer: C

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14. $x^2 + 7x + 1 = 2x^2 - 4x + 3$

Which of the following is a value of x that is valid in the above equation ?

A. $5.5 - \sqrt{28.25}$

B. $\sqrt{5.5}$

C. $\sqrt{30.25}$

D. $5.5 + \sqrt{30.25}$

Answer: A

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15. Given the equation $2x^2 + 8x + 4 + 2z = 0$, for what value of z is there exactly one solution for x ?

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16. The product of all the solutions to the equation $3y^2 + 4v - 2 = 0$ is M. What is the value of M ?

A. -3

B. $-\frac{2}{3}$

C. $-\frac{1}{3}$

D. $\frac{4}{3}$

Answer: B

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17. What are the solution to the equation $4x^2 - 24x + 16 = 0$?

A. $x = 3 \pm \sqrt{5}$

B. $x = 4 \pm \sqrt{6}$

C. $x = 5 \pm \sqrt{3}$

D. $x = 5 \pm 2\sqrt{2}$

Answer: A

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18. $3x^2 = m(5x + v)$

What are the values of x that satisgy the equation above, where m and v are constants ?

A. $x = -\frac{5m}{6} \pm \frac{\sqrt{25m^2 + 12mv}}{6}$

B. $x = \frac{5m}{6} \pm \frac{\sqrt{25m^2 + 12mv}}{6}$

C. $x = -\frac{5m}{3} \pm \frac{\sqrt{12m^2 + 12mv}}{3}$

D. $x = \frac{5m}{3} \pm \frac{\sqrt{25m^2 + 12mv}}{3}$

Answer: B

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19. $x(dx + 10) = -3$

The equation above, where d is a constant, has no real solutions. The value of d could be which of the following?

A. -12

B. 4

C. 8

D. 10

Answer: D

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20. Which of the following equations does NOT have any solutions that are real numbers ?

A. $x^2 + 8x - 12 = 0$

B. $x^2 - 8x + 12 = 0$

C. $x^2 - 9x + 21 = 0$

D. $x^2 + 100x - 1 = 0$

Answer: C

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21. 

The following quadratinos are all representations of the graph above. Which equation clearly represents the exact values of the x-intercepts of the graph ?

A. $y = 4x^2 - x - 3$

B. $y = (4x + 3)(x - 1)$

C. $y = 4(x - 0.125)^2 - 3.0625$

D. $y + 3.0625 = 4(x - 0.125)^2$

Answer: B

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22. Which equation represents the Axis of symmetry for the graph of the quadratic function $f(x) = -\frac{11}{3}x^2 + 17x - \frac{43}{13}$?

A. $x = -\frac{102}{11}$

B. $x = -\frac{51}{22}$

C. $x = \frac{51}{22}$

D. $x = \frac{102}{11}$

Answer: C

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23. How many times do the parabolas given by the equation

$f(x) = 3x^2 - 24x + 52$ and $g(x) = x^2 + 12x - 110$

intersect ?

A. Never

B. Once

C. Twice

D. More than twice

Answer: B

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24. What is the positive difference between the x-intercepts of the parabola given by the equatin $g(x) = -2.5x^2 + 10x - 7.5$?

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25. A toy rocket is fired from ground level. The height of the rocket with respect to time can be represented by a quadratic function. If the toy rocket reaches a maximum height of 34 feet 3 seconds after it was fired, which of the following

functions could represent the height, h, of the rocket t secnds after it was fired ?

A. $h(t) = -16(t-3)^2 + 34$

B. $h(t) = -16(t+3)^2 + 34$

C. $h(t) = 16(t-3)^2 + 34$

D. $h(t) = 16(t+3)^2 + 34$

Answer: A

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26. $\begin{cases} a = b^2 + 4b - 12 \\ a = -12 + b \end{cases}$

The ordered pair (a,b) satisfies the system of equatin above. What is one possible value of b ?

A. -6

B. -3

C. 2

D. 3

Answer: B

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27. In the xy-coordinate plane, the graph of $y = 5x^2 - 12x$ intersects the grphs of $y = -2$ at points (0,0) and (a,b). What is the value of a ?

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28. How many real solutions are there to the system of equations above ?

A. Exactly 4 real solutions

B. Exactly 2 real solutions

C. Exactly 1 real solutions

D. No real solutions

Answer: B

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29.

The graph of the function f, dedined by $f(x) = -2(x-3)^2 - 4$, is shown in the xy-plane above. The function g (not shown) is defined by $g(x) = 2x - 10$. If $f© = g©$, what is one possible value of c ?

A. -6

B. -4

C. 2

D. 4

Answer: C

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30. On the xy-plane, points P and Q are the two points where the parabola with the equation $y = 3x^2 + \frac{14}{3}x - \frac{73}{3}$ and the line with thte equation $y = -\frac{4}{3}x - \frac{1}{3}$ meet. What is the distance between point P and point Q ?

A. 5

B. 8

C. 10

D. 12

Answer: C

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31. The function $f(x) = 4x^2 - 25$ and $g(x) = -4x^2 + 25$ are graphed in the xy-plane above. The point where

the two functions intersect are (z,0) and $(-z, 0)$.

What is the value of z ?

A. 0.5

B. 1.0

C. 2.5

D. 4.0

Answer: C

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32. The equation $\frac{1}{4}(4x^2 - 8x - k) = 30$ has two solutions: $x = -5$ and $x = 7$. What is the value of 2k ?

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33. 

The maximum value of the data shown in the scatterplot above occurs at $x = 25$. It the data is modeled using a quadratic regression and the correlation coefficient is 1.0 (the fit is exact), then what is the y-value when $x = 35$?

A. 10

B. 15

C. 22

D. 27

Answer: D

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34. The height of a boulder launched from a Roman catap can be described as a function of time according to the following quadratic equation: $h(t) = -16t^2 + 224t + 240.$

What is the maximum height that the boulder attains ?

A. 240

B. 784

C. 1024

D. 1696

Answer: C

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35. The height of a boulder launched from a Roman catap can be described as a function of time according to the following quadratic equation: $h(t) = -16t^2 + 224t + 240$.

How much time elapese between the moment the boulder is launched and the moment it hits the ground, assuming that the ground is at a height of 0 ?

A. 7

B. 12

C. 14

D. 15

Answer: D

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36. 

If the function shown in the graph is represented by $f(x) = a(x-h)^2 + k,$ which of the following statements is NOT true ?

A. The value of a is negative.

B. f (x) is symmetrical across the line $y = 3.$

C. The function $g(x) = \frac{2x}{3}$ intersects f (x) at its vertex.

D. The value of h is positive.

Answer: B

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37. If (x,y) is a solution to the system of equations above, what is the value of x^2 ?

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38. What are the x-intercepts of the parabolic function $f(x) = x^2 - 7x + \frac{81}{4}$?

A. 1 and $8\frac{1}{4}$

B. $1\frac{1}{4}$ and $5\frac{3}{4}$

C. $1\frac{1}{4}$ and $5\frac{3}{4}$

D. $1\frac{1}{2}$ and $5\frac{1}{2}$

Answer: D

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39. If $g(x) = (x-2)^2 - 5$, which of the following statements is true ?

A. The function g (x) is increasing over the entire domain.

B. The functin g (x) is decreasing over the entire domain.

C. The function g (x) is increasing for $x < 2$ and decreasing for $x > 2$.

D. The function g (x) is decreasing for $x < 2$ and increasing for $x > 2$.

Answer: D

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40. What is the sum of the solutions of

$(6x + 5)^2 - (3x - 2)^2 = 0$?

A. $-\frac{8}{3}$

B. $-\frac{1}{6}$

C. $\frac{7}{3}$

D. 3

Answer: A

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41. If the equation above is true, then what is the positive value of the expression $10\sqrt{x} - 15$?

A. 20

B. 25

C. 30

D. 35

Answer: A

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42. In the equation $x - 2 = \dfrac{3}{x - 2}$, which of the following is a possible value of $x - 2$?

A. $\sqrt{3}$

B. 1

C. $2 + \sqrt{3}$

D. 3

Answer: A

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43. If $\frac{z^{x^2+y^2}}{z^{-2xy}} = (z^3)$, x and y are positive integers, and $x > y$, what is the value of $x - y$?

A. 1

B. 2

C. 3

D. 8

Answer: A

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Solving Quadratics By Factoring

1. If $x^2 - 7x = 30$ and $x > 0$, what is the value of $x - 5$?

A. 5

B. 6

C. 10

D. 25

Answer: A

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Classic Quadratics

1. Which of the following expressions is equivalent to $25x^2y^4 - 1$?

A. $5(x^2y^4 - 1)$

B. $-5(xy^2 + 1)$

C. $(5xy - 1)(5xy + 1)$

D. $(5xy^2 - 1)(5xy^2 + 1)$

Answer: D

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Completing The Square

1. Which of the following equations has the same solutions as the equation $40 - 6x = x^2 - y$?

A. $y = (x - 6)^2 - 40$

B. $y = (x - 6)^2 + 40$

C. $y = (x + 3)^2 - 49$

D. $y = (x + 3)^2 + 49$

Answer: C

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The Quadratic Formula

1. Which of the following are the real values of x that satisfy the equation $2x^2 - 5x - 2 = 0$?

A. $1 \text{ and } 4$

B. $-\frac{5}{4} + \frac{\sqrt{41}}{4} \text{ and } \frac{5}{4} - \frac{\sqrt{41}}{4}$

C. $\frac{5}{4} + \frac{\sqrt{41}}{4} \text{ and } \frac{5}{4} - \frac{\sqrt{41}}{4}$

D. No real solutions

Answer: C

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Graphs Of Quadratics

1. Given the equatin $y = -(2x-4)^2 + 7$, which of the following statements is NOT true ?

A. The vertex is (4,7).

B. The y-intercept is $(0, -9)$.

C. The parabola opens diownward.

D. The graph crosses the x-axis at least one time.

Answer: A

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Systems Of Quadratic And Linear Equations

1. In the xy-plane, the graph of $y + 3x = 5x^2 + 6$ and $y - 6 = 2x$ intersect at points (0,6) and (a,b). What is the value of b ?

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