MATHS

BOOKS - PRINCETON MATHS (ENGLISH)

ALGEBRA: CRACKING THE SYSTEM

Example

1. If $2x - 15 = 25$, what is the value of x?

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2. Suppose the evaporation rate of water in a lake is given by the equation $E = \frac{\frac{T_a - T_b}{700} - \frac{V}{T_w}}{h^4}$, where E is the evaporation rate in gallons/day. T_a is the air temperature, T_d is the dew point temperature, V is the volume of water in the table, T_w is the water temperature, and h is the number of hours the water is exposed to sunlight. Which of the following expresses T_w in terms $T_a, T_b, V, E,$ and h?

A. $T_w = \dfrac{Eh^4}{(T_a - T_b)V}$

B. $T_w = \dfrac{700}{T_a - T_d - Eh^4V}$

C. $T_w = \dfrac{V^4(T_a - T_b)}{Eh^4}$

D. $T_w = \dfrac{V}{\frac{T_a - T_d}{700} - Eh^4}$

Answer: D

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3. If $7\sqrt{x} - 24 = 11,$ what is the value of x?

A. $\sqrt{5}$

B. $\sqrt{7}$

C. 5

D. 25

Answer: D

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4. If $\frac{18}{r+10} = \frac{3}{r}$, what is the value of $\frac{r}{3}$?

A. $\frac{2}{3}$

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

C. 2

D. 3

Answer: A

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5. $\sqrt{t+4} = t - 2$

Which of the following contains the solution set to the equation above?

A. $\{0, 5\}$

B. $\{0, 4, 5\}$

C. $\{0\}$

D. $\{5\}$

Answer: A

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6. If $4x + 2 = 4$, what is the value of $4x - 6$?

A. -6

B. -4

C. 4

D. 8

Answer: B

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7. If $\sqrt{5} = x - 2$, what is the value of $(x - 2)^2$?

A. $\sqrt{5}$

B. $\sqrt{7}$

C. 5

D. 25

Answer: C

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8. $3a - 7b = 4d - 9$

$-4c + 10a = 6b + 7$

$-2a + 3c - 4d = 10$

Given the system of equation above, what is the value of $-10a - 2b + 2c$?

A. -52

B. -26

C. 8

D. 26

Answer: A

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9. If $-3x + 6 \geq 18$, which of the following must be true?

A. $x \leq -4$

B. $x \leq 8$

C. $x \geq -4$

D. $x \geq -8$

Answer: A

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10. Aubrie, Bera, and Kea are running a lemonade and snack stand to earn money. They are sellling lemonade for $1.07 a cup and

chocolate chip cookies for $0.78 each. Their customers arrive on foot or by car. During a three hour period, they had 47 customers each buying only one item and made $45.94. Aubrie, Bera, and Kea need to determine if they have enough supplies for tomorrow. Solving which of the following system of equations will let them know many cups of lemonade, x, and how many cookies , y, they sold today?

A. $\begin{cases} x + y = 45.94 \\ 1.07x + 0.78y = 47 \end{cases}$

B. $\begin{cases} x + y = 47 \\ 1.07x + 0.78y = 45.94 \end{cases}$

C. $\begin{cases} x + y = 47 \\ 0.78x + 1.07y = 45.94 \end{cases}$

D. $\begin{cases} x + y = 47 \\ 107x + 78y = 45.94 \end{cases}$

Answer: B

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11. To save on helium costs, a balllon is inflated with both helium and nitrogen gas. Between the two gases, the ballon can be inflated up to 8 liters in volume. The density of helium is 0.20 gram per liter, and the density of nitrogen is

1.30 grams per liter. The ballon must be filled so that the volumetric average density of the ballon is lower than that of air, which has a density of 1.20 grams per liter. Which if the following system of inequalities best describes how the ballon will be filled, if x represent the number in liters of helium and y represents the number of liters of nitrogen?

A. $\begin{cases} x + y > 8 \\ 20x + 130y > 120 \end{cases}$

B. $\begin{cases} x + y = 8 \\ \frac{0.2x + 1.30y}{2} < 1.20 \end{cases}$

C. $\begin{cases} x + y = 47 \\ 0.78x + 1.07y = 45.94 \end{cases}$

D. $\begin{cases} x + y \leq 8 \\ 0.20x + 1.30y < 1.20 \end{cases}$

Answer: C

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12. Which of the following is equivalent to $\frac{f^2}{g} + f$?

A. $\frac{f}{g}(f + g)$

B. $f\left(\frac{f}{g} + f\right)$

C. $f^2\left(\frac{1}{g} - \frac{1}{f}\right)$

D. $f^2\left(\frac{1}{g}+1\right)$

Answer: A

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13. In the expressions $x^2+kx+12$, k is a negative integer. Which of the following is a possible value of k?

A. -13

B. -12

C. -6

D. 7

Answer: A

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14. If $2x - 3y = 5$, what is the value of $4x^2 - 12xy + 9y^2$?

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15. If $3 - \frac{3}{x} = x + 7$ and xne0`, which of the following is a possible value for x?

A. -7

B. -1

C. 1

D. 3

Answer: B

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16. What is the product all the solutions to the equation $3z^2 - 12z + 6 = 0$?

A. $\sqrt{2}$

B. 2

C. 4

D. $4\sqrt{2}$

Answer: B

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17. For $i = \sqrt{-1}$, what is the result of subtracting $(2 + 4i)$ from $(-5 + 6i)$?

A. $-7 + 2i$

B. $-3 - 10i$

C. $3 + 2i$

D. $7 - 10i$

Answer: A

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18. If $i = \sqrt{-1}$, which of the following is equivalent to $\dfrac{14}{2 - \sqrt{10}i}$?

A. $2 + \sqrt{10}i$

B. $2 - \dfrac{\sqrt{10}}{14}i$

C. $\dfrac{2 - \sqrt{10}i}{14}$

D. $28 - 14\sqrt{10}i$

Answer: A

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19. $|x + 2| = 6$

$|y - 2| = 7$

For the equations shown above, which of the folllowing is a possible value of x - y?

A. -14

B. -5

C. -2

D. 14

Answer: B

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Algebra Drill 1 No Calculator Section

1. $y = 3x + 1$

$\frac{1}{2}y + x = 1$

In the system of equations above , if (x, y) is the solution to the system, what is the value of $\frac{y}{x}$?

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

B. $\frac{2}{5}$

C. 8

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

Answer: C

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2. For the equation $\sqrt{mx-5}=x+3$,the value of m is -3. What is the solution set for the equation?

A. $\{-3,3\}$

B. $\{-2\}$

C. $\{-2, -7\}$

D. $\{3, 6\}$

Answer: B

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3. If $i = \sqrt{-1}$, what is the product of $(4 + 7i)$ and $\left(\frac{1}{2} - 2i\right)$?

A. $16 - \frac{9}{2}i$

B. $14 + \frac{9}{2}i$

C. $2 - 8i - 14i^2$

D. $i\left(8 + \frac{9}{2}\right)$

Answer: A

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4. $rx^2 = \frac{1}{s}x + 3$

A quadratic equation is provided above, where r and s are constants. What are the solutions for x?

A. $x = \frac{1}{2sr} \pm \frac{\sqrt{\frac{1}{s^2} + 12r}}{2r}$

B. $x = \frac{s}{2r} \pm \frac{\sqrt{\frac{1}{s^2} - 12r}}{2sr}$

C. $x = \frac{s}{2r} \pm \frac{\sqrt{\frac{1}{s^2} - 12r}}{2r}$

D. $x = \frac{s}{2r} \pm \frac{\sqrt{s^2 - 12sr}}{2sr}$

Answer: A

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Algebra Drill 2 Calculator Permitted Section

1. If $x + 6 > 0$ and $1 - 2x > -1$,which of the following values oof x is NOT solutions?

A. -6

B. -4

C. 0

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

Answer: A

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2. If $\frac{2x}{x^2+1} = \frac{2}{x+2}$, what is the value of x?

A. $\frac{-1}{4}$

B. $\frac{1}{2}$

C. 0

D. 2

Answer: B

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3. If the product of x and y is 76, and x is twice the square of y, which of the following pairs of equations could be used to determine the values of x and y?

A. $xy = 76, x = 2y^2$

B. $xy = 76, x = (2y)^2$

C. $x + y = 76 : x = 4y^2$

D. $xy = 76, x = 2y$

Answer: A

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4. If $-6 < -4r + 10 \leq 2$, what is the least possible value of $4r + 3$?

A. 2

B. 5

C. 8

D. 11

Answer: D

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5. How many solutions exist to the equation $|x| = |2x - 1|$?

A. 0

B. 1

C. 2

D. 3

Answer: C

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6. The sum of three numbers a, b, and c is 400. One of the numbers, a, is 40 percent less than the sum b and c. What is the value of b+c?

A. 40

B. 60

C. 150

D. 250

Answer: D

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