

for Introductory Physics

Answers

1. CHOICE D: We are given $x - 1 = 2$. To solve for x , add 1 to both sides of the equation:

$$\begin{array}{r} x - 1 = 2 \\ + 1 = + 1 \\ \hline x = 3 \end{array}$$
 so $x + 1 = (3 + 1) = 4$

2. CHOICE B: volume = " $R^2 h = (3)(2 \text{ cm})^2 (5 \text{ cm}) = 60 \text{ cm}^3$

3. CHOICE C: If $x = 3$ then $x^2 + 3 = 3^2 + 3 = 9 + 3 = 12$

4. CHOICE C: The area is 8 entire squares plus $0.8 + 0.4 + 0.9 + 0.1 + 0.5$ squares which is 10.7 squares. Each square has an area of so the total area is about 53.5.

5. CHOICE A: $\frac{(-2)(-6)}{\text{-----}} = \frac{12}{\text{-----}} =$

$$(2xy^3)^3 = 2^3 x^3 (y^3)^3 = 8x^3 y^9$$

7. CHOICE A: $(2x - 1)(4x + 1) = 2x(4x + 1) + (-1)(4x + 1)$

$$= 8x^2 + 2x - 4x - 1$$

$$= 8x^2 - 2x - 1$$

8. CHOICE A: $\frac{4^n 10^{\#15}}{\text{-----}}$ #15+12 #3 #4

9. CHOICE D: A common denominator is xy . Multiply the first term by $\frac{x}{x}$ to get

$$\frac{x^2 y}{xy} + \frac{x}{y} = \frac{x^2 y + x}{xy}$$

10. CHOICE C: This is the difference between x^2 and 100.

$$x^2 - 100 = (x - 10)(x + 10)$$

11. CHOICE A: $(5 \cdot 10^8)(6 \cdot 10^{-12}) = 30 \cdot 10^{8-12} = 30 \cdot 10^{-4} = 3 \cdot 10^{-3}$

12. CHOICE A: $(2x + 3) - (x - 2) = 2x + 3 - x + 2 = x + 5$

13. CHOICE C: $x^2 + 2x + 2 = (x + 1)^2 + 1$

14. CHOICE C: Let x be the number. "Of" means multiply. "is" means equals.

$$\frac{1}{3}(x) = 8$$

Multiply both sides by 3.

$$x = 24$$

$$\frac{1}{4}(24) = 6$$

15. CHOICE A: $(-3xy - (-2)^3) - (-8)(5) = 10$

16. CHOICE E: $25 \text{ m} = (25 \text{ m})(3 \text{ feet})$

17. CHOICE C: $(x^2 - 3x + 2) - (3x^2 - 5x - 1)$

$$= x^2 - 3x + 2 - 3x^2 + 5x + 1$$

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

18. CHOICE D: $\frac{2x}{3y} - \frac{9y}{4x^2} = \frac{2x^3 - 9y^2}{3y \cdot 4x^2} = \frac{2x^3 - 9y^2}{12x^2 y}$

29. CHOICE D: $10(-2) \left(\frac{-3}{5} \right) + 11 = -20 - \frac{6}{5} = -\frac{106}{5}$

30. CHOICE A: The graphs of $x - 2y = 6$ and $x + y = -3$ intersect at the values of x and y that satisfy both equations. To get these, solve the two equations.

6. Substitute into the second equation:

$$(2y + 6) + y = -3$$

$$= 3y + 6 = -3$$

Subtract 6 from both sides:

$$\begin{array}{r} 3y + 6 = -3 \\ -6 \quad -6 \\ \hline \end{array}$$

$$3y = -9$$

Divide both sides by three:

$$\frac{3y}{3} = \frac{-9}{3}$$

$$y = -3$$

$$y = -3$$

31. CHOICE B: $\frac{2^{-1/2} 3^{1/2}}{2} = \frac{2^{-1/2} 3^{1/2}}{2} = \frac{1}{2} \cdot \frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{3}}{2\sqrt{2}}$

32. CHOICE B: $\sqrt{-27} = -3i$ because $(-3i)(-3i)(-3i) = -27i^3$. Roots can be negative.

33. CHOICE A: As x becomes very large and positive, y becomes very large. Because the term x^3 increases much faster than that in x , the same is true as x becomes very negative. Also recall an equation of the form $ax^2 + bx + c$ is a parabola.

34. CHOICE D: Recall that $\log_3(x) = n$ means $3^n = x$.

$$\log_3(x + 1) = 2 \text{ means } 3^2 = x + 1$$

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$$\begin{array}{r}
 = 6w + 6 = 90 \\
 - 6 - 6 \\
 \hline
 6w = 84 \\
 \\
 6 \\
 \\
 w = 14
 \end{array}$$

56. CHOICE A: $4(s + 2) = (4 \times s) + (4 \times 2) = 4s + 8$

57. CHOICE A: $3/4 \times 1/7 = \frac{3}{4} \times \frac{1}{7} = \frac{3 \times 1}{4 \times 7} = \frac{3}{28}$

58. CHOICE B: Subtract one from both sides:

$$\begin{array}{r}
 1 - 5x < 3 \\
 - 1 - 1 \\
 \hline
 - 5x < 2
 \end{array}$$

Divide both sides by -5, and remember to switch the sign of the inequality because we are dividing by a negative number:

$$\begin{array}{r}
 - 5x < 2 \\
 \hline
 - 5 - 5 \\
 \\
 x > - 2 / 5
 \end{array}$$

59. CHOICE B: The function has an absolute minimum at $x = 1$, the lowest point on the graph between 0 and 4. The other low point at $x = 3$ is a "local minimum."

60. CHOICE A: $3^2 + 4^2 = D^2 = 25$ so $D = 5$.

61. CHOICE B: $(2\sqrt{3})(3\sqrt{6}) = 6\sqrt{18} = 6\sqrt{(2)(9)} = 6\sqrt{9}\sqrt{2} = (6)(3)\sqrt{2} = 18\sqrt{2}$

62. CHOICE B: $1 - \sin^2\theta = \cos^2\theta$ (a trigonometric identity).

63. CHOICE A: $f(x) = \cos(3x)$, then $f(\pi/6) = \cos(\pi/2) = 0$.

64. CHOICE A: The circumference of a circle is $2\pi R$.
65. CHOICE E: The sine curve has a y-intercept at zero, increases as x increases to $\pi/2$ and decreases as x decreases to $-\pi/2$.
66. CHOICE E: $\csc \theta = 1/\sin \theta$ and $\tan \theta = \sin \theta / \cos \theta$, so
 $\sin \theta \tan \theta \csc^2 \theta = \sin \theta (\sin \theta / \cos \theta) (1/\sin^2 \theta) = 1/\cos \theta = \sec \theta$.
67. CHOICE B: $\tan \theta = \sin \theta / \cos \theta$, and $\cos(-\pi/2)$ is zero. A zero in the denominator renders the expression undefined.
68. CHOICE E: The area of a circle is πR^2 .
69. CHOICE B: the sum of the angles in a triangle add up to 180 degrees.
70. CHOICE C: Taking the slope between $x = 0$ and $x = 5$, we see that:

$$\text{slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{20 - 5}{5 - 0} = \frac{15}{5} = 3$$

71. CHOICE E: $\frac{100 \text{ km}}{1 \text{ minute}} = \frac{100 \text{ km} \cdot 5 \text{ miles}}{1 \text{ minute} \cdot 8 \text{ km}} \cdot \frac{1 \text{ minute}}{60 \text{ seconds}}$
 $= \frac{500 \text{ miles}}{480 \text{ seconds}} = 1 \frac{\text{mile}}{\text{second}}$