

●4-1 Solving Equation

Multiple-Choice

1. If $5 + \sqrt{n} = 8.2$, what is the value of $5 - \sqrt{n}$?
(A) 0
(B) 1.8
(C) 3.2
(D) 5
(E) 6.8
2. If $(9 - 4)(x + 4) = 30$, then $x =$
(A) 2
(B) 4
(C) 6
(D) 8
(E) 12
3. If $2(1 + 5) = 3(w - 4)$, then $w =$
(A) 0
(B) 2
(C) 4
(D) 6
(E) 8
4. If $\frac{x}{3} - 1 = 1 - 3$, then $x =$
(A) -6
(B) -3
(C) -1
(D) 3
(E) 6
5. If $5a - 2b = b + 1 = 9$, what is the value of a ?
(A) 2
(B) 5
(C) 10
(D) 15
(E) 25
6. If $3x - 6 = 18$, then $x - 2 =$
(A) 2
(B) 4
(C) 6
(D) 8
(E) 10
7. If $2x + y = y + 14$, then $x =$
(A) $\frac{7}{2}$
(B) 7
(C) 14
(D) 21
(E) It cannot be determined.
8. If $\frac{4}{7}k = 36$, then $\frac{3}{7}k =$
(A) 21
(B) 27
(C) 32
(D) 35
(E) 42
9. If $\frac{1}{2}x + \frac{1}{4}x + \frac{1}{8}x = 14$, then $x =$
(A) 4
(B) 8
(C) 12
(D) 16
(E) 24
10. If $2s + 3t = 12$ and $4s = 36$, then $t =$
(A) -3
(B) -2
(C) 2
(D) 3
(E) 9
11. If $r = \frac{3}{4}xt$, what is the value of t when $r = 54$ and $x = 12$?
(A) 5
(B) 6
(C) 8
(D) 12
(E) 20
12. If $\frac{2}{x} = 2$, then $x + 2 =$
(A) $\frac{3}{2}$
(B) $\frac{5}{2}$
(C) 3
(D) 4
(E) 6
13. If $\frac{y - 2}{2} = y + 2$, then $y =$
(A) -6
(B) -4
(C) -2
(D) 4
(E) 6
14. If $\frac{2y}{7} = \frac{y + 3}{4}$, then $y =$
(A) 5
(B) 9
(C) 13
(D) 17
(E) 21

15. If $\frac{y}{3} = 4$, then $3y =$

- (A) 4
- (B) 12
- (C) 24
- (D) 30
- (E) 36

16. If $4(j + k) - 5 = 16 + (j + k)$, then $j + k =$

- (A) 8
- (B) 7
- (C) 5
- (D) 4
- (E) It cannot be determined from the information given.

17. When the number k is multiplied by 5, the result is the same as when 5 is added to k . What is the value of k ?

- (A) $\frac{4}{5}$
- (B) 1
- (C) $\frac{5}{4}$
- (D) $\frac{3}{2}$
- (E) $\frac{7}{4}$

18. If $\frac{x}{y} = 27$ and $y = \frac{2}{3}$, what is the value of $\frac{1}{2}x$?

- (A) 3
- (B) $4\frac{1}{2}$
- (C) 6
- (D) 9
- (E) 12

19. If $\frac{1}{3} + \frac{3}{p} = 1$, then $p =$

- (A) $\frac{3}{2}$
- (B) 2
- (C) $\frac{5}{2}$
- (D) $\frac{9}{2}$
- (E) 6

20. If $\frac{3}{4} = \frac{6}{x} = \frac{9}{y}$, then $x + y =$

- (A) 4
- (B) 8
- (C) 12
- (D) 16
- (E) 20

Grid-In

1. If $2x - 1 = 11$ and $3y = 12$, what is the value of $\frac{x}{y}$?
2. If $7(a + b) - 4(a + b) = 24$, what is the value of $a + b$?
3. If $1 - x - 2x - 3x = 6x - 1$, what is the value of x ?
4. In the equation $p = \frac{5b}{c^2}$, what is a value of c when $p = 9$ and $b = 20$?
5. If 60% of r is equal to $s\%$ of 45, what is the value of $\frac{r}{s}$?

●4-1 Solving Equation 解答・解説

1. (B) If $5 + \sqrt{n} = 8.2$, then $\sqrt{n} = 8.2 - 5 = 3.2$, so $5 - \sqrt{n} = 5 - 3.2 = 1.8$.

$$\begin{aligned} 2. \text{ (A)} \quad (9 - 4)(x + 4) &= 30 \\ 5(x + 4) &= 30 \\ x + 4 &= \frac{30}{5} = 6 \\ x &= 6 - 4 \\ &= 2 \end{aligned}$$

$$\begin{aligned} 3. \text{ (E)} \quad 2(1 + 5) &= 3(w - 4) \\ 2(6) &= 3(w) + 3(-4) \\ 12 &= 3w - 12 \\ 12 + 12 &= 3w \\ 24 &= 3w \\ \frac{24}{3} &= w \\ 8 &= w \end{aligned}$$

$$\begin{aligned} 4. \text{ (B)} \quad \frac{x}{3} - 1 &= 1 - 3 \\ \frac{x}{3} - 1 &= -2 \\ \frac{x}{3} &= -2 + 1 \\ \frac{x}{3} &= -1 \\ x &= -1(3) = -3 \end{aligned}$$

5. (B) Break down $5a - 2b = b + 1 = 9$ into two equations: $5a - 2b = 9$ and $b + 1 = 9$. Solving the second equation for b gives $b = 8$. Substitute 8 for b in the first equation:

$$\begin{aligned} 5a - 2(8) &= 9 \\ 5a - 16 &= 9 \\ 5a &= 9 + 16 \\ \frac{5a}{5} &= \frac{25}{5} \\ a &= 5 \end{aligned}$$

6. (C) *Solution 1:* Solve $3x - 6 = 18$ for $x - 2$ by dividing each member of the equation by 2:

$$\begin{aligned} \frac{3x}{3} - \frac{6}{3} &= \frac{18}{3} \\ x - 2 &= 6 \end{aligned}$$

Solution 2: The answer choices represent possible values for $x - 2$. Add 2 to each answer choice to obtain the possible values for x . Then substitute each of these values into the given equation until you find one that works:

$$\begin{aligned} 3x - 6 &= 18 \\ 3(6 + 2) - 6 &= 18 \\ 24 - 6 &= 18 \end{aligned}$$

7. (B) If $2x + y = y + 14$, subtracting y from each side of the equation gives $2x = 14$, so

$$x = \frac{14}{2} = 7$$

8. (B) If $\frac{4}{7}k = 36$, then

$$\frac{1}{7}k = \frac{1}{4}(36) = 9$$

Since $\frac{1}{7}k = 9$, then

$$\frac{3}{7}k = 3(9) = 27$$

9. (D) $\frac{1}{2}x + \frac{1}{4}x + \frac{1}{8}x = 14$

$$\frac{4}{8}x + \frac{2}{8}x + \frac{1}{8}x = 14$$

$$\frac{7}{8}x = 14$$

$$\frac{8}{7}\left(\frac{7}{8}x\right) = \frac{8}{7}(14)$$

$$x = 16$$

10. (B) If $2s + 3t = 12$ and $4s = 36$, the second equation can be used to eliminate s in the first equation. Since $\frac{4s}{2} = 2s = \frac{36}{2} = 18$, replace $2s$ with 18 in the first equation. Then solve for t :

$$18 + 3t = 12$$

$$3t = 12 - 18$$

$$3t = -6$$

$$t = \frac{-6}{3} = -2$$

11. (B) If $r = \frac{3}{4}xt$ and $r = 54$ and $x = 12$, then

$$54 = \frac{3}{4}(12)t$$

$$54 = \frac{3}{\cancel{4}^3}(1\cancel{2})t$$

$$54 = 9t$$

$$\frac{54}{9} = \frac{9}{9}t$$

$$6 = t$$

12. (C) If $\frac{2}{x} = 2$, then $x = 1$ since $\frac{2}{1} = 2$.
Hence,
$$x + 2 = 1 + 2 = 3$$

13. (A) If $\frac{y-2}{2} = y+2$, then $y-2 = 2(y+2)$. Eliminate the parentheses, and then collect all the terms involving y on the same side of the equation.

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

$$= 2y+4$$

$$y-2y = 4+2$$

$$-y = 6, \text{ so } y = -6$$

14. (E) If $\frac{2y}{7} = \frac{y+3}{4}$, set the cross-products equal and then solve the resulting equation.

$$\frac{2y}{7} = \frac{y+3}{4}$$

$$4(2y) = 7(y+3)$$

$$8y = 7y + 21$$

$$8y - 7y = 21$$

$$y = 21$$

15. (E) If $\frac{y}{3} = 4$, then $y = 3(4) = 12$, so

$$3y = 3(12) = 36$$

16. (B) Treat " $j+k$ " as a single variable and solve for it in the usual way:

$$4(j+k) - 5 = 16 + (j+k)$$

$$\frac{- (j+k)}{3(j+k) - 5} = \frac{- (j+k)}{3(j+k) - 5}$$

$$3(j+k) - 5 = 16$$

Add 5 to both sides:

$$3(j+k) - 5 + 5 = 16 + 5$$

$$3(j+k) = 21$$

$$\frac{3(j+k)}{3} = \frac{21}{3}$$

$$j+k = 7$$

17. (C) According to the conditions of the problem, $5k = k + 5$ so $5k - k = 5$.

Since $4k = 5$, $k = \frac{5}{4}$.

18. (D) Solve $\frac{x}{y} = 27$ for x after replacing y with $\frac{2}{3}$:

$$x \div y = 27$$

$$x \div \frac{2}{3} = 27$$

$$\frac{3}{2}x = 27$$

$$\frac{2}{3} \cdot \left(\frac{3}{2}x \right) = \frac{2}{3} \cdot 27$$

$$x = 18$$

$$\text{so } \frac{1}{2}x = \frac{1}{2}(18) = 9$$

Instead of first solving for x , you could also solve directly for $\frac{1}{2}x$. Since $\frac{3}{2}x = 27$, solve

for $\frac{1}{2}x$ by dividing both sides of the equation

by 3:

$$\frac{3}{3} \left(\frac{1}{2}x \right) = \frac{27}{3}$$

$$\frac{1}{2}x = 9$$

19. (D) Since $\frac{1}{3} + \frac{3}{p} = 1$, isolate the letter by

subtracting $\frac{1}{3}$ from each side of the equation:

$$\frac{3}{p} = 1 - \frac{1}{3} = \frac{2}{3}$$

Eliminate the fractions in this equation by cross-multiplying:

$$\frac{3}{p} = \frac{2}{3}$$

$$2p = 9$$

$$p = \frac{9}{2}$$

20. (E) Write the equation $\frac{3}{4} = \frac{6}{x} = \frac{9}{y}$ as two equations:

$$\frac{3}{4} = \frac{6}{x} \quad \text{and} \quad \frac{3}{4} = \frac{9}{y}$$

Solve the first equation for x :

$$\begin{aligned} \frac{3}{4} &= \frac{6}{x} \\ 3x &= 24 \\ x &= \frac{24}{3} = 8 \end{aligned}$$

Solve the second equation for y :

$$\begin{aligned} \frac{3}{4} &= \frac{9}{y} \\ 3y &= 36 \\ y &= \frac{36}{3} = 12 \end{aligned}$$

Hence,

$$x + y = 8 + 12 = 20$$

5. (0.75) Since 60% of r is equal to $s\%$ of 45,
 $0.60 \times r = \frac{s}{100} \times 45 = 0.45s$. Hence:

$$\begin{aligned} \frac{0.60r}{0.60} &= \frac{0.45s}{0.60} \\ r &= 0.75s \\ \frac{r}{s} &= \frac{0.75s}{s} \\ \frac{r}{s} &= 0.75 \end{aligned}$$

Grid-in **0.75** or **3/4**.

GRID-IN

- (6/4) If $2x - 1 = 11$, then $2x = 12$, so
 $x = \frac{12}{2} = 6$. Since $3y = 12$, then
 $y = \frac{12}{3} = 4$. Hence, $\frac{x}{y} = \frac{6}{4}$. Grid in as
 6/4 or 1.5.
- (8) If $7(a + b) - 4(a + b) = 24$, then
 $3(a + b) = 24$, so
 $a + b = \frac{24}{3} = 8$
- (2/12) If $1 - x - 2x - 3x = 6x - 1$, then
 $1 - 6x = 6x - 1$, so $1 + 1 = 6x + 6x$ and
 $2 = 12x$. Thus, $x = \frac{2}{12}$. Grid in as 2/12.
- (10/3) In the equation $p = \frac{5b}{c^2}$, if $p = 9$
 and $b = 20$, then $9 = \frac{5(20)}{c^2}$ or $9c^2 = 100$,
 so $c^2 = \frac{100}{9}$. Taking the positive square
 root of both sides of the equation gives

$$c = \frac{\sqrt{100}}{\sqrt{9}} = \frac{10}{3}$$

Grid in as 10/3.