Algebra & Linear Equations Practice

Easy to Medium (20 Questions)

1. Write down an algebraic expression for each statement.
   (a) Add 5 to the product of a and b.
   (b) Subtract 3 from twice x.
   (c) Divide $7y$ by 2.
   (d) The cube of m decreased by 4.

2. Given $x = -3$ and $y = 4$, evaluate:
   (a) $2x - 5y$
   (b) $x^2 + y^2$
   (c) $\dfrac{3y}{x}$

3. Given $p = 2,\ q = -5,\ r = 3$, evaluate:
   (a) $pq + 2r$
   (b) $(p - q)^2$
   (c) $\dfrac{r}{pq}$

4. Simplify:
   (a) $13x + (-7x)$
   (b) $-9a + 4a - 6$
   (c) $-5y - (2y - 8)$

5. Simplify:
   (a) $6x + 5 - (2x - 3)$
   (b) $4p - \big[3p - (2 - p)\big]$

6. Find the sum of each pair of expressions.
   (a) $(3x - 5)$ and $(2x + 7)$
   (b) $(4a - b)$ and $(-a + 6b)$

7. Expand:
   (a) $3(2x - 5)$
   (b) $-4(y + 3)$
   (c) $5(1 - 2m)$

8. Expand and simplify:
   (a) $2(3p-4)+3(p+1)$
   (b) $4(x-2)-2(3x+5)$

9. Factorise completely:
   (a) $8x+12$
   (b) $15a^2b-10ab$
   (c) $-21m-14n$

10. Factorise completely:
   (a) $12p+18q-6r$
   (b) $25u-35v$
   (c) $9k^2-3k$

11. Simplify:
   (a) $\frac{1}{4}x+\frac{3}{4}x$
   (b) $\frac{5}{6}p-\frac{1}{3}p$
   (c) $\frac{2}{5}m+\frac{1}{10}m$

12. Simplify:
   (a) $\frac{1}{2}\big[8x+6-2(3-x)\big]$
   (b) $\frac{3}{5}\big[10p-(5+2p)\big]$

13. Express each as a single fraction in simplest form:
   (a) $\frac{1}{2}+\frac{3}{4}$
   (b) $\frac{x}{4}+\frac{x}{6}$
   (c) $\frac{2}{x+3}+\frac{1}{x+3}$

14. Express each as a single fraction in simplest form:
   (a) $\frac{3x-4}{5}-\frac{x+1}{5}$
   (b) $\frac{2a+1}{3}-\frac{a-2}{6}$

15. Solve:
   (a) $x+8=-5$
   (b) $3y-7=20$
   (c) $5-2t=17$

16. Solve:

(a) $4(x-3)=28$

(b) $\dfrac{y+5}{3}=-2$

(c) $\dfrac{2m-1}{5}=3$

17. Solve:

    (a) $0.6x+1.8=6$

    (b) $2.5-0.4y=0.9$

18. Solve:

    (a) $\dfrac{x-2}{4}+3=5$

    (b) $\dfrac{3y+1}{2}-(y-3)=7$

19. A number is tripled and then decreased by 8. The result is 25. Find the number.

20. The volume V of a cuboid is $V=lbh$. If $V=360$ cm^3, $l=10$ cm, $b=6$ cm, find h.

Harder (20 Questions)

1. Expand and simplify:

    (a) $-3[2x-(4-x)]$

    (b) $5\{3a-2[a-(2-3a)]\}$

2. Expand and simplify:

    (a) $4(2p-3q)-3(5p+q)$

    (b) $-2(3x-4)+5(x-7)-(2x+1)$

3. Simplify:

    (a) $7x-2[3x-5(1-x)]$

    (b) $\frac{1}{2}(6y-4)-\frac{3}{4}(2y+8)$

4. Express as a single fraction in simplest form:

    (a) $\frac{a+1}{3}+\frac{2a-5}{6}$

    (b) $\frac{3x-1}{4}-\frac{x+2}{3}$

5. Express as a single fraction in simplest form:

    (a) $4-\frac{x-y}{3}-\frac{3y+4x}{4}$

(b) $\frac{5(p-q)}{2} - \frac{2q-p}{7}$

6. Factorise completely:

   (a) $12x^2 - 18x$

   (b) $6ay - 9a + 4y - 6$

   (c) $15m^2n + 20mn^2$

7. Factorise completely:

   (a) $5x - 10 + 3xy - 6y$

   (b) $4x(2y - 3) - 5(2y - 3)$

   (c) $9a(b - 2) - 6(b - 2)$

8. Solve:

   (a) $4(2x - 3) - 5(x + 1) = 7$

   (b) $3(2y - 1) + 4 = 5(y + 3)$

9. Solve:

   (a) $\frac{3x-2}{5} - \frac{x+1}{2} = 1$

   (b) $2 - \frac{x-3}{4} = \frac{x+5}{6}$

10. Solve:

    (a) $\frac{5y+2}{3} = \frac{2y-1}{4} + 5$

    (b) $\frac{7}{x-2} - 2 = \frac{3}{x-2} + \frac{1}{2}$

11. Given $4x + y = 3x + 5y$, find:

    (a) $x : y$

    (b) $\dfrac{3x}{16y}$

12. If $\dfrac{5x + 2y}{x + y} = 4$, find $x : y$.

13. In a school, the number of girls who take Art is twice the number who take Music. If 10 girls switch from Art to Music, the numbers become equal. Find the number who take Music at first.

14. A two-digit positive integer has ones digit twice its tens digit. Reversing the digits increases the number by 27. Find the number.

15. The numerator of a fraction is 4 less than its denominator. If 2 is added to both numerator and denominator, the new fraction is $\frac{3}{5}$. Find the original fraction.

16. A cyclist travels the first 180 km at v km/h and the remaining 120 km at $(v-6)$ km/h. If the times for the two parts are equal, find v and $(v-6)$.

17. Use $C = (F-32)\frac{5}{9}$.

    (a) Convert $68°F$ to $°C$.

    (b) Convert $-20°C$ to $°F$.

18. Three consecutive integers have middle integer n.

    (a) Write a formula for their sum S in terms of n.

    (b) Find S when $n = 15$.

19. Given $a = 3,\ b = -4,\ c = 2$, evaluate $\dfrac{a+2b}{a-b} - \dfrac{c}{a}$.

20. Simplify: $\frac{1}{3}[6x + 9 - (2x-3)] - \frac{1}{2}(x-4)$.

Concise Answers

Easy to Medium

1. (a) $ab + 5$ (b) $2x - 3$ (c) $\frac{7y}{2}$ (d) $m^3 - 4$
2. (a) -26 (b) 25 (c) -4
3. (a) -4 (b) 49 (c) $-\frac{3}{10}$
4. (a) $6x$ (b) $-5a - 6$ (c) $-7y + 8$
5. (a) $4x + 8$ (b) 2
6. (a) $5x + 2$ (b) $3a + 5b$
7. (a) $6x - 15$ (b) $-4y - 12$ (c) $5 - 10m$
8. (a) $9p - 5$ (b) $-2x - 18$
9. (a) $4(2x + 3)$ (b) $5ab(3a - 2)$ (c) $-7(3m + 2n)$
10. (a) $6(2p + 3q - r)$ (b) $5(5u - 7v)$ (c) $3k(3k - 1)$
11. (a) x (b) $\frac{p}{2}$ (c) $\frac{m}{2}$
12. (a) $5x$ (b) $\frac{24p - 15}{5}$
13. (a) $\frac{5}{4}$ (b) $\frac{5x}{12}$ (c) $\frac{3}{x + 3}$
14. (a) $\frac{2x - 5}{5}$ (b) $\frac{3a + 4}{6}$
15. (a) -13 (b) 9 (c) -6
16. (a) 10 (b) -11 (c) 8
17. (a) 7 (b) 4
18. (a) 10 (b) 7
19. 11
20. 6 cm

Harder

1. (a) $-9x + 12$ (b) $-25a + 20$
2. (a) $-7p - 15q$ (b) $-3x - 28$
3. (a) $-9x + 10$ (b) $\frac{3}{2}y - 8$
4. (a) $\frac{4a - 3}{6}$ (b) $\frac{5x - 11}{12}$
5. (a) $\frac{48 - 16x - 5y}{12}$ (b) $\frac{37p - 39q}{14}$
6. (a) $6x(2x - 3)$ (b) $(2y - 3)(3a + 2)$ (c) $5mn(3m + 4n)$
7. (a) $(x - 2)(3y + 5)$ (b) $(2y - 3)(4x - 5)$ (c) $3(b - 2)(3a - 2)$
8. (a) $x = 8$ (b) $y = 14$
9. (a) $x = 19$ (b) $x = \frac{23}{5}$
10. (a) $y = \frac{7}{2}$ (b) $x = \frac{18}{5}$
11. (a) $4 : 1$ (b) $\frac{3}{4}$
12. $2 : 1$
13. 20
14. 36
15. $\frac{1}{2}$
16. $v = 18,\ v - 6 = 12$
17. (a) $20°C$ (b) $-4°F$
18. (a) $S = 3n$ (b) 45
19. $-\frac{29}{21}$
20. $\frac{5}{6}x + 6$