

Chapter 3 Use of Formulae

Multiple Choice Questions

1. Which of the following is an algebraic fraction?

- A. d B. $a + c$ C. $\frac{d}{a+c}$ D. $\frac{d}{2} + a$

2. Simplify $-\frac{1}{x} - \frac{3}{x}$.

- A. $-\frac{4}{x}$ B. $-\frac{2}{x}$ C. $\frac{2}{x}$ D. $\frac{4}{x}$

3. Simplify $\frac{1}{8y} + \frac{3}{8y}$.

- A. $-\frac{1}{2y}$ B. $-\frac{1}{8y}$ C. $\frac{1}{8y}$ D. $\frac{1}{2y}$

4. Simplify $\frac{7}{r-s} + \frac{4}{s-r}$.

- A. $\frac{3}{s-r}$ B. $\frac{3}{r-s}$ C. $\frac{11}{r-s}$ D. $\frac{11}{s-r}$

5. Simplify $\frac{3p}{q-3p} + \frac{q}{3p-q}$.

- A. 1 B. -1 C. $q - 3p$ D. $3p - q$

6. Simplify $\frac{1}{3r-2} - \frac{r}{2-3r} + \frac{3}{3r-2}$.

- A. $\frac{r-4}{3r-2}$ B. $\frac{r+4}{3r-2}$ C. $\frac{r+4}{3r+2}$ D. $\frac{r-4}{3r+2}$

7. Simplify $\frac{2}{3k} + \frac{1}{6k}$.

- A. $\frac{1}{6k}$ B. $\frac{1}{9k}$ C. $\frac{2}{3k^2}$ D. $\frac{5}{6k}$

8. Simplify $\frac{1}{2c} - \frac{3}{8c}$.

- A. $\frac{1}{8c}$ B. $\frac{5}{8c}$ C. $-\frac{1}{8c}$ D. $-\frac{5}{8c}$

9. Simplify $\frac{5}{3(5+k)} - \frac{3}{2(5+k)}$.
- A. $\frac{2}{5+k}$ B. $\frac{3}{2(5+k)}$ C. $\frac{1}{6(5+k)}$ D. $-\frac{1}{6(5+k)}$
10. Factorize $a - ab$.
- A. $-ab$ B. $a(1 - b)$ C. $b(1 - a)$ D. $b(a - b)$
11. Factorize $-3a - 3b$.
- A. $-3(a + b)$ B. $-3(a - b)$ C. $3(a + b)$ D. $3(a - b)$
12. Factorize $4x + 6xz + 7yx$.
- A. $x(7y + 6z - 4)$ B. $x(7y - 6z + 4)$ C. $x(7y + 6z + 4)$ D. $x(7y - 6z - 4)$
13. Factorize $s - 5st - sp$.
- A. $s(1 - 5t - p)$ B. $s(1 + 5t - p)$ C. $s(1 - 5t + p)$ D. $s(1 + 5t + p)$
14. Use a formula to represent the following sentence.
The area of a parallelogram equals to the product of its base and its height.
- A. $A = b + h$, where A is the area, b is the base and h is the height.
B. $A = bh$, where A is the area, b is the base and h is the height.
C. $A = bh^2$, where A is the area, b is the base and h is the height.
D. $A = b^2h$, where A is the area, b is the base and h is the height.
15. Which of the following formulae uses x as the subject?
- A. $x + z = y$ B. $xy = z + 7$ C. $x = 7z + 1$ D. $7x + by = 1$
16. Given $5x = 3 + 4y$, find the value of x when $y = 3$.
- A. $\frac{1}{4}$ B. $\frac{1}{3}$ C. 3 D. 4
17. Given $\frac{x}{y} = k + 1$, find the value of y when $k = 7$ and $x = 2$.
- A. $\frac{1}{4}$ B. $\frac{1}{16}$ C. 4 D. 16
18. Given $k = \frac{8}{z} - y$, find the value of z when $k = -2$ and $y = 6$.
- A. -2 B. $\frac{1}{4}$ C. 2 D. 4

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19. Given $(n - 5)^2 + m = k$, find the value of m when $k = 6$ and $n = -1$.

- A. -30 B. 0 C. 12 D. 42

20. Given $x^2 + y^2 = z^2$, find the value of x when $z = 9$ and $y = \sqrt{45}$.

- A. 6 or -6 B. 36 or -36 C. $\sqrt{6}$ or $-\sqrt{6}$ D. $3\sqrt{5}$ or $-3\sqrt{5}$

21. Make a the subject of the formula $\frac{x-5a}{4b} = 1$.

- A. $a = \frac{4b-x}{5}$ B. $a = \frac{x-4b}{5}$ C. $a = \frac{x-5a}{4}$ D. $a = \frac{5a-x}{4}$

22. Make b the subject of the formula $c - b = a(c + b)$.

- A. $b = \frac{-c}{a}$ B. $b = \frac{a(1-c)}{c}$ C. $b = \frac{c(a-1)}{a+1}$ D. $b = \frac{c(1-a)}{a+1}$

23. Make a the subject of the formula $\frac{1}{a} + \frac{1}{b} = -2$.

- A. $a = \frac{-b}{1+2b}$ B. $a = \frac{-b}{1-2b}$ C. $a = \frac{b}{1+2b}$ D. $a = \frac{b}{1-2b}$

24. Make b the subject of the formula $k = \frac{4}{ab} - \frac{1}{c}$.

- A. $b = \frac{4c}{a(kc+1)}$ B. $b = \frac{4c}{a(kc-1)}$ C. $b = \frac{4c}{a(1-kc)}$ D. $b = \frac{c}{a(4-kc)}$

25. Make t the subject of the formula $x = \frac{2 - \frac{1}{t}}{2 + \frac{1}{t}}$.

- A. $t = \frac{2x}{1+x}$ B. $t = \frac{1+x}{2x}$ C. $t = \frac{1+x}{1-x}$ D. $t = \frac{1+x}{2(1-x)}$

26. If $\frac{2a}{b} = 5(x+y)$, find the value of $\frac{2b}{3}$.

- A. $\frac{20a}{3(x+y)}$ B. $\frac{3a}{5(x+y)}$ C. $\frac{4a}{15(x+y)}$ D. $\frac{2a}{15(x+y)}$

Level 1

1. Simplify the following.

(a) $\frac{3}{x} - \frac{2}{x}$

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

2. Simplify the following.

(a) $\frac{3}{7x} + \frac{4}{7x}$

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

3. Simplify $\frac{2}{x+1} + \frac{2x}{x+1}$.

4. Simplify $\frac{2}{3x-2} - \frac{6}{2-3x}$.

5. Factorize the following expressions.

(a) $3m - 12n$

(b) $-ab - 2ac$

6. Factorize the following expressions.

(a) $3x^2 - 9x$

(b) $8x^2 - 12x$

7. Factorize the following expressions.

(a) $4x^2 + 12xy$

(b) $-9n - 7m^2n$

8. Factorize the following expressions.

(a) $ab + bc + bd$

(b) $7x + 14x^2 + 49x^3$

9. Given $T = K - 273$, find the value of T when $K = 320$.

10. Given $A = \frac{22}{7}(r^2)$, find the value of A when $r = 14$.

11. Given $S = \frac{1}{2}n(n+1)$, find the value of S when $n = 6$.

12. Given $S = \pi r \sqrt{r^2 + h^2}$, find the value of S when $\pi = 3$, $r = 6$ and $h = 8$.

13. Given that $F = \frac{9}{5}C + 32$.

(a) Find the value of F when $C = 15$.

(b) Find the value of C when $F = 104$.

14. Given that $a + b + c = 180$.

(a) Find the value of c when $a = 35$ and $b = 72$.

(b) Find the value of a when $b = 105$ and $c = 9$.

15. Make x the subject of the formula $ax - b + c = 0$.

16. Make x the subject of the formula $d - e = fx - cx$.

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17. Make a the subject of the formula $v = u + at$.
18. Make x the subject of the formula $ax + c = dx - b$.
19. Make m the subject of the formula $PV = \frac{1}{3}Nmc^2$.
20. (a) Make m the subject of the formula $E = mc^2$.
(b) Find the value of m if $E = 36$ and $c = 3$.
21. (a) Make A the subject of the formula $R = K \frac{\ell}{A}$.
(b) Find the value of A if $R = 100$, $K = 60$ and $\ell = 20$.
22. (a) Make m the subject of the formula $p = \frac{1}{3}mv^2$.
(b) Find the value of m if $p = 100$ and $v = 5$.

Level 2

23. Simplify $\frac{1}{2x} + \frac{1}{3x}$.
24. Simplify $\frac{4x}{9y} - \frac{1}{3y}$.
25. Simplify $\frac{1}{3(r+1)} - \frac{2}{6(1+r)}$.
26. Simplify $\frac{y}{3(4y-9)} - \frac{3}{4(4y-9)}$.
27. Factorize the following expressions.
(a) $-6f^3 + 3fg + 9f$ (b) $2xy^2 + 2xy + 4x^2y$
28. Given $x = \frac{1-y}{1+y}$, find the value of y when $x = 4$.
29. Given $\frac{4}{x} = \frac{y+4}{y-8}$.
(a) Find the value of y when $x = 16$. (b) Find the value of x when $y = 10$.
30. (a) Make r the subject of the formula $p = A(1 - \frac{r}{100})$.
(b) Find the value of r if $p = 180$ and $A = 200$.
31. (a) Make h the subject of the formula $V = \frac{1}{3}\pi r^2 h$.
(b) If $V = 198$, $r = 3$ and $\pi = \frac{22}{7}$, find the value of h .

32. (a) Make u the subject of the formula $h = ut + \frac{1}{2}at^2$.
 (b) If $a = -10$, $t = 2$ and $h = 40$, find the value of u .
33. For a triangle with sides a , b and c , the area A is $A = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{1}{2}(a+b+c)$. If $a = 7$, $b = 8$ and $c = 9$, find
 (a) the value of s .
 (b) the value of A . (Correct your answer to 2 decimal places.)
34. The geometric mean M of two numbers, a and b , is given by the formula $M = \sqrt{ab}$.
 (a) Make a the subject of the formula.
 (b) Find the value of a if $M = 9$ and $b = 3$.

Level 3

35. Given that the sum S of the natural numbers from 1 to n is $S = \frac{1}{2}n(n+1)$.
 (a) If $S_1 = 1 + 2 + 3 + \cdots + 70$, find the value of S_1 .
 (b) If $S_2 = 1 + 2 + 3 + \cdots + 100$, find the value of S_2 .
 (c) If $S_3 = 71 + 72 + 73 + \cdots + 100$, express S_3 in terms of S_1 and S_2 . Then find the value of S_3 .
 (d) If $S_4 = 2 + 4 + 6 + \cdots + 140$, express S_4 in terms of S_1 . Then find the value of S_4 .