

Chapter 2 : Factorisation and Algebraic Fractions

1. (a) (i) Factorise $18a + 3$ (ii) Expand $-3(-y + 5)$

(b) Express $\frac{5}{6y} - \frac{3x-5}{12y}$ as a single fraction in its simplest form.

2. (a) Expand:

(i) $3(-a + c)$

(ii) $-5(a - c)$

(b) Factorise $4x + 2$

(c) Simplify : $\frac{3x+6}{x^2-4} \div \frac{x+2}{x-2}$

3. (a) Factorise :

(i) $5m + 25$

(ii) $7x + 9xy$

(b) Simplify : $\frac{4x-12}{4y} \div \frac{x^2-9}{y^z}$

4. (a) Factorise completely:

$4 - 100n^2$

(b) Express $\frac{4}{5x} - \frac{7-10y}{15x}$ as a single fraction in its simplest form.

5. (a) Simplify:

$(m - 4n)(m + 4n) - m^2$

(b) Simplify : $\frac{3x-3y}{x+y} \times \frac{2x+2y}{6x}$

6. (a) Simplify each of the following :

(i) $\frac{12mn}{32}$

(ii) $\frac{x^2-xy}{x}$

(b) Express $\frac{1}{2q} - \frac{2p-7}{6q}$ as a single fraction in its simplest form.

7. (a) Factorise $2ae + 3af - 6de - 9df$

(b) Simplify $\frac{a^2-b^2}{(a+b)^2}$

8. (a) Factorise $-8c^2 - 12ac$.

(b) Simplify $\frac{ae+ad-2be-2bd}{a^2-4b^2}$

9. (a) Factorise $12x^2 - 27y^2$

(b) Simplify $\frac{3m^2-10m+3}{m^2-9} \div \frac{3m-1}{m+3}$

10. Simplify : $\frac{8m+mn}{3m} \div \frac{n^2-64}{24}$

11. (a) Expand :
 $x(2 + y)$

(b) Express $\frac{5}{6y} - \frac{3x-5}{12y}$ as a single fraction in its simplest form.

ANSWERS :

Question 1 :

(a)(i) $18a + 3 = 3(6a + 1)$

(a)(ii) $-3(-y + 5) = 3y - 15$

(b)

$$\begin{aligned}\frac{5}{6y} - \frac{3x-5}{12y} &= \frac{5 \times 2}{6y \times 2} - \frac{(3x-5)}{12y} \\&= \frac{10-3x+5}{12y} \\&= \frac{15-3x}{12y} \\&= \frac{3(5-x)}{4 \cancel{12}y} \\&= \frac{5-x}{4y}\end{aligned}$$

Question 2 :

(a)(i) $3(-a + c) = -3a + 3c$

(a)(ii) $-5(a - c) = -5a + 5c$

(c)

$$\begin{aligned}\frac{3x+6}{x^2-4} \div \frac{x+2}{x-2} &= \frac{3(\cancel{x+2})}{(x+2)(\cancel{x-2})} \times \frac{\cancel{x-2}}{\cancel{x+2}} \\&= \frac{3}{x+2}\end{aligned}$$

Question 3 :

(a)(i) $5m + 25 = 5(m + 5)$

(a)(ii) $7x + 9xy = x(7 + 9y)$

(b)
$$\frac{4x-12}{4y} \div \frac{x^2-9}{yz} = \frac{\cancel{4}(x-3)}{\cancel{4}y} \times \frac{yz}{(x+3)(\cancel{x-3})}$$

$$= \frac{z}{x+3}$$

Question 4 :

(a)

$$4 - 100n^2 = (2 + 10n)(2 - 10n)$$

(b)

$$\begin{aligned} \frac{4}{5x} - \frac{7-10y}{15x} &= \frac{4 \times 3}{5x \times 3} - \frac{(7-10y)}{15x} \\ &= \frac{12-7+10y}{15x} \\ &= \frac{5+10y}{15x} \\ &= \frac{\cancel{5}(1+2y)}{\cancel{3} \cancel{5}x} \\ &= \frac{1+2y}{3x} \end{aligned}$$

Question 5 :

(a)

$$\begin{aligned} (m - 4n)(m + 4n) - m^2 \\ = m^2 + 4mn - 4mn - 4n^2 - m^2 \\ = 0 \end{aligned}$$

(b)

$$\begin{aligned} \frac{3x-3y}{x+y} \times \frac{2x+2y}{6x} &= \frac{\cancel{3}(x-y)}{\cancel{3}(x+y)} \times \frac{\cancel{2}(x+y)}{\cancel{6}x} \\ &= \frac{x-y}{x} \end{aligned}$$

Question 6 :

$$(a)(i) \frac{12mn}{32} = \frac{3mn}{8}$$

$$(a)(ii) \frac{x^2 - xy}{x} = \frac{\cancel{x}(x-y)}{\cancel{x}} = x - y$$

(b)

$$\begin{aligned} \frac{1}{2q} - \frac{2p-7}{6q} &= \frac{1 \times 3}{2q \times 3} - \frac{(2p-7)}{6q} \\ &= \frac{3-2p+7}{6q} \\ &= \frac{10-2p}{6q} \\ &= \frac{2(5-p)}{3 \cancel{6}q} \\ &= \frac{5-p}{3q} \end{aligned}$$

Question 7 :

(a)

$$\begin{aligned} 2ae + 3af - 6de - 9df &= a(2e + 3f) - 3d(2e + 3f) \\ &= (2e + 3f)(a - 3d) \end{aligned}$$

(b)

$$\begin{aligned} \frac{a^2 - b^2}{(a+b)^2} &= \frac{\cancel{(a+b)}(a-b)}{\cancel{(a+b)}(a+b)} \\ &= \frac{a-b}{a+b} \end{aligned}$$

Question 8 :

(a)

$$\begin{aligned} -8c^2 - 12ac \\ &= -4c(2c + 3a) \end{aligned}$$

(b)

$$\begin{aligned} \frac{ae+ad-2be-2bd}{a^2-4b^2} &= \frac{a(e+d)-2b(e+d)}{(a+2b)(a-2b)} \\ &= \frac{(e+d)\cancel{(a-2b)}}{(a+2b)\cancel{(a-2b)}} \\ &= \frac{e+d}{a+2b} \end{aligned}$$

Question 9 :

(a)

$$12x^2 - 27y^2 = 3(4x^2 - 9y^2) \\ = 3(2x - 3y)(2x + 3y)$$

(b)

$$\frac{3m^2 - 10m + 3}{m^2 - 9} \div \frac{3m - 1}{m + 3} = \frac{\cancel{(3m - 1)} \cancel{(m - 3)}}{\cancel{(m + 3)} \cancel{(m - 3)}} \times \frac{\cancel{m + 3}}{\cancel{3m - 1}} \\ = 1$$

Question 10 :

$$\frac{8m + mn}{3m} \div \frac{n^2 - 64}{24} \\ = \frac{8m + mn}{3m} \times \frac{24}{n^2 - 64} \\ = \frac{m(8 + n)}{3m} \times \frac{24}{n^2 - 8^2} \\ = \frac{\cancel{m} \cancel{(8 + n)}}{3 \cancel{m}} \times \frac{2\cancel{4}_8}{(n - 8) \cancel{(n + 8)}} \\ = \frac{8}{n - 8}$$

Question 11 :

(a)

$$x(2 + y) = 2x + xy$$

(b)

$$\begin{aligned} & \frac{5}{6y} - \frac{3x-5}{12y} \\ &= \frac{5 \times 2}{6y \times 2} - \frac{3x-5}{12y} \\ &= \frac{10-(3x-5)}{12y} \\ &= \frac{10-3x+5}{12y} \\ &= \frac{15-3x}{12y} \\ &= \frac{\cancel{3}(5-x)}{\cancel{12}^4y} \\ &= \frac{5-x}{4y} \end{aligned}$$