

ALGEBRAIC FRACTIONS

Show all working. Fully factorise before cancelling factors.

1. Simplify:

$$(a) \frac{6x^2 + 9x}{4x + 6}$$

$$(b) \frac{4n \square 12}{n^2 \square 3n}$$

$$(c) \frac{4p + 8q}{p^2 + 2pq}$$

$$(d) \frac{16mn \square 12n^2}{8m^2 \square 6mn}$$

$$(e) \frac{3c \square c^2}{c^2}$$

$$(f) \frac{w}{w^2 \square 2w}$$

$$(g) \frac{6y}{xy \square y^2}$$

$$(h) \frac{4b^2}{2ab \square 8b^2}$$

$$(i) \frac{2w^2t \square w^3}{6t \square 3w}$$

$$(j) \frac{t^3 + 2t^2}{t^3}$$

$$(k) \frac{3a \square ab}{3ab \square ab^2}$$

$$(l) \frac{3mn}{m^2n \square mn^2}$$

2. Simplify:

$$(a) \frac{t^2 \square 9}{4t + 12}$$

$$(b) \frac{3y \square 12}{y^2 \square 16}$$

$$(c) \frac{1 \square x^2}{x + 1}$$

$$(d) \frac{9 \square a^2}{4a + 12}$$

$$(e) \frac{w + 5}{w^2 \square 25}$$

$$(f) \frac{2c + c^2}{4 \square c^2}$$

$$(g) \frac{1 \square 4p^2}{3 \square 6p}$$

$$(h) \frac{4 \square 9n^2}{4 \square 6n}$$

$$(i) \frac{m^2 \square 9n^2}{3m \square 9n}$$

$$(j) \frac{4x^2 \square 9y^2}{2x + 3y}$$

$$(k) \frac{u^3 + 2u^2}{u^2 \square 4}$$

$$(l) \frac{m^3 + 2m^2}{m^3 \square 4m}$$

3. Simplify:

$$(a) \frac{x^2 + 5x + 6}{3x + 9}$$

$$(b) \frac{t^2 + 7t + 12}{2t^2 + 8t}$$

$$(c) \frac{3y^2 + 12y}{y^2 + 5y + 4}$$

$$(d) \frac{4n^2 \square 8n}{n^2 \square 6n + 8}$$

$$(e) \frac{y^2 \square 9}{y^2 \square 8y + 15}$$

$$(f) \frac{p^2 \square 16}{p^2 + 3p \square 4}$$

$$(g) \frac{m^2 + 4m \square 12}{m^2 \square 4}$$

$$(h) \frac{t^2 \square 4}{t^2 + 2t \square 8}$$

$$(i) \frac{w^2 + 5w \square 24}{w^2 \square 6w + 9}$$

$$(j) \frac{x^2 \square 11x + 24}{x^2 \square 7x \square 8}$$

$$(k) \frac{r^2 \square 2r \square 24}{r^2 + r \square 12}$$

$$(l) \frac{n^2 \square 4n + 4}{n^2 + 3n \square 10}$$

4. Simplify:

$$(a) \frac{2c^2 + 5c + 3}{6c + 9}$$

$$(b) \frac{3a^2 + 8a + 5}{3a^2 + 5a}$$

$$(c) \frac{4p^2 \square 6p}{4p^2 \square 12p + 9}$$

$$(d) \frac{2n^2 + n}{2n^2 + 7n + 3}$$

$$(e) \frac{t^2 \square 4}{2t^2 \square 7t + 6}$$

$$(f) \frac{4k^2 \square 9}{2k^2 \square 13k + 15}$$

$$(g) \frac{9x^2 \square 4}{3x^2 + 4x \square 4}$$

$$(h) \frac{3r^2 + 8r \square 3}{9r^2 \square 1}$$

$$(i) \frac{y^2 \square y \square 20}{2y^2 + 7y \square 4}$$

$$(j) \frac{4d^2 \square 5d + 1}{d^2 + 4d \square 5}$$

$$(k) \frac{2m^2 + m \square 3}{6m^2 + 7m \square 3}$$

$$(l) \frac{9w^2 \square 18w + 5}{9w^2 \square 12w \square 5}$$

5. Simplify:

$$(a) \frac{x^2 + 7xy + 6y^2}{2x + 12y}$$

$$(b) \frac{m^2 \square n^2}{m^2 \square 5mn + 4n^2}$$

$$(c) \frac{u^2 + 2uv \square 8v^2}{u^2 \square 4v^2}$$

$$(d) \frac{3r^2 \square 2rt \square 5t^2}{9r^2 \square 25t^2}$$

$$(e) \frac{p^2 + 3pq + 2q^2}{p^2 + 4pq + 4q^2}$$

$$(f) \frac{4u^2 + 5uv + v^2}{u^2 + 2uv + v^2}$$

$$(g) \frac{2a^2 + 9ab \square 5b^2}{a^2 + 4ab \square 5b^2}$$

$$(h) \frac{6a^2 + 5ab \square 6b^2}{2a^2 \square 5ab \square 12b^2}$$

ANSWERS

1. (a) $\frac{3x}{2}$ (b) $\frac{4}{n}$ (c) $\frac{4}{p}$ (d) $\frac{2n}{m}$ (e) $\frac{3c}{c}$ (f) $\frac{1}{w^2}$
(g) $\frac{6}{x^2y}$ (h) $\frac{2b}{a^24b}$ (i) $\frac{w^2}{3}$ (j) $\frac{t+2}{t}$ (k) $\frac{1}{b}$ (l) $\frac{3}{m^2n}$

2. (a) $\frac{t^23}{4}$ (b) $\frac{3}{y+4}$ (c) 1^2x (d) $\frac{3^2a}{4}$ (e) $\frac{1}{w^25}$ (f) $\frac{c}{2^2c}$
(g) $\frac{1+2p}{3}$ (h) $\frac{2+3n}{2}$ (i) $\frac{m+3n}{3}$ (j) $2x^23y$ (k) $\frac{u^2}{u^22}$ (l) $\frac{m}{m^22}$

3. (a) $\frac{x+2}{3}$ (b) $\frac{t+3}{2t}$ (c) $\frac{3y}{y+1}$ (d) $\frac{4n}{n^24}$ (e) $\frac{y+3}{y^25}$ (f) $\frac{p^24}{p^21}$
(g) $\frac{m+6}{m+2}$ (h) $\frac{t+2}{t+4}$ (i) $\frac{w+8}{w^23}$ (j) $\frac{x^23}{x+1}$ (k) $\frac{r^26}{r^23}$ (l) $\frac{n^22}{n+5}$

4. (a) $\frac{c+1}{3}$ (b) $\frac{a+1}{a}$ (c) $\frac{2p}{2p^23}$ (d) $\frac{n}{n+3}$ (e) $\frac{t+2}{2t^23}$ (f) $\frac{2k+3}{k^25}$
(g) $\frac{3x+2}{x+2}$ (h) $\frac{r+3}{3r+1}$ (i) $\frac{y^25}{2y^21}$ (j) $\frac{4d^21}{d+5}$ (k) $\frac{m^21}{3m^21}$ (l) $\frac{3w^21}{3w+1}$

5. (a) $\frac{x+y}{2}$ (b) $\frac{m+n}{m^24n}$ (c) $\frac{u+4v}{u+2v}$ (d) $\frac{r+t}{3r+5t}$ (e) $\frac{p+q}{p+2q}$ (f) $\frac{4u+v}{u+v}$
(g) $\frac{2a^2b}{a^2b}$ (h) $\frac{3a^22b}{a^24b}$