Lesmahagow High School

Mathematics Department

BGE Fractions

Fractions

1. Express each sum as a fraction in its simplest form:

(a) $\frac{1}{5}+\frac{3}{5}$ **(b)** $\frac{2}{5}+\frac{1}{10}$ **(c)** $\frac{3}{4}+\frac{1}{8}$ **(d)** $\frac{1}{6}+\frac{2}{3}$

(e) $\frac{1}{9}+\frac{2}{3}$ **(f)** $\frac{1}{3}+\frac{1}{4}$ **(g)** $\frac{3}{5}+\frac{1}{4}$ **(h)** $\frac{1}{4}+\frac{1}{6}$

(i) $\frac{1}{3}+\frac{5}{8}$ **(j)** $\frac{1}{2}+\frac{2}{5}$ **(k)** $\frac{3}{4}+\frac{1}{6}$ **(l)** $\frac{1}{2}+\frac{3}{7}$

(m) $\frac{2}{7}+\frac{1}{8}$ **(n)** $\frac{1}{5}+\frac{3}{8}$ **(o)** $\frac{2}{9}+\frac{3}{7}$ **(p)** $\frac{1}{3}+\frac{4}{7}$

2. Express each difference as a fraction in its simplest form:

(a) $\frac{3}{4}-\frac{1}{4}$ **(b)** $\frac{1}{2}-\frac{1}{6}$ **(c)** $\frac{5}{6}-\frac{2}{3}$ **(d)** $\frac{11}{12}-\frac{5}{6}$

(e) $\frac{11}{12}-\frac{2}{3}$ **(f)** $\frac{1}{2}-\frac{1}{16}$ **(g)** $\frac{2}{3}-\frac{1}{4}$ **(h)** $\frac{1}{2}-\frac{2}{5}$

(i) $\frac{4}{5}-\frac{1}{2}$ **(j)** $\frac{7}{8}-\frac{3}{16}$ **(k)** $\frac{11}{12}-\frac{1}{3}$ **(l)** $\frac{7}{12}-\frac{1}{3}$

(m) $\frac{5}{8}-\frac{2}{5}$ **(n)** $\frac{5}{6}-\frac{3}{5}$ **(o)** $\frac{7}{9}-\frac{3}{7}$ **(p)** $\frac{5}{8}-\frac{7}{16}$

3. Express each product as a fraction in its simplest form:

(a) $\frac{1}{4}\times\frac{4}{7}$ **(b)** $\frac{1}{3}\times\frac{3}{10}$ **(c)** $\frac{1}{2}\times\frac{4}{7}$ **(d)** $\frac{2}{3}\times\frac{1}{8}$

(e) $\frac{4}{5}\times\frac{1}{16}$ **(f)** $\frac{6}{7}\times\frac{2}{3}$ **(g)** $\frac{3}{5}\times\frac{10}{21}$ **(h)** $\frac{3}{8}\times\frac{4}{21}$

(i) $\frac{21}{32}\times\frac{4}{7}$ **(j)** $\frac{1}{9}\times\frac{12}{13}$ **(k)** $\frac{5}{16}\times\frac{6}{25}$ **(l)** $\frac{5}{7}\times\frac{14}{15}$

(m) $\frac{7}{9}\times\frac{12}{35}$ **(n)** $\frac{12}{13}\times\frac{39}{48}$ **(o)** $\frac{2}{3}\times\frac{5}{9}$ **(p)** $\frac{5}{8}\times\frac{11}{15}$

4. Express as a single fraction:

(a)	$\frac{1}{4} \div \frac{1}{3}$	**(b)**	$\frac{2}{5} \div \frac{2}{7}$	**(c)**	$\frac{4}{5} \div \frac{3}{4}$	**(d)**	$\frac{3}{7} \div \frac{2}{5}$
(e)	$\frac{5}{12} \div \frac{5}{3}$	**(f)**	$\frac{5}{9} \div \frac{1}{3}$	**(g)**	$\frac{2}{5} \div \frac{9}{10}$	**(h)**	$\frac{3}{7} \div \frac{11}{14}$
(i)	$\frac{4}{9} \div \frac{2}{3}$	**(j)**	$\frac{2}{5} \div \frac{4}{5}$	**(k)**	$\frac{24}{35} \div \frac{20}{21}$	**(l)**	$\frac{6}{25} \div \frac{9}{20}$
(m)	$\frac{8}{21} \div \frac{9}{14}$	**(n)**	$\frac{10}{21} \div \frac{8}{9}$	**(o)**	$\frac{20}{33} \div \frac{15}{44}$	**(p)**	$\frac{7}{30} \div \frac{5}{20}$

The following are extension Questions

5. Express each sum as a fraction in its simplest form:

(a)	$\frac{a}{5} + \frac{a}{5}$	**(b)**	$\frac{2b}{5} + \frac{b}{10}$	**(c)**	$\frac{3x}{4} + \frac{x}{8}$	**(d)**	$\frac{p}{6} + \frac{2p}{3}$
(e)	$\frac{y}{9} + \frac{2y}{3}$	**(f)**	$\frac{3}{m} + \frac{2}{m}$	**(g)**	$\frac{5}{x} + \frac{1}{x}$	**(h)**	$\frac{2}{a} + \frac{5}{2a}$
(i)	$\frac{4}{3y} + \frac{3}{y}$	**(j)**	$\frac{8}{p} + \frac{3}{5p}$	**(k)**	$\frac{3}{a} + \frac{2}{b}$	**(l)**	$\frac{5}{x} + \frac{3}{y}$
(m)	$\frac{2}{m} + \frac{7}{n}$	**(n)**	$\frac{4}{p} + \frac{3}{q}$	**(o)**	$\frac{9}{c} + \frac{7}{d}$	**(p)**	$\frac{3}{2x} + \frac{2}{3y}$
(q)	$\frac{4}{3a} + \frac{5}{2b}$	**(r)**	$\frac{2}{3a} + \frac{9}{3b}$	**(s)**	$\frac{5}{4m} + \frac{3}{2n}$	**(t)**	$\frac{7}{3p} + \frac{2}{6q}$
(u)	$\frac{1}{a} + \frac{2}{a^2}$	**(v)**	$\frac{5}{x^2} + \frac{3}{x}$	**(w)**	$\frac{3}{3b} + \frac{4}{b^2}$	**(x)**	$\frac{8}{2m} + \frac{5}{3m^2}$

6. Express each difference as a fraction in its simplest form:

(a) $\frac{3a}{5}-\frac{a}{5}$ **(b)** $\frac{2b}{5}-\frac{b}{10}$ **(c)** $\frac{3x}{4}-\frac{x}{8}$ **(d)** $\frac{5p}{6}-\frac{2p}{3}$

(e) $\frac{8y}{9}+\frac{2y}{3}$ **(f)** $\frac{5}{m}-\frac{2}{m}$ **(g)** $\frac{7}{x}-\frac{3}{x}$ **(h)** $\frac{5}{a}-\frac{1}{2a}$

(i) $\frac{8}{3y}-\frac{2}{y}$ **(j)** $\frac{8}{p}-\frac{3}{5p}$ **(k)** $\frac{3}{a}-\frac{2}{b}$ **(l)** $\frac{5}{x}-\frac{3}{y}$

6. (continued)

(m) $\frac{7}{m}-\frac{2}{n}$ **(n)** $\frac{4}{p}-\frac{3}{q}$ **(o)** $\frac{9}{c}-\frac{7}{d}$ **(p)** $\frac{3}{2x}-\frac{2}{3y}$

(q) $\frac{5}{3a}-\frac{3}{2b}$ **(r)** $\frac{5}{3a}-\frac{2}{3b}$ **(s)** $\frac{5}{4m}-\frac{3}{2n}$ **(t)** $\frac{7}{3p}-\frac{2}{6q}$

(u) $\frac{1}{a}-\frac{2}{a^2}$ **(v)** $\frac{7}{x^2}-\frac{3}{x}$ **(w)** $\frac{4}{3b}-\frac{3}{b^2}$ **(x)** $\frac{7}{2p^2}-\frac{4}{3p}$

7. Express each product as a fraction in its simplest form

(a) $\frac{x}{3}\times\frac{x}{6}$ **(b)** $\frac{y}{2}\times\frac{y}{4}$ **(c)** $\frac{a}{2}\times\frac{b}{7}$ **(d)** $\frac{p}{3}\times\frac{q}{8}$

(e) $\frac{c^2}{5}\times\frac{c}{6}$ **(f)** $\frac{6}{a}\times\frac{2}{a}$ **(g)** $\frac{3}{x}\times\frac{10}{y}$ **(h)** $\frac{3}{p}\times\frac{4}{p}$

(i) $\frac{2}{3m}\times\frac{4}{5m}$ **(j)** $\frac{1}{b}\times\frac{11}{3c}$ **(k)** $\frac{5m}{6}\times\frac{3}{2m}$ **(l)** $\frac{5}{7x}\times\frac{4x}{3}$

(m) $\frac{2y}{9}\times\frac{12}{5y^2}$ **(n)** $\frac{2}{3a}\times\frac{3}{7a^2}$ **(o)** $\frac{5}{3p}\times\frac{2}{p^3}$ **(p)** $\frac{3t^2}{5s}\times\frac{2s^2}{6t^3}$

(q) $\frac{5pq}{2}\times\frac{3}{4pq^2}$ **(r)** $\frac{7ab^2}{6c}\times\frac{2c^3}{3a^2}$ **(s)** $\frac{4}{5mn}\times\frac{2m^4}{n^2}$

(t) $\frac{4yz}{9x}\times\frac{3xz}{2y^3}$ **(u)** $\frac{5ab^3}{3c}\times\frac{3a}{2bc^2}$ **(v)** $\frac{2cd}{7a}\times\frac{3a^2}{4cd^2}$

(w) $\frac{10xy^2}{3}\times\frac{12xy}{5y^2}$ **(x)** $\frac{3}{8s^3}\times\frac{4st}{t^3}$ **(y)** $\frac{4pq^2}{3a}\times\frac{6a^2}{5p^3}$

8. Express as a single fraction:

(a) $\frac{a}{4} \div \frac{a}{2}$ **(b)** $\frac{x}{2} \div \frac{y}{2}$ **(c)** $\frac{ab}{5} \div \frac{a}{2}$

(d) $\frac{p^2}{10} \div \frac{p}{5}$ **(e)** $\frac{2c}{3} \div \frac{c^2}{6}$ **(f)** $\frac{3}{t} \div \frac{6}{t}$

8. (continued)

(g) $\frac{2}{k} \div \frac{4}{m}$ **(h)** $\frac{3}{y} \div \frac{9}{y^2}$ **(i)** $\frac{4}{bc} \div \frac{2}{c}$

(j) $\frac{3}{2x} \div \frac{12}{x^2}$ **(k)** $\frac{24xy}{35z} \div \frac{20xy}{21z}$ **(l)** $\frac{6q^2}{25p} \div \frac{9q}{20p^2}$

(m) $\frac{8ab}{21c} \div \frac{9b}{14ac}$ **(n)** $\frac{10m}{21n^2} \div \frac{8mn}{9}$ **(o)** $\frac{20ax}{33y} \div \frac{15x}{44ay^2}$

9. Simplify the following:

(a) $\frac{x+2}{3} + \frac{x+3}{6}$ **(b)** $\frac{a+6}{4} + \frac{a-2}{3}$ **(c)** $\frac{d-3}{2} - \frac{d+2}{6}$

(d) $\frac{2a-1}{4} - \frac{a+2}{5}$ **(e)** $\frac{a+3b}{2} + \frac{a-2b}{4}$ **(f)** $\frac{2u+v}{3} - \frac{u-v}{4}$

(g) $\frac{2}{x+3} + \frac{3}{x+2}$ **(h)** $\frac{4}{x+5} + \frac{5}{x+1}$ **(i)** $\frac{7}{x-3} + \frac{4}{x+2}$

(j) $\frac{2}{x+4} - \frac{3}{x-3}$ **(k)** $\frac{1}{x-3} - \frac{5}{x-2}$ **(l)** $\frac{2}{x-5} - \frac{3}{x-4}$

ALGEBRAIC FRACTIONS **EXAM QUESTIONS**

1. Write as a single fraction in its simplest form $\frac{5}{x+2}+\frac{4}{x}:\ x\neq -2,\ x\neq 0$.

2. Simplify this fraction $\frac{2x^2-5x+3}{4x^2-9}$

3. Simplify fully the fraction $\frac{6e^2-3e}{4e^2-1}$

4. Simplify $\frac{3}{x+2}-\frac{5}{x-1}$

5. Write as a single fraction in its simplest form: $\frac{3a}{5x}\div\frac{a}{x^2}$

6. Express as a single fraction in its simplest form: $\frac{3}{x}-\frac{2}{x-5}$.

REDUCING an ALGEBRAIC FRACTION to SIMPLEST FORM

1. **(a)** $\frac{1}{2}$ **(b)** $\frac{2}{3}$ **(c)** $\frac{15}{8}$ **(d)** $\frac{3}{4}$ **(e)** $2a$ **(f)** $\frac{3b}{2}$

(g) $\frac{3}{2x}$ **(h)** $\frac{5}{3y}$ **(i)** $\frac{1}{4c}$ **(j)** $\frac{4}{a^2}$ **(k)** $\frac{1}{4p}$ **(l)** $\frac{6a}{c}$

(m) $\frac{2}{a}$ **(n)** $\frac{5x}{6y}$ **(o)** $\frac{v}{3t}$ **(p)** $\frac{5b^2}{a}$ **(q)** $\frac{6p}{5q}$ **(r)** $\frac{27x^2}{2}$

(s) $\frac{3n}{4}$ **(t)** $\frac{4df}{5e}$ **(u)** $\frac{3b^2}{4a}$ **(v)** $\frac{k}{7m}$ **(w)** $\frac{1}{2eg}$ **(x)** $\frac{7y^2}{12x^2}$

2. **(a)** $\frac{a+2b}{2}$ **(b)** $2(2x+3y)$ **(c)** $\frac{3+a}{b}$ **(d)** $\frac{x+y}{2}$

(e) $\frac{y+x}{6+y}$ **(f)** $\frac{a+2b}{3b}$ **(g)** $\frac{5b+3b^2}{2}$ **(h)** $\frac{7p+5q}{s}$

(i) $\frac{3}{2b-c}$ **(j)** $\frac{2x}{3(x+y)}$ **(k)** $\frac{t}{3r-t}$ **(l)** $\frac{1}{2a+3b}$

(m) $\frac{7p}{4}$ **(n)** $\frac{4}{3a}$ **(o)** $\frac{2n}{3}$ **(p)** $\frac{3x}{2}$

3. **(a)** $b-2$ **(b)** $x+9$ **(c)** $a-5$ **(d)** $y-6$ **(e)** $\frac{c+7}{2}$ **(f)** $\frac{a-8}{2}$

(g) $\frac{p+1}{5}$ **(h)** $\frac{q-3}{3}$ **(i)** $\frac{a-b}{3}$ **(j)** $\frac{x+y}{5}$ **(k)** $m-3$ **(l)** $\frac{d+4}{4}$

(m) $x+2$ **(n)** $\frac{1}{p-1}$ **(o)** $\frac{a}{x+5}$ **(p)** $\frac{a-1}{a+1}$ **(q)** $\frac{b-3}{b+3}$ **(r)** $\frac{c-3}{c-5}$

(s) $\frac{3x-1}{x-2}$ **(t)** $\frac{y+2}{y-3}$ **(u)** $\frac{p-5}{p+1}$ **(v)** $\frac{c-4}{c-7}$ **(w)** $\frac{2x+1}{x+3}$ **(x)** $\frac{2a-5}{a-4}$

(y) $\frac{5b+1}{5b-1}$

APPLYING the FOUR OPERATIONS to ALGEBRAIC FRACTIONS

1. **(a)** $\frac{4}{5}$ **(b)** $\frac{1}{2}$ **(c)** $\frac{7}{8}$ **(d)** $\frac{5}{6}$ **(e)** $\frac{7}{9}$ **(f)** $\frac{7}{12}$

(g) $\frac{17}{20}$ **(h)** $\frac{5}{12}$ **(i)** $\frac{23}{24}$ **(j)** $\frac{9}{10}$ **(k)** $\frac{11}{12}$ **(l)** $\frac{13}{14}$

(m) $\frac{23}{56}$ **(n)** $\frac{23}{40}$ **(o)** $\frac{41}{63}$ **(p)** $\frac{19}{21}$

2. **(a)** $\frac{1}{2}$ **(b)** $\frac{1}{3}$ **(c)** $\frac{1}{6}$ **(d)** $\frac{1}{12}$ **(e)** $\frac{1}{4}$ **(f)** $\frac{7}{16}$

(g) $\frac{5}{12}$ **(h)** $\frac{1}{10}$ **(i)** $\frac{3}{10}$ **(j)** $\frac{11}{16}$ **(k)** $\frac{7}{12}$ **(l)** $\frac{1}{4}$

(m) $\frac{9}{40}$ **(n)** $\frac{7}{30}$ **(o)** $\frac{22}{63}$ **(p)** $\frac{3}{16}$

3. **(a)** $\frac{1}{7}$ **(b)** $\frac{1}{10}$ **(c)** $\frac{2}{7}$ **(d)** $\frac{1}{12}$ **(e)** $\frac{1}{20}$ **(f)** $\frac{4}{7}$

(g) $\frac{2}{7}$ **(h)** $\frac{1}{14}$ **(i)** $\frac{3}{8}$ **(j)** $\frac{4}{39}$ **(k)** $\frac{3}{40}$ **(l)** $\frac{2}{3}$

(m) $\frac{4}{15}$ **(n)** $\frac{3}{4}$ **(o)** $\frac{10}{27}$ **(p)** $\frac{11}{24}$

4. **(a)** $\frac{3}{4}$ **(b)** $\frac{7}{5}$ **(c)** $\frac{16}{15}$ **(d)** $\frac{15}{14}$ **(e)** $\frac{1}{4}$ **(f)** $\frac{5}{3}$

(g) $\frac{4}{9}$ **(h)** $\frac{6}{11}$ **(i)** $\frac{2}{3}$ **(j)** $\frac{1}{2}$ **(k)** $\frac{18}{25}$ **(l)** $\frac{8}{15}$

(m) $\frac{16}{27}$ **(n)** $\frac{15}{28}$ **(o)** $\frac{16}{9}$ **(p)** $\frac{14}{15}$

5. **(a)** $\frac{2a}{5}$ **(b)** $\frac{b}{2}$ **(c)** $\frac{7x}{8}$ **(d)** $\frac{5p}{6}$ **(e)** $\frac{7y}{9}$ **(f)** $\frac{5}{m}$

(g) $\frac{6}{x}$ **(h)** $\frac{9}{2a}$ **(i)** $\frac{13}{3y}$ **(j)** $\frac{43}{5p}$ **(k)** $\frac{3b+2a}{ab}$ **(l)** $\frac{5y+3x}{xy}$

(m) $\frac{2n+7m}{mn}$ **(n)** $\frac{4q+3p}{pq}$ **(o)** $\frac{9d+7c}{cd}$ **(p)** $\frac{9y+4x}{6xy}$

(q) $\frac{8b+15a}{6ab}$ **(r)** $\frac{2b+9a}{3ab}$ **(s)** $\frac{5n+6m}{4mn}$ **(t)** $\frac{7q+p}{3pq}$

(u) $\frac{2+a}{a^2}$ **(v)** $\frac{5+3x}{x^2}$ **(w)** $\frac{b+4}{b^2}$ **(x)** $\frac{12m+5}{3m^2}$

6. **(a)** $\frac{2a}{5}$ **(b)** $\frac{3b}{10}$ **(c)** $\frac{5x}{8}$ **(d)** $\frac{p}{6}$ **(e)** $\frac{2y}{9}$ **(f)** $\frac{3}{m}$

(g) $\frac{4}{x}$ **(h)** $\frac{9}{2a}$ **(i)** $\frac{2}{3y}$ **(j)** $\frac{37}{5p}$ **(k)** $\frac{3b-2a}{ab}$ **(l)** $\frac{5y-3x}{xy}$

(m) $\frac{7n-2m}{mn}$ **(n)** $\frac{4q-3p}{pq}$ **(o)** $\frac{9d-7c}{cd}$ **(p)** $\frac{9y-4x}{6xy}$

(q) $\frac{10b-9a}{6ab}$ **(r)** $\frac{5b-2a}{3ab}$ **(s)** $\frac{5n-6m}{4mn}$ **(t)** $\frac{7q-p}{3pq}$

(u) $\frac{a-2}{a^2}$ **(v)** $\frac{7-3x}{x^2}$ **(w)** $\frac{4b-9}{3b^2}$ **(x)** $\frac{21-8p}{6p^2}$

7. **(a)** $\frac{x^2}{18}$ **(b)** $\frac{y^2}{8}$ **(c)** $\frac{ab}{14}$ **(d)** $\frac{pq}{24}$ **(e)** $\frac{c^3}{30}$ **(f)** $\frac{12}{a^2}$

(g) $\frac{30}{xy}$ **(h)** $\frac{12}{p^2}$ **(i)** $\frac{8}{15m^2}$ **(j)** $\frac{11}{3bc}$ **(k)** $\frac{5}{4}$ **(l)** $\frac{20}{21}$

(m) $\frac{8}{15y}$ **(n)** $\frac{2}{7a^3}$ **(o)** $\frac{10}{3p^4}$ **(p)** $\frac{s}{5t}$ **(q)** $\frac{15}{8q}$ **(r)** $\frac{7b^2c^2}{9a}$

(s) $\frac{8m^3}{5n^3}$

(t) $\frac{2z^2}{3y^2}$ **(u)** $\frac{5a^2b^2}{2c^3}$ **(v)** $\frac{3a}{14d}$

(w) $8x^2y$ **(x)** $\frac{3}{2s^2t^2}$ **(y)** $\frac{8q^2a}{5p^2}$

8. **(a)** $\frac{1}{2}$ **(b)** $\frac{x}{y}$ **(c)** $\frac{2b}{5}$ **(d)** $\frac{p}{2}$ **(e)** $\frac{4}{c}$ **(f)** $\frac{1}{2}$

(g) $\frac{m}{2k}$ **(h)** $\frac{y}{3}$ **(i)** $\frac{2}{b}$ **(j)** $\frac{x}{8}$ **(k)** $\frac{18}{25}$ **(l)** $\frac{8pq}{15}$

(m) $\frac{16a^2}{27}$ **(n)** $\frac{15}{28n^3}$ **(o)** $\frac{16a^2y}{9}$

9. **(a)** $\frac{3x+7}{6}$ **(b)** $\frac{7a+10}{12}$ **(c)** $\frac{2d-11}{6}$ **(d)** $\frac{6a-13}{20}$

(e) $\frac{3a+4b}{4}$ **(f)** $\frac{5u+7v}{12}$ **(g)** $\frac{5x+13}{(x+3)(x+2)}$ **(h)** $\frac{9x+29}{(x+5)(x+1)}$

(i) $\frac{11x+2}{(x-3)(x+2)}$ **(j)** $\frac{-x-18}{(x+4)(x-3)}$ **(k)** $\frac{13-4x}{(x-3)(x-2)}$ **(l)** $\frac{7-x}{(x-5)(x-4)}$

ALGEBRAIC FRACTIONS EXAM QUESTIONS

1. $\frac{9x+8}{x(x+2)}$ **2.** $\frac{x-1}{(2x+3)}$ **3.** $\frac{3e}{e+1}$

4. $\frac{-2x-13}{(x-1)(x+2)}$ **5.** $\frac{3x}{5}$ **6.** $\frac{x-15}{x(x-5)}$