



Algebraic Fractions (M&D)

Algebraic Fractions: Multiplication & Division

Algebraic fractions are fractions containing algebraic expressions. When applying multiplication or division operations, there are some important things to remember to maximise your efficiency.

Firstly, expand products only when necessary. This is useful for binomials (even trinomials) that can be crossed out. Secondly, invert your fractions to change $\div$ into $\times$.

EXAMPLE 1:

Multiply

$$\frac{x+1}{8x} \times \frac{x}{x+1}$$

STEP ONE:

Multiply without expansion

$$\frac{x(x+1)}{8x(x+1)}$$

STEP TWO:

Cross out and simplify

$$\frac{\cancel{x}(x+1)}{8\cancel{x}(x+1)} = \frac{1}{8}$$

EXAMPLE 1:

Divide

$$\frac{x-3}{14} \div \frac{x}{7}$$

STEP ONE:

Invert fraction and multiply

$$\frac{x-3}{14} \times \frac{7}{x} = \frac{7(x-3)}{14x}$$

STEP TWO:

Cross out and simplify

$$\frac{7(x-3)}{\cancel{14}x} = \frac{x-3}{2x}$$

Instructions: Multiply and divide the algebraic fractions below.

1

$$\frac{3c}{5} \times \frac{d}{3c}$$

2

$$\frac{2p^5}{3} \div \frac{5}{p}$$



3

$$\frac{a^5}{b^6} \times \frac{b^8}{a^2}$$

4

$$\frac{14k^8}{3} \div \frac{7k^2}{4}$$

5

$$\frac{12v}{5} \div \frac{15w}{3v^3}$$

6

$$\frac{11n^8}{n^{11}} \times \frac{4n^5}{2}$$

7

$$\frac{16q}{3r} \div \frac{8q}{2r^2}$$

8

$$\frac{5t}{4u^2} \div \frac{t^3}{10u^4}$$



9

$$\frac{(x+4)^2}{2(x+4)} \times \frac{4(x-4)}{(x+4)^5}$$

10

$$\frac{a^2 - 3a}{a(a-3)^2} \div \frac{6(a+3)}{2(a-3)}$$

11

$$\frac{4k - jk}{8k} \times \frac{32}{(4-j)^3}$$



12

$$\frac{-14e}{e^2 + e} \times \frac{e + 1}{21e}$$

13

$$\frac{9u - 18u^2}{u^2} \div \frac{(1 - 2u)^2}{uw^2}$$

14

$$\frac{x^2 + 4x + 4}{(x + 2)(x - 2)} \times \frac{(x - 2)^2}{(x + 2)^3}$$



15

$$\frac{(w-7)(w-5)}{w^2-25} \div \frac{w^2-14w+49}{(w+5)^2}$$

16

$$\frac{h^2+8h}{9h} \div \frac{h^2-64h}{3(h-8)^4}$$

17

$$\frac{42(l^2-12l+36)}{35(m+5)} \times \frac{m^2+10m+25}{(l-6)(m+5)}$$



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$$\frac{9t}{6u} \times \frac{t^2}{tu^2}$$

2

$$\frac{11s^7}{3t} \div \frac{10st}{2s^4}$$



3

$$\frac{4b^3c^4}{bcd} \times \frac{8cd^2}{2b^4d}$$

4

$$\frac{21j^4}{k^2} \times \frac{2k}{49jk^2}$$

5

$$\frac{36qrs}{2r^2} \times \frac{3qs}{18q}$$

6

$$\frac{56v^8}{16v^5} \times \frac{u^3}{2vu^2}$$

7

$$\frac{72}{60f^4} \div \frac{3e^2f}{ef^2}$$

8

$$\frac{54mn^3}{m^3n^6} \div \frac{30m^4}{12n^5}$$



9

$$\frac{(6-r)^3}{12-2r} \times \frac{rs^2}{s(6-r)^4}$$

10

$$\frac{18c+27}{9cd^2} \div \frac{(2c+3)(2c-3)}{3(2c+3)^2}$$

11

$$\frac{w^2+6w+9}{(w+3)(w-3)} \div \frac{3}{9w-27}$$



12

$$\frac{90 + 110g}{4g - 4} \times \frac{4(g - 1)^3}{10}$$

13

$$\frac{96p^2}{p^2 - 64} \div \frac{48pq^4}{p + 8}$$

14

$$\frac{12t^7}{(t + 2)(t - 1)} \div \frac{8t + 16}{(2t - 2)(t + 2)}$$



15

$$\frac{(a^4b^5)^3}{a^2 - b^2} \times \frac{(a + b)^2}{a^8b^{10}}$$

16

$$\frac{132n^3 - 144n}{n(n + 4)} \div \frac{24n}{n^2 + 8n + 16}$$

17

$$\frac{4(4d + 5)^2}{7d + 14} \times \frac{24(d + 2)}{56(12d + 15)}$$