# Algebraic Fractions (Simplifying)

SCAN ME

REVISE THIS TOPIC

**1** Simplify fully $\frac{3a + 9}{a^3 + 3a^2}$ **[2 marks]**

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

Answer $\frac{3}{a^2}$

**2** Simplify fully $\frac{2x^2 - 2xy}{xy^4 - y^5}$ **[2 marks]**

$\frac{2x(x-y)}{y^4(x-y)}$

Answer $\frac{2x}{y^4}$

**3** Simplify fully $\frac{3b + b^3}{4b^2 + 12}$ **[2 marks]**

$\frac{b(3+b^2)}{4(b^2+3)}$

Answer $\frac{b}{4}$

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**4** Simplify fully $\frac{10n^2 - 90}{2n - 6}$ **[2 marks]**

$\frac{10(n^2-9)}{2(n-3)} = \frac{10(n+3)(n-3)}{2(n-3)}$

Answer $5(n+3)$ [or $5n+15$]

**5** Simplify fully $\frac{4k^2 - 1}{6k^3 - 3k^2}$ **[2 marks]**

$\frac{(2k+1)(2k-1)}{3k^2(2k-1)}$

Answer $\frac{2k+1}{3k^2}$

**6** Simplify fully $\frac{4c^3 - 100c}{4c + 20}$ **[2 marks]**

$\frac{4c(c^2-25)}{4(c+5)} = \frac{4c(c+5)(c-5)}{4(c+5)}$

Answer $c(c-5)$ [or $c^2-5c$]

**7** Simplify fully $\dfrac{2x^2 - 32}{x^2 + 9x + 20}$ **[3 marks]**

$\dfrac{2(x^2-16)}{(x+4)(x+5)} = \dfrac{2(x+4)(x-4)}{(x+4)(x+5)}$

Answer $\dfrac{2(x-4)}{x+5}$ [or $\dfrac{2x-8}{x+5}$]

**8** Simplify fully $\dfrac{a^2 - 11a + 30}{a^2 - 12a + 36}$ **[3 marks]**

$\dfrac{(a-5)(a-6)}{(a-6)(a-6)}$

Answer $\dfrac{a-5}{a-6}$

**9** Simplify fully $\dfrac{y^2 - 7y - 18}{y^2 - 81}$ **[3 marks]**

$\dfrac{(y+2)(y-9)}{(y+9)(y-9)}$

Answer $\dfrac{y+2}{y+9}$

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**10** Simplify fully $\dfrac{9x^2 - 25}{3x^2 + 14x + 15}$ **[3 marks]**

$\dfrac{(3x+5)(3x-5)}{(3x+5)(x+3)}$

Answer $\dfrac{3x-5}{x+3}$

**11** Simplify fully $\dfrac{4y^2 - 9}{2y^2 - 11y + 12}$ **[3 marks]**

$\dfrac{(2y+3)(2y-3)}{(2y-3)(y-4)}$

Answer $\dfrac{2y+3}{y-4}$

**12** Simplify fully $\dfrac{n^2 + 11n + 24}{5n^2 + 22n + 21}$ **[3 marks]**

$\dfrac{(n+8)(n+3)}{(5n+7)(n+3)}$

Answer $\dfrac{n+8}{5n+7}$

**13** Simplify fully $\dfrac{45 - 20x^2}{2x^2 + 5x + 3}$ **[3 marks]**

$\dfrac{5(9 - 4x^2)}{(2x+3)(x+1)} = \dfrac{5(3-2x)(3+2x)}{(2x+3)(x+1)}$

Answer $\dfrac{5(3-2x)}{x+1}$ [or $\dfrac{15-10x}{x+1}$]

**14** Simplify fully $\dfrac{3x^2 + 19x + 6}{9x^2 + 6x + 1}$ **[3 marks]**

$\dfrac{(3x+1)(x+6)}{(3x+1)(3x+1)}$

Answer $\dfrac{x+6}{3x+1}$

**15** Simplify fully $\dfrac{3x^2 - 300}{6x^2 + 55x - 50}$ **[3 marks]**

$\dfrac{3(x^2-100)}{(6x-5)(x+10)} = \dfrac{3(x+10)(x-10)}{(6x-5)(x+10)}$

Answer $\dfrac{3(x-10)}{6x-5}$ [or $\dfrac{3x-30}{6x-5}$]

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**16** Show that $\frac{12x - 36}{x^2 + 5x} \times \frac{x^2 + 9x + 20}{3x - 9}$ can be written in the form $a + \frac{b}{x}$ **[4 marks]**

where $a$ and $b$ are integers.

$$\frac{12(x-3)}{x(x+5)} \times \frac{(x+4)(x+5)}{3(x-3)}$$

$$= \frac{12(x-3)(x+4)(x+5)}{3x(x+5)(x-3)}$$

$$= \frac{4(x+4)}{x}$$

$$= \frac{4x + 16}{x}$$

$$= 4 + \frac{16}{x}$$

**17** Show that $(10x - 35) \div \frac{2x^2 - 15x + 28}{2x^2 - 32}$ can be written in the form $ax + b$ **[4 marks]**

where $a$ and $b$ are integers.

$$5(2x-7) \times \frac{2(x+4)(x-4)}{(2x-7)(x-4)}$$

$$= \frac{10(2x-7)(x+4)(x-4)}{(2x-7)(x-4)}$$

$$= 10(x+4)$$

$$= 10x + 40$$

**18** Show that $9x^{-3} \times \frac{3x^5 + 10x^4}{9x^2 - 100} \div \frac{x^2}{6x - 20}$ can be written in the form $\frac{a}{x}$ **[4 marks]**

where $a$ is an integer.

$$\frac{9}{x^3} \times \frac{x^4(3x+10)}{(3x+10)(3x-10)} \times \frac{2(3x-10)}{x^2}$$

$$= \frac{18x^4(3x+10)(3x-10)}{x^5(3x+10)(3x-10)}$$

$$= \frac{18}{x}$$

**19** $2x - \frac{x^3 - x^2}{x^2 + 2x - 3} \times \frac{2x^2 - 1}{x^2}$ can be written in the form $\frac{ax + b}{x + 3}$

where $a$ and $b$ are integers. Work out the values of $a$ and $b$. **[4 marks]**

$$2x - \frac{x^2(x-1)}{(x+3)(x-1)} \times \frac{2x^2-1}{x^2}$$

$$= 2x - \frac{2x^2-1}{x+3}$$

$$= \frac{2x(x+3)}{x+3} - \frac{2x^2-1}{x+3}$$

$$= \frac{(2x^2+6x)-(2x^2-1)}{x+3}$$

$$= \frac{2x^2+6x-2x^2+1}{x+3}$$

$$= \frac{6x+1}{x+3}$$

$a =$ 6 $b =$ 1

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