Solutions

2. Simplify. State any restrictions on the variables.

a) $\dfrac{2x}{3} \div \dfrac{x^2}{5}$

$$x^2 \neq 0$$
$$\Rightarrow x \neq 0$$
$$= \dfrac{2x}{3} \times \dfrac{5}{x^2}$$
$$= \dfrac{10x}{3x^2}$$
$$= \dfrac{10(x)}{3x(x)}$$
$$= \dfrac{10}{3x}$$

c) $\dfrac{3x(x-6)}{(x+2)(x-7)} \div \dfrac{(x-6)}{(x+2)}$

$$x \neq -2, 7 \qquad x \neq -2, 6$$
$$= \dfrac{3x(x-6)}{(x+2)(x-7)} \times \dfrac{(x+2)}{(x-6)}$$
$$= \dfrac{3x(x-6)(x+2)}{(x+2)(x-7)(x-6)}$$
$$= \dfrac{3x}{x-7}$$

2. Simplify. State any restrictions on the variables.

b) $\dfrac{x-7}{10} \div \dfrac{2x-14}{25}$

d) $\dfrac{x^2-1}{x-2} \div \dfrac{x+1}{12-6x}$

$= \dfrac{x-7}{10} \div \dfrac{2(x-7)}{25}$

$x \neq 7$

$= \dfrac{x-7}{10} \times \dfrac{25}{2(x-7)}$

$= \dfrac{25(x-7)}{20(x-7)}$

$= \dfrac{(5)(5)(x-7)}{(4)(5)(x-7)}$

$= \dfrac{5}{4}$

$= \dfrac{(x+1)(x-1)}{(x-2)} \div \dfrac{(x+1)}{6(2-x)}$

$x \neq 2 \qquad x \neq 2, -1$

$= \dfrac{(x+1)(x-1)}{(x-2)} \times \dfrac{6(-1)(x-2)}{(x+1)}$

$= \dfrac{-6(x+1)(x-1)(x-2)}{(x-2)(x+1)}$

$= -6(x-1)$

OR $6(1-x)$ OR $6-6x$

4. Simplify. State any restrictions on the variables.

b) $\dfrac{7a}{3} \div \dfrac{14a^2}{5}$

d) $\dfrac{3a^2b^3}{2ab^2} \div \dfrac{9a^2b}{14a^2}$

$a^2 \neq 0$
$a \neq 0$

$= \dfrac{7a}{3} \times \dfrac{5}{14a^2}$

$= \dfrac{7a}{3} \times \dfrac{5}{7a(2a)}$

$= \dfrac{(7a)(5)}{3(7a)(2a)}$

$= \dfrac{5}{3(2a)} = \dfrac{5}{6a}$

$a \neq 0, b \neq 0$

$= \dfrac{3a^2b^3}{2ab^2} \times \dfrac{14a^2}{9a^2b}$

$= \dfrac{42a^4b^3}{18a^3b^3}$

$= \dfrac{7(6)(a)(a^3)(b^3)}{3(6)(a^3)(b^3)}$

$= \dfrac{7a}{3}$

5. Simplify. State any restrictions on the variables.

b) $\dfrac{3a-6}{a+2} \div \dfrac{a-2}{a+2}$

$a \neq -2, \quad a \neq -2, 2$

$= \dfrac{3(a-2)}{a+2} \times \dfrac{a+2}{a-2}$

$= \dfrac{3\cancel{(a-2)}\cancel{(a+2)}}{\cancel{(a+2)}\cancel{(a-2)}}$

$= 3$

d) $\dfrac{3(m+4)^2}{2m+1} \div \dfrac{5(m+4)}{7m+14}$

$= \dfrac{3(m+4)(m+4)}{2m+1} \div \dfrac{5(m+4)}{7(m+2)}$

$2m \neq -1, \quad m \neq -\dfrac{1}{2}, \quad m \neq -2, -4$

$= \dfrac{3(m+4)(m+4)}{2m+1} \times \dfrac{7(m+2)}{5(m+4)}$

$= \dfrac{3(m+4)\cancel{(m+4)}(7)(m+2)}{(2m+1)(5)\cancel{(m+4)}}$

$= \dfrac{21(m+4)(m+2)}{5(2m+1)}$

7. Simplify. State any restrictions on the variables.

b) $\dfrac{2a^2-12ab+18b^2}{a^2-7ab+10b^2} \div \dfrac{4a^2-12ab}{a^2-7ab+10b^2}$

$= \dfrac{(2a-6b)(a-3b)}{(a-5b)(a-2b)} \div \dfrac{4a(a-3b)}{(a-5b)(a-2b)}$

$a \neq 5b, 2b \qquad\qquad a \neq 5b, 2b, 3b, 0$

$= \dfrac{\cancel{2}(a-3b)\cancel{(a-3b)}}{\cancel{(a-5b)}\cancel{(a-2b)}} \times \dfrac{\cancel{(a-5b)}\cancel{(a-2b)}}{\cancel{2}(2a)\cancel{(a-3b)}}$

$= \dfrac{a-3b}{2a}$

7. Simplify. State any restrictions on the variables.

c) $\dfrac{10x^2 + 3xy - y^2}{9x^2 - y^2} \div \dfrac{6x^2 + 3xy}{12x + 4y}$

$= \dfrac{(5x-y)(2x+y)}{(3x+y)(3x-y)} \div \dfrac{3x(2x+y)}{4(3x+y)}$

$3x \neq -y, y$

$x \neq -\frac{1}{3}y, \frac{1}{3}y$

$3x \neq -y, \ 2x \neq -y$

$x \neq -\frac{1}{3}y, x \neq -\frac{1}{2}y, 0$

$= \dfrac{(5x-y)\cancel{(2x+y)}}{\cancel{(3x+y)}(3x-y)} \times \dfrac{4\cancel{(3x+y)}}{3x\cancel{(2x+y)}}$

$= \dfrac{4(5x-y)}{3x(3x-y)}$