Solutions

---

1. Simplify. State any restrictions on the variables.

a) $\dfrac{6-4t}{2}$

$= \dfrac{2(3-2t)}{2}$

No restrictions

$= 3-2t$

b) $\dfrac{9x^2}{6x^3}$

$= \dfrac{3x^2(3)}{3x^2(2x)}$

$x \neq 0$

$= \dfrac{3}{2x}$

c) $\dfrac{7a^2b^3}{21a^4b}$

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

$a \neq 0, b \neq 0$

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

2. Simplify. State any restrictions on the variables.

b) $\dfrac{6x - 9}{2x - 3}$

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

$$x \neq \frac{3}{2}$$

$$= 3$$

c) $\dfrac{4a^2b - 2ab^2}{(2a - b)^2}$

$$= \frac{2ab(2a - b)}{(2a - b)(2a - b)}$$

$$2a \neq b$$

$$= \frac{2ab}{(2a - b)}$$

5. Simplify. State any restrictions on the variables.

a) $\dfrac{a + 4}{a^2 + 3a - 4}$

$$= \frac{a + 4}{(a + 4)(a - 1)}$$

$$a \neq -4, \ a \neq 1$$

$$= \frac{1}{a - 1}$$

c) $\dfrac{x^2 - 5x + 6}{x^2 + 3x - 10}$

$$= \frac{(x - 2)(x - 3)}{(x + 5)(x - 2)}$$

$$x \neq -5, \ x \neq 2$$

$$= \frac{x - 3}{x - 5}$$

e) $\dfrac{t^2 - 7t + 12}{t^3 - 6t^2 + 9t}$

$$= \frac{(t - 3)(t - 4)}{t(t - 3)(t - 3)}$$

$$t \neq 0, \ t \neq 3$$

$$= \frac{t - 4}{t(t - 3)}$$

2

5. Simplify. State any restrictions on the variables.

b) $\dfrac{x^2 - 9}{15 - 5x}$

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

$x \neq 3$

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

$= \dfrac{3-x}{5}$

d) $\dfrac{10 + 3p - p^2}{25 - p^2}$

$= \dfrac{(5-p)(2+p)}{(5-p)(5+p)}$

$p \neq 5, p \neq -5$

$= \dfrac{2+p}{5+p}$

f) $\dfrac{6t^2 - t - 2}{2t^2 - t - 1}$

$= \dfrac{(2t+1)(3t-2)}{(2t+1)(t-1)}$

$t \neq -\dfrac{1}{2}, t \neq 1$

$= \dfrac{3t-2}{t-1}$

6. State the domain of each function. Explain how you found each answer.

a) $f(x) = \dfrac{2 + x}{x}$

Reciprocal function
Can have ANY value
except denominator $= 0$

$D = \{x \in \mathbb{R} \mid x \neq 0\}$

d) $f(x) = \dfrac{1}{x^2 - 1}$

Reciprocal function
Can have ANY
value except
denominator $= 0$

$f(x) = \dfrac{1}{x^2 - 1}$

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

$D = \{x \in \mathbb{R} \mid x \neq -1, 1\}$

6. State the domain of each function. Explain how you found each answer.

b) $g(x) = \dfrac{3}{x(x-2)}$ **e)** $g(x) = \dfrac{1}{x^2 + 1}$

Reciprocal function

$\Rightarrow x \neq 0, x \neq 2$

$D = \{x \in \mathbb{R} \mid x \neq 0, 2\}$

Reciprocal function

Can't have

$x^2 + 1 = 0$

$x^2 = -1$

No real solutions

$\Rightarrow$ Can have ANY value for x

$D = \{x \in \mathbb{R}\}$

---

6. State the domain of each function. Explain how you found each answer.

c) $h(x) = \dfrac{-3}{(x+5)(x-5)}$ **f)** $h(x) = \dfrac{x-1}{x^2 - 1}$

Reciprocal function

$\Rightarrow x \neq -5, x \neq 5$

$D = \{x \in \mathbb{R} \mid x \neq -5, 5\}$

Reciprocal function

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

$D = \{x \in \mathbb{R} \mid x \neq -1, 1\}$

12. The quotient of two polynomials is $3x - 2$. Give two examples of a rational expression equivalent to this polynomial that has the restriction $x \neq 4$.

Quotient $\rightarrow$ The result of dividing

$$\text{divisor} \overline{\smash{)}\text{dividend}} \quad \text{quotient (+ remainder)}$$

what you're dividing by

what you're dividing

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

$$= \frac{3x^2 - 14x + 8}{x - 4}$$

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

$$= \frac{6x^2 - 28x + 16}{2x - 8}$$