

Chapter 6 Review

1. Determine the non-permissible value(s) for each rational expression.

a. $\frac{5}{x+3}$

b. $\frac{7}{xy}$

c. $\frac{x+3}{(x+4)(x-5)}$

d. $\frac{1-x}{3x+5}$

e. $\frac{2a}{a^2-3a}$

f. $\frac{m+1}{m^2+5m+6}$

2. Simplify each rational expression. State any non-permissible values.

a. $\frac{3(x+5)}{(x+5)(x-5)}$

b. $\frac{(x-7)(x+2)}{-5x(7-x)}$

c. $\frac{(x+3)^2}{3(x+3)(x-3)}$

d. $\frac{3x(4x-1)}{(4x-1)(3x+1)}$

e. $\frac{25(x-5)(x+1)}{10(2x+1)(x-5)}$

f. $\frac{4xy(y-9)}{(y-9)(x+4)}$

g. $\frac{6r^2st}{10rs^2t^2}$

h. $\frac{3x-6}{x^2-4}$

i. $\frac{cd}{cd+d}$

j. $\frac{7m-c}{4c-28m}$

k. $\frac{x^2+x}{x^2-4x-5}$

l. $\frac{y^2-2y-3}{y^2-3y}$

m. $\frac{3x^2+11x-4}{x^2+8x+16}$

n. $\frac{4+8a+4a^2}{16-16a^2}$

o. $\frac{2x^2+5x+2}{5x^2-5x-30}$

3. Simplify each product. Identify any non-permissible values.

a. $\left(\frac{9x}{14y^2}\right)\left(\frac{7y^3}{3x^2}\right)$

b. $\left[\frac{5xy}{(x+y)^2}\right]\left[\frac{x(x+y)}{10}\right]$

c. $(x-3)\left(\frac{x+2}{4x-12}\right)$

d. $\left[\frac{(x+1)(x-6)}{(x-6)(x+6)}\right]\left[\frac{x(x+6)}{(1+x)}\right]$

e. $\left(\frac{x-2}{x^2-4}\right)\left(\frac{x^2-2x-8}{x+2}\right)$

f. $\left(\frac{5y-5}{y^2+4y-5}\right)\left(\frac{y^2-25}{y^2-2y-15}\right)$

g. $\left(\frac{x^3-9x}{2x^2-x-15}\right)\left(\frac{2x^2+x-10}{x^2+x-6}\right)$

4. Divide. Express each quotient in simplest form. Identify any non-permissible values.

a. $\left(\frac{5a}{3b}\right) \div \left(\frac{15c}{9a^2}\right)$

b. $\left(\frac{x+1}{3x+5}\right) \div \left(\frac{x+3}{3x+5}\right)$

c. $\frac{4a}{3(a-4)} \div \frac{16a^2}{9(a-4)}$

d. $\frac{2(x+3)(x-3)}{3x} \div x(x-3)$

e. $\frac{16a^2b}{a^2-2a} \div \frac{4ab^2}{a^2b-4b}$

f. $\frac{x-x^2}{10x+8} \div \frac{(x-1)^2}{5x^2+4x}$

g. $\frac{x^2+8x+7}{x^2-6x-7} \div \frac{x^2+7x+6}{x^2-x-42}$

h. $\frac{9y^2-1}{y+3} \div \frac{3y^2-8y-3}{9-y^2}$

5. Add or subtract. Identify any non-permissible values.

a. $\frac{3}{x-5} + \frac{2}{x+7}$

b. $\frac{3x}{7y} - \frac{x}{7(y+3)}$

c. $\frac{5x}{x+1} - \frac{x^2+4}{(x+1)(x-1)} + \frac{3}{x-1}$

d. $\frac{2a}{2a+6} - \frac{a^2+9}{a^2-9}$

e. $\frac{3}{4-x^2} + \frac{5}{x^2+4x+4}$

f. $\frac{x-6}{x^2-11x+28} - \frac{x-5}{x^2-8x+7}$

6. Solve each rational equation.

a. $\frac{3}{x+3} = \frac{x+15}{x+3} - 5$

b. $\frac{x}{x+1} - \frac{x+4}{x+1} = \frac{6}{x}$

c. $\frac{2}{x-3} + \frac{3}{x} = 2$

d. $\frac{x}{x-2} + \frac{2}{x+2} = 1$

e. $\frac{x+1}{x-3} = \frac{x}{x-5}$

f. $\frac{x+4}{x-2} = \frac{x-4}{x+4}$

g. $\frac{x-2}{x} = \frac{2-x}{x+1}$

h. $\frac{5}{x+1} - \frac{1}{x^2-x-2} = \frac{3}{x+2}$

i. $\frac{x+5}{2x+4} = \frac{x}{x-3} - \frac{2x+9}{x^2-x-6}$

7. It takes Rico 10 minutes to shovel the driveway. Fredrick can shovel the driveway in 15 minutes. How long will it take them to complete the task if they work together?

8. Michael can weed the garden in 90 minutes. His brother Jordan can do it in 75 minutes. If they work together, how long will it take them to complete the task?

9. John's family travels 300 km from their home to a family reunion. His cousin Susan and her family take the same amount of time to travel 200 km from their home. Determine the speed of both vehicles given that one of the vehicles travels 30 km/h faster than the other one.

Answers

1.a) $x \neq -3$ b) $x \neq 0, y \neq 0$ c) $x \neq -4, 5$ d) $x \neq -\frac{5}{3}$ e) $x \neq 0, 3$ f) $x \neq -2, -3$

2. Simplify each rational expression. State any non-permissible values.

a. $\frac{3}{(x-5)}; x \neq 5, -5$

b. $\frac{(x+2)}{5x}; x \neq 0, 7$

c. $\frac{(x+3)}{3(x-3)}; x \neq 3, -3$

d. $\frac{3x}{(3x+1)}; x \neq -\frac{1}{3}, \frac{1}{4}$

e. $\frac{5(x+1)}{2(2x+1)}; x \neq -\frac{1}{2}, 5$

f. $\frac{4xy}{(x+4)}; x \neq -4, y \neq 9$

g. $\frac{3r}{5st}; r \neq 0, t \neq 0, s \neq 0$

h. $\frac{3}{(x+2)}; x \neq -2, 2$

i. $\frac{c}{c+1}; c \neq -1, d \neq 0$

j. $\frac{-1}{4}; c \neq 7m$

k. $\frac{x}{(x-5)}; x \neq -1, 5$

l. $\frac{(y+1)}{y}; y \neq 0, 3$

m. $\frac{3x-1}{x+4}; x \neq -4$

n. $\frac{a+1}{4(1-a)}; a \neq 1, -1$

o. $\frac{2x+1}{5(x-3)}; x \neq -2, 3$

3. Simplify each product. Identify any non-permissible values.

a. $\frac{3y}{2x}; x \neq 0, y \neq 0$

b. $\frac{x^2y}{2(x+y)}; x \neq -y$

c. $\frac{x+2}{4}; x \neq 3$

d. $x; x \neq -1, 6, -6$

e. $\frac{x-4}{x+2}; x \neq 2, -2$

f. $\frac{5}{(y+3)}; y \neq 5, -5, 1, -3$

g. $x; x \neq 3, -3, 2, -\frac{5}{2}$

4. Divide. Express each quotient in simplest form. Identify any non-permissible values.

a. $\frac{a^3}{bc}; a \neq 0, b \neq 0, c \neq 0$

b. $\frac{x+1}{x+3}; x \neq -3, -\frac{5}{3}$

c. $\frac{3}{4a}; a \neq 0, 4$

d. $\frac{2(x+3)}{3x^2}; x \neq 0, 3$

e. $4(a+2); a \neq 0, 2, -2, b \neq 0$

f. $\frac{-x^2}{2(x-1)}; x \neq 0, 1, -\frac{4}{5}$

g. $\frac{x+7}{x+1}; x \neq -6, -1, 7$

h. $-(3y-1); y \neq -3, 3, \frac{1}{3}$

5. Add or subtract.

a. $\frac{5x+11}{(x-5)(x+7)}; x \neq 5, -7$

b. $\frac{2xy+9x}{7y(y+3)}; y \neq 0, -3$

c. $\frac{4x^2-2x-1}{(x+1)(x-1)}; x \neq 1, -1$

d. $\frac{-3}{a-3}; a \neq -3, 3$

e. $\frac{-2(x-8)}{(x+2)^2(2-x)}; x \neq \pm 2$

f. $\frac{2}{(x-4)(x-1)}; x \neq 1, 4, 7$

6. Solve each rational equation.

a. $x = -\frac{3}{4}; x \neq -3$

b. $x = -\frac{3}{5}; x \neq -1, 0$

c. $x = 1, \frac{9}{2}; x \neq 0, 3$

d. $x = 0; x \neq 2, -2$

e. $x = -5; x \neq 3, 5$

f. $x = -\frac{4}{7}; x \neq 2, -4$

g. $x = -\frac{1}{2}, 2; x \neq 0, -1$

h. $x = \frac{-1 \pm \sqrt{33}}{2}; x \neq -2, -1, 2$

i. $x = -1; x \neq -2, 3$

7. 6 minutes

8. About 41 minutes

9. John travels at 90km/hr; Susan travels at 60km/hr.