

1. Determine the nonpermissible values for each of the following:

a)  $\frac{x+3}{x-7}$

b)  $\frac{5x-5}{6x(x-1)(x+3)}$

c)  $\frac{x^2-9}{x^2-2x-15}$

d)  $\frac{2x^2-3x-2}{2x^2-x-6}$

2. Reduce to the lowest terms, and state the restrictions on each variable:

a)  $\frac{25x^2-36}{5x+6}$

b)  $\frac{25x^3y^4}{5y^8}$

c)  $\frac{x^2-49}{(x+7)^2}$

d)  $\frac{8-8x^2}{16x^3+16x^2-32x}$

3. Simplify and state the nonpermissible values.

a)  $\frac{3}{x} - \frac{5}{x} + \frac{1}{x}$

b)  $\frac{5a-2}{3a} + \frac{a-7}{3a}$

c)  $\frac{2}{3x} + \frac{3}{4x} - \frac{5}{6x}$

d)  $\frac{2}{y+3} - \frac{3}{y-4}$

$$e) \frac{2x-1}{x+2} - \frac{x+2}{2x-1}$$

$$f) \frac{2}{2x-3} + \frac{3}{3x-2} + \frac{4}{4x-1}$$

$$g) \frac{4x^2-4x-3}{4x^2-1} - \frac{x^2-4x-96}{x^2+4x-32}$$

4. Simplify and state the nonpermissible values.

$$a) \frac{24xy}{4z} \times \frac{3xz^2}{y}$$

$$b) \frac{x^2-9}{6x+24} \times \frac{10x+40}{x(x+3)}$$

$$c) \frac{x^2-6x}{x^2+5x} \times \frac{x^2+7x+10}{18-3x}$$

$$d) \frac{x^2+2xy-15y^2}{3x^2-33xy-84y^2} \times \frac{12y^2+xy-x^2}{2x^2+16xy+30y^2}$$

7. A speed boat can travel 100 km downstream in the same time it can travel 78 km upstream. If the current is 6 km over 10 km/h, what is the speed of the boat in still water?

5. Simplify and state the nonpermissible values.

a)  $\frac{a^2 - 64}{8a}$   
 $(a - 8)^2$

b)  $\frac{10 - \frac{12}{a}}{\frac{5}{a} + 4}$

c)  $\frac{a^2 - 3a - 10}{a^2 - 5a + 6} + \frac{a^2 + a - 30}{a^2 + 4a - 12}$

6. Solve  $\frac{8x}{2x+3} - \frac{x+3}{x-7} = 3$  algebraically and graphically.

7. A speed boat can travel 108 km downstream in the same time it can travel 78 km upstream. If the current in the river is 10 km/h, what is the speed of the boat in still water?

Answers:

1) a) 7 b) 0,1,-3 c) -3,5 d)  $-3/2, 2$

2) a)  $5x-6, x \neq -6/5$  b)  $5x^3/y^4, y \neq 0$  c)  $(x-7)/(x+7), x \neq -7$   
d)  $(-1-x)/(2x(x+2)), x \neq -2, 0, 1$

3) a)  $-1/x, x \neq 0$  b)  $(a-3)/a, a \neq 0$  c)  $7/(12x), x \neq 0$   
d)  $(-y-17)/((y+3)(y-4)), y \neq -3, 4$  e)  $(3x^2-8x-3)/((x+2)(2x-1)), x \neq -2, 1/2$   
f)  $(72x^2-116x-37)/((2x-3)(3x-2)(4x-1)), x \neq 1/4, 2/3, 3/2$   
g)  $(14x)/((2x-1)(x-4)), x \neq -8, \pm 1/2, 4$

4) a)  $18x^2z, y \neq 0, z \neq 0$  b)  $5(x-3)/(3x), x \neq -4, -3, 0$  c)  $(-x-2)/3, x \neq -5, 0, 6$   
d)  $(3y-x)/(6(x-7y)), x \neq -5y, -3y, 4y, 7y$

5) a)  $(a+8)/(8a(a-8)), a \neq 8, 0$  b)  $2/(2a+1), a \neq -1/2, 0, -5/4$   
c)  $(a+2)/(a-3), a \neq -6, 2, 3, 5$

6)  $x = \sqrt[27]{16}, x \neq 7, -3/2$

7) 62 km/h