

Period: \_\_\_\_\_

Name: KEY

Chapter 6 Assignment – Rational Expressions & Equations

/25

Show all of your work.

1) Simplify. Keep a list of non-permissible values in the rectangle (2 marks each).

a)  $\frac{6x+18}{x^2+8x+15}$   $x \neq 3, -5$

$= \frac{6(x+3)}{(x+3)(x+5)}$

$= \frac{6}{x+5}$

ANSWER:  $\frac{6}{x+5}$

b)  $\frac{x^2-4}{6+3x}$   $x \neq -2$

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

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

ANSWER:  $\frac{x-2}{3}$

2) Simplify. Keep a list of non-permissible values in the rectangle (2 marks each).

a)  $\frac{n^2-4}{2n-1} \cdot \frac{12n-6}{n+2}$   $n \neq \frac{1}{2}, -2$

$\frac{(n-2)(n+2)}{2n-1} \cdot \frac{6(2n-1)}{n+2}$

$= \frac{(n-2)(n+2)(6)(2n-1)}{(2n-1)(n+2)}$

$= (n-2)(6) = 6(n-2)$

ANSWER:  $6(n-2)$   
or  $6n-12$

b)  $\frac{x-3}{x^2+2x-15} \cdot \frac{2x+10}{2x^2-15x+7} \div \frac{2x+4}{x^2-5x-14}$   $x \neq 3, -5, \frac{1}{2}, 7, -2$

$\frac{(x-3)}{(x-3)(x+5)} \cdot \frac{2(x+5)}{(2x-1)(x-7)} \cdot \frac{2(x+2)}{(x-7)(x+2)}$

$= \frac{2}{(2x-1)(x-7)} \times \frac{(x-7)}{2}$  ← Flip!

$= \frac{1}{2x-1}$

$2x^2 - 15x + 7$   
 $2x^2 - x - 14x + 7$   
 $x(2x-1) - 7(2x-1)$   
 $(2x-1)(x-7)$   
 $-14x - 1 = 14$   
 $-14 + 1 = -15$

ANSWER:  $\frac{1}{2x-1}$

3) Simplify. Keep a list of non-permissible values in the rectangle (2 marks each).

a)  $\frac{2y}{y+3} + \frac{3}{y^2-9}$   $y \neq \pm 3$

$$\frac{2y \overset{(y-3)}{+}}{(y+3)\overset{+}{(y-3)}} + \frac{3}{(y+3)(y-3)}$$

$$\frac{2y^2 - 6y + 3}{(y+3)(y-3)}$$

ANSWER:  $\frac{2y^2 - 6y + 3}{(y+3)(y-3)}$

b)  $\frac{3x+3}{x^2-4x-12} - \frac{x+1}{x^2-4}$   $x \neq 6, \pm 2$

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

FOIL!

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

$$= \frac{3(x^2 - x - 2) - (x^2 - 5x - 6)}{(x-6)(x+2)(x-2)}$$

$$= \frac{3x^2 - 3x - 6 - x^2 + 5x + 6}{(x-6)(x+2)(x-2)} = \frac{2x^2 + 2x}{(x-6)(x+2)(x-2)}$$

ANSWER:  $\frac{2x(x+1)}{(x-6)(x+2)(x-2)}$

4) Simplify. Keep a list of non-permissible values in the rectangle (3 marks):

$$\frac{1 + \frac{3}{x}}{x - 5 - \frac{24}{x}} \rightarrow = \div !$$

$\overset{\text{top}}{1 + \frac{3}{x}} \div \overset{\text{bottom}}{x - 5 - \frac{24}{x}}$

$$\frac{x + \frac{3}{x}}{\frac{x^2}{x} - \frac{5x}{x} - \frac{24}{x}}$$

$$\frac{x+3}{x} \div \frac{x^2 - 5x - 24}{x}$$

Factor, simple way!

flip

$$\frac{(x+3)}{x} \cdot \frac{x}{(x-8)(x+3)}$$

cancel common factors

=  $\frac{1}{x-8}$

$x \neq 0, 8, -3$

ANSWER:  $\frac{1}{x-8}$

Equations now... so Eliminate fractions by Multiplying ALL terms by L.C.D.!

5) Solve and check. Keep a list of non-permissible values in the rectangle (3 marks each). (Lowest Common Denominator)

a)  $\frac{2y}{y^2-1} = \frac{2}{y+1} - \frac{1}{y-1}$

$y \neq \pm 1$

$$\frac{2y}{(y+1)(y-1)} = \frac{2}{y+1} - \frac{1}{y-1}$$

$$2y = 2y - 2 - y - 1$$

$$2y = y - 3$$

$y = -3$

check:

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

$$\frac{-6}{8} = \frac{2}{-2} - \frac{1}{-4}$$

$$-\frac{3}{4} = -\frac{4}{4} + \frac{1}{4}$$

$$-\frac{3}{4} = -\frac{3}{4} \checkmark$$

ANSWER:

$y = -3$

b)  $\frac{z}{2z+2} + \frac{2z}{4z+4} = \frac{2z-3}{z+1}$

$z \neq -1$

$$\frac{z}{2(z+1)} + \frac{2z}{4(z+1)} = \frac{2z-3}{z+1}$$

$$2z + 2z = 8z - 12$$

$$4z = 8z - 12$$

$$-8z = -8z$$

$$-4z = -12$$

$z = 3$

check:

$$\frac{3}{2(3)+2} + \frac{2(3)}{4(3)+4} = \frac{2(3)-3}{3+1}$$

$$\frac{3}{8} + \frac{6}{16} = \frac{3}{4}$$

$$\frac{3}{8} + \frac{3}{8} = \frac{3}{4}$$

$$\frac{6}{8} = \frac{3}{4}$$

$$\frac{3}{4} = \frac{3}{4} \checkmark$$

ANSWER:

$z = 3$

6) It takes Ryan 7 hours to do the lawn and gardening maintenance at a commercial property alone. Jeff can do the work in 6 hours alone. Assuming they have enough equipment, how long would it take them to complete the work together? Create and solve a rational equation. Answer in hours and minutes (to the nearest minute). (4 marks)

	Time to do work alone	fraction done in 1 hour	fraction done in x hours
Ryan	7	$\frac{1}{7}$	$\frac{1}{7}(x) = \frac{x}{7}$
Jeff	6	$\frac{1}{6}$	$\frac{1}{6}(x) = \frac{x}{6}$
Together	x	$\frac{1}{x}$	$\frac{1}{x}(x) = \frac{x}{x} = 1$

$$\frac{x}{7} + \frac{x}{6} = 1$$

L.C.D. = 42!

$$6x + 7x = 42$$

$$13x = 42$$

$$x = 3.23 \text{ hr}$$

$$0.23 \text{ hr} \times 60 \text{ min/hr}$$

$$= 13.8 \text{ min}$$

$$= 14 \text{ min}$$

SENTENCE ANSWER:

It would take them 3 hrs 14 mins to complete work together.

