7.1 ③

$$\frac{a-3}{a^2-9}$$

$$\frac{(a-3)}{(a-3)(a+3)}$$

$$\frac{1}{a+3}$$

Unit conversion

#57 circumference is 518 ft

one trip around takes 40 sec

What is the speed in $\frac{mi}{hr}$?

$$\frac{518\ ft}{40\ sec}\left(\frac{60\ sec}{1\ min}\right)\left(\frac{60\ min}{1\ hr}\right)\left(\frac{1\ mi}{5280\ ft}\right)$$

$$93240\ \frac{mi}{10\,60\ hr}$$

$$\approx 8.83\ \frac{mi}{hr}$$

7.1 #17

$$\frac{3x+15}{3x^2+24x+45}$$

$$\frac{1}{\frac{3(x+5)}{3(x^2+8x+15)}}$$

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

$$\frac{1}{x+3}$$

prod 15 5(3)
sum 8

$x^2+5x+3x+15$

$x(x+5)+3(x+5)$

$(x+5)(x+3)$

(43) $\dfrac{x^3+8}{x^2+x-2}$

$\dfrac{(x+2)(x^2-2x+4)}{(x+2)(x-1)}$

$\dfrac{x^2-2x+4}{x-1}$

$(x)^3+(2)^3$

$8 \wedge (1/3)$

2

$a^3+b^3=(a+b)(a^2-ab+b^2)$

a a^2

a ab

b b^2

prod -2 $2(-1)$

sum 1

7.3 Addition & Subtraction of Rational Expressions

$\frac{1}{5} + \frac{2}{5}$

$\frac{3}{5}$

$\frac{4}{x+1} + \frac{x}{x+1}$

$\frac{4+x}{x+1}$

$\frac{2}{3} + \frac{1}{8}$

$\frac{2}{3} + \frac{1}{2 \cdot 2 \cdot 2}$

$\frac{8}{8}\frac{2}{3} + \frac{1}{8}\left(\frac{3}{3}\right)$

$\frac{16}{24} + \frac{3}{24}$

$\frac{19}{24}$

LCD = $\frac{2 \cdot 2 \cdot 2 \cdot 3}{24}$

$\frac{\text{factor missing}}{\text{factor missing}} = 1$

LCD = $4x$

(24) $\left(\frac{4}{4}\right)\frac{1}{x} - \frac{1}{4}\left(\frac{x}{x}\right)$

$\frac{4}{4x} - \frac{x}{4x}$

$\frac{4-x}{4x}$

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

LCD $= 2(x-3)$

$$\frac{2x+1}{2(x-3)} - \left(\frac{x+2}{x-3}\right)\left(\frac{2}{2}\right)$$

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

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

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

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

(4) $\dfrac{6}{x^2-9} - \dfrac{5}{x^2-x-6}$ LCD $= (x+3)(x-3)(x+2)$

$\left(\dfrac{x+2}{x+2}\right)\dfrac{6}{(x+3)(x-3)} - \dfrac{5}{(x-3)(x+2)}\left(\dfrac{x+3}{x+3}\right)$

prod -6
sum -1
$-3, 2$

$$\frac{6x+12-5x-15}{(x+2)(x+3)(x-3)}$$

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

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

① $\dfrac{x^2 - 8x + 15}{x^2 - x - 6}$

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

$\dfrac{x-5}{x+2}$

(14) $\dfrac{2}{x^2+5x+6} + \dfrac{x}{x^2-9}$ $\quad$ LCD $= (x+2)(x+3)(x-3)$

$\left(\dfrac{x-3}{x-3}\right)\dfrac{2}{(x+2)(x+3)} + \dfrac{x}{(x-3)(x+3)}\left(\dfrac{x+2}{x+2}\right)$

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

$$\frac{x^2+4x-6}{(x-3)(x+2)(x+3)}$$ done

(40) $\dfrac{2x-1}{x^2+x-6} - \dfrac{x+2}{x^2+5x+6}$ LCD $= (x+3)(x-2)(x+2)$

$\left(\dfrac{x+2}{x+2}\right)\dfrac{2x-1}{(x+3)(x-2)} - \dfrac{x+2}{(x+2)(x+3)}\left(\dfrac{x-2}{x-2}\right)$

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

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

$\dfrac{x^2+3x+2}{(x+2)(x+3)(x-2)}$

$\dfrac{(x+1)\cancel{(x+2)}^{1}}{\cancel{(x+2)}_{1}(x+3)(x-2)}$

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

20 - 10

$$\frac{1}{x} + \frac{x}{2x+4} - \frac{2}{x^2+2x}$$

LCD = $2x(x+2)$

$$\frac{(2x+4)}{2(x+2)}\frac{1}{x} + \frac{x}{2(x+2)}\left(\frac{x}{x}\right) - \frac{2}{x(x+2)}\left(\frac{2}{2}\right)$$

$$\frac{2x+4+x^2-4}{2x(x+2)}$$

$$\frac{x^2+2x}{2x(x+2)}$$

$$\frac{x(x+2)}{2x(x+2)}$$

$$\frac{1}{2}$$

7.4 Solving Equations containing rational expressions

Ex $(6)\frac{x}{2} + \frac{4}{3} = -\frac{2}{3}(6)$

LCD = 6

$3x + 8 = -4$

$-8 \quad -8$

$\frac{3x}{3} = \frac{-12}{3}$

$x = -4$

$3x + 12 = 0$

$3(x+4) = 0$

$x + 4 = 0$

$-4 \quad -4$

$x = -4$

(ex) $\frac{4x}{x-4} - \frac{3x}{x-2} = \frac{-3}{x^2-6x+8}$ LCD = $(x-4)(x-2)$

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

$4x(x-2) - 3x(x-4) = -3$

$4x^2 - 8x - 3x^2 + 12x = -3$

$x^2 + 4x = -3$

$+3 \quad +3$

$x^2 + 4x + 3 = 0$

$(x+3)(x+1) = 0$

$x = -3$ or $x = -1$

(a) #36 $\frac{2}{y^2-9} = \frac{6}{y^2-3y}$

LCD $= y(y-3)(y+3)$

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

$$2y = 6(y+3)$$

$$2y = 6y + 18$$

$$-6y \quad -6y$$

$$-4y = 18$$

$$\frac{-4y}{-4} = \frac{18}{-4}$$

$$y = -\frac{9}{2}$$

(28) $\frac{x}{x+1} + \frac{4}{5} = \frac{-14}{5(x+1)}$

$x = -2$

LCD = $5(x+1)$

$5x + 4(x+1) = -14$

$5x + 4x + 4 = -14$

$-4 \quad -4$

$\frac{9x}{9} = \frac{-18}{9}$

$x = -2$ ☺

(38) $\dfrac{2}{a^2-1} = \dfrac{6}{a^2-2a-3}$

$x =$ ~~no solution~~

$\dfrac{(a+1)(a-1)(a-3)\,2}{(a+1)(a-1)} = \dfrac{6\,(a+1)(a-1)(a-3)}{(a+1)(a-3)}$

LCD = $(a+1)(a-1)(a-3)$

$2(a-3) = 6(a-1)$

$2a-6 = 6a-6$

$-2a \quad -2a$

$-6 = 4a-6$

$+6 \quad +6$

$\dfrac{0}{4} = \dfrac{4a}{4}$

$0 = a$

$\dfrac{0}{a} = 0$

7.5 Applications

Number problems

(2) If $\frac{3}{5}$ is added to twice the reciprocal of a number, the result is 1.

Find the number.

let n = the number

$$\frac{3}{5} + \frac{1}{n}\left(\frac{2}{1}\right) = 1$$

$$(5n)\ \frac{3}{5} + \frac{2}{n}\cdot 5(n) = 1\ 5(n) \qquad \text{LCD} = 5n$$

$$3n + 10 = 5n$$

$$-3n \qquad\qquad -3n$$

$$\frac{10}{2} = \frac{2n}{2}$$

$$5 = n$$

Motion Problems

(14) 1 car travels 300 mi in the same time the 2nd car travels 275 mi. The 2nd car is 5 mi/hr slower. What are the speeds of the cars?

$\frac{d}{r} = \frac{rt}{r}$

let x = the speed of car 1

$x-5$ = the speed of car 2

	speed rate	distance	time $\frac{d}{r}$
car 1	x	300	$\frac{300}{x}$
car 2	$x-5$	275	$\frac{275}{x-5}$

$x(x-5)\frac{300}{x} = \frac{275}{x-5}x(x-5)$ LCD = $x(x-5)$

$\frac{300}{1} \quad \frac{275}{1}$

$300x - 1500 = 275x$

$-300x \quad -300x$

$-1500 = -25x$

$\frac{-1500}{-25} = \frac{-25x}{-25}$

$60 = x$

$x - 5 = 55$

The 1st car is going 60 mi/hr. and the 2nd is going 55 mi/hr.