Solve the following equations. List any restrictions and check for extraneous solutions.

$x \neq -3$

LCD: $x+3$

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

$2x = -6 - 2(x+3)$
$2x = -6 - 2x - 6$
$4x = -12 \Rightarrow x = -3$

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

$x \neq -2$

$3(x+2) = 2x$
$3x + 6 = 2x$
$x = -6$

$x \neq 2$

LCD: $x-2$

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

$x + 3(x-2) = 2$
$x + 3x - 6 = 2$
$4x = 8 \Rightarrow x = 2$ No solution

(4) $\dfrac{4}{x-2} = \dfrac{7}{x^2+3x-10} - \dfrac{3}{x+5}$

$x \neq 2, -5$

LCD: $(x-2)(x+5)$

$4(x+5) = 7 - 3(x-2)$
$4x + 20 = 7 - 3x + 6$
$7x = -7 \Rightarrow x = -1$

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

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

$3(2x-3) = 5(x+5)$
$6x - 9 = 5x + 25$
$x = 34$

(6) $\dfrac{3}{x-2} = \dfrac{1}{x-1} + \dfrac{7}{x^2-3x+2}$

$x \neq 1, 2$

LCD: $(x-1)(x-2)$

$3(x-1) = 1(x-2) + 7$
$3x - 3 = x - 2 + 7$
$2x = 8 \Rightarrow x = 4$

Solve for the indicated variable.

(7) $C = \dfrac{5}{9}(F-32)$ for F

$9C = 5(F-32)$
$\dfrac{9}{5}C = F - 32$
$F = \dfrac{9}{5}C + 32$ OR $\dfrac{9C+160}{5}$

(8) $\dfrac{1}{3} - \dfrac{1}{a} = \dfrac{1}{b}$ for a

LCD: $3ab$

$ab - 3b = 3a$
$-3b = 3a - ab$
$-3b = a(3-b)$

$a = \dfrac{-3b}{3-b}$ OR $\dfrac{3b}{b-3}$

(9) $xy^2 + xz^2 = xw^2 - 6$ for x

$xy^2 + xz^2 - xw^2 = -6$
$x(y^2 + z^2 - w^2) = -6$
$x = \dfrac{-6}{y^2 + z^2 - w^2}$

(10) $\dfrac{1}{w} + \dfrac{1}{x} = \dfrac{1}{y}$ for y

LCD: wxy

$xy + wy = wx$
$y(x+w) = wx$
$y = \dfrac{wx}{x+w}$

Solve the following word problems.

(11) It takes a person the same time to drive 150 miles as it takes a plane to fly 1350 miles. If the plane is flying 400 mi/h faster than the car, how fast is each traveling?

(12) It took a woman the same time to drive 150 miles as it takes a train to travel 250 miles. If the train is traveling 20 mi/h faster than the woman is driving, find the rate at which each is traveling.

(13) Wilma can mow the lawn in 3 hours. If Kyle helps her with another mower, the lawn can be mowed in 2 hours. How long would it take Kyle if he worked alone?

(14) Ralph can paint a room in 2 hours, and Joy can paint the same room in 3 hours. If they work together, how long would it take them to paint the room?

11.

R	X	T	= D
Drive	r	t	150
Fly	r+400	t	1350

$$\frac{R \times T=D}{R}$$
$$T=\frac{D}{R}$$

Drive
$$t=\frac{150}{r}$$

Fly
$$t=\frac{1350}{r+400}$$

$$\frac{150}{r}=\frac{1350}{r+400}$$
$$1350r=150(r+400)$$
$$1350r=150r+60,000$$
$$1200r=60,000$$
$$r=50$$

Drive: 50 mph
Fly: 450 mph

12.

R	X	T	= D
Woman	r	t	150
Train	r+20	t	250

$$\frac{R \times T=D}{R}$$
$$T=\frac{D}{R}$$

Woman
$$t=\frac{150}{r}$$

Train
$$t=\frac{250}{r+20}$$

$$\frac{150}{r}=\frac{250}{r+20}$$
$$250r=150(r+20)$$
$$250r=150r+3000$$
$$100r=3000$$
$$r=30$$

Woman: 30 mph
Train: 50 mph

13.

R	X	T	= W
Wilma	$\frac{1}{3}$	2	$\frac{2}{3}$
Kyle	$\frac{1}{x}$	2	$\frac{2}{x}$

$$\frac{2}{3}+\frac{2}{x}=1$$
LCD: 3x $2x+6=3x$
$$x=6$$

Kyle alone: 6 hrs

14.

R	X	T	= W
Ralph	$\frac{1}{2}$	t	$\frac{1}{2}t$
Joy	$\frac{1}{3}$	t	$\frac{1}{3}t$

$$\frac{1}{2}t+\frac{1}{3}t=1$$
LCD: 6 $3t+2t=6$
$$5t=6$$
$$t=\frac{6}{5}$$

Together: $1\frac{1}{5}$ hrs