C11 - 6.4 - Hoses filling Pool

Two hoses together fill a pool in 2 hours. If only hose A is used, the pool fills in 3 hours. How long would it take to fill the pool if only hose B were used?

	Amount	Time	Rate
Hose A	1 pool	3 hours	$\frac{1\,pool}{3\,hours}$
Hose B	1 pool	x hours	$\frac{1\,pool}{x\,hours}$
Together	1 pool	2 hours	$\frac{1\,pool}{2\,hours}$

$$\frac{1}{3}+\frac{1}{x}=\frac{1}{2}$$
$$\left(\frac{1}{3}+\frac{1}{x}=\frac{1}{2}\right)\times 6x$$
$$2x+6=3x$$
$$-2x \qquad -2x$$
$$6=x$$

It will take 6 hours.

C11 - 6.4 - Sum of Recips of Two Consecutive Ints SOL

The sum of the reciprocals of two consecutive integers is $\frac{5}{6}$. What are the integers?

$Let\ "x"\ =\ 1st\ \#$
$Let\ x\ +\ 1\ =\ 2nd\ \#$

$$\frac{1}{x} + \frac{1}{(x+1)} = \frac{5}{6}$$

$$\frac{1}{x} + \frac{1}{(x+1)} = \frac{5}{6}$$
$$\left(\frac{1}{x} + \frac{1}{(x+1)} = \frac{5}{6}\right) \times LCD \qquad LCD: 6x(x+1)$$
$$6(x+1) + 6x = 5x(x+1)$$
$$6x + 6 + 6x = 5x^2 + 5x$$
$$0 = 5x^2 - 7x - 6$$
$$0 = (5x^2 - 10x) + (3x - 6)$$
$$0 = 5x(x-2) + 3(x-2)$$
$$0 = (5x+3)(x-2)$$

Restrictions

~~$x = -3/5$~~ $x = 2$ $x \neq 0$ $x \neq -1$

Reject

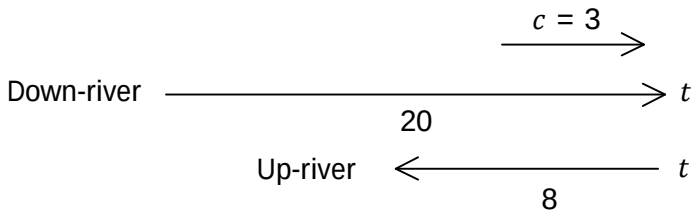
$x = 2$

$1st\ number = 2$
$2nd\ number = 3$

C11 - 6.4 - Rationals Word Problems: Canoe Table SOL

Mary paddles down river 20km with a current of 3km/h. It takes her the same time to paddle up river 8km. What is the speed of the boat?

	Speed	Distance	Time
Down-river	$v_b + 3$	20	t
Up-river	$v_b - 3$	8	t



$Let\ v_b = velocity\ of\ boat$
$t = time$

Down river

$$v = \frac{d}{t}$$
$$v_b + 3 = \frac{20}{t}$$
$$v_b = \frac{20}{t} - 3$$

Up river

$$v = \frac{d}{t}$$
$$v_b - 3 = \frac{8}{t}$$
$$v_b = \frac{8}{t} + 3$$

$v = \frac{d}{t}$

Substitution

Isolation

$$v_b = v_b$$
$$\frac{20}{t} - 3 = \frac{8}{t} + 3$$

Substitution

$$\left(\frac{20}{t} - 3 = \frac{8}{t} + 3\right) \times LCD: t$$
$$20 - 3t = 8 + 3t$$
$$12 = 6t$$
$$t = 2s$$

LCD = t

Solve

$$v_b = \frac{20}{t} - 3$$
$$v_b = \frac{20}{2} - 3$$
$$v_b = 7\frac{km}{hr}$$

Substitution

Solve

C11 - 6.4 - Plane with Wind Speed SOL

An airplane makes a 990 km flight with a tailwind and returns, flying into the same wind. Total flying time is 3 hours 20 minutes. The airplane's speed in still air is 600 km/h. Derive an equation in terms of t to represent this problem. Solve the equation to determine the speed of the wind.

$Total\ time: 3\ hrs + 20\ mins$
$Total\ time: 3\ hrs + 0.\bar{3}\ hrs$
$Total\ time: 3.\bar{3}\ hrs$

$20\ \cancel{mins} \times \frac{1\ hr}{60\ \cancel{mins}} = 0.\bar{3}\ hrs$

$Let\ w = wind\ speed$
$Let\ t = time\ trip\ took\ with\ the\ tailwind$

$$Speed = \frac{distance}{time}$$

$$s = \frac{d}{t} \longleftrightarrow s = \frac{d}{t}$$

$$600 + w = \frac{990}{t}$$
$$-600 \qquad -600$$
$$w = \frac{990}{t} - 600$$

$$600 - w = \frac{990}{3.\bar{3} - t}$$
$$600 - \left(\frac{990}{t} - 600\right) = \frac{990}{3.\bar{3} - t}$$
$$1200 - \frac{990}{t} = \frac{990}{3.\bar{3} - t}$$
$$(3.\bar{3} - t)(1200) - \frac{990}{t}(3.\bar{3} - t) = \frac{990}{\cancel{3.\bar{3} - t}} \times \cancel{3.\bar{3} - t}$$
$$4000 - 1200t - \frac{3300}{t} + 990 = 990$$
$$-990 \qquad -990$$
$$4000 - 1200t - \frac{3300}{t} = 0$$
$$t \times \left(-1200t + 4000 - \frac{3300}{t}\right) = 0 \times t$$
$$-1200t^2 + 4000t - 3300 = 0$$
$$-1.2t^2 + 4t - 3.3 = 0$$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$t = \frac{-(4) \pm \sqrt{(4)^2 - 4(-1.2)(-3.3)}}{2(-1.2)}$$
$$t = \frac{-4 \pm 0.4}{-2.4}$$
$$t = 1.5\ hrs\ or\ 1.8\bar{3}$$

$$w = \frac{990}{t} - 600$$
$$w = \frac{990}{1.8\bar{3}} - 600$$
$$w = 540.98 - 600$$
$$w = 59.02\ km/h$$

$$w = \frac{990}{t} - 600$$
$$w = \frac{990}{1.5} - 600$$
$$w = 660 - 600$$
$$w = 60\ km/h$$