Algebra II

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2)	15 and 10	12)	30 members
4)	8	14)	800 km/hr
6)	18 hours	16)	60 mph
8)	800 km/hr	18)	96 km/hr
10)	32 km	20)	4 m/s

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2) Find two numbers whose sum is 25 and the sum of whose reciprocals is $^1/_6$.

reciprocal- one over

Let x = 1st number
$25-x$ = 2nd number

$$\left(\frac{1}{x}+\frac{1}{25-x}=\frac{1}{6}\right)6x(25-x)$$

domain: $\mathbb{R}$ except $\{0, 25\}$

$$6(25-x)+6x = x(25-x)$$

4) The reciprocal of one third of a number decreased by one third of the reciprocal of the number is $^1/_3$.

Let x = number

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

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

reciprocal

$\frac{3}{x}$

$\frac{1}{3} \cdot \frac{1}{x} = \frac{1}{3x}$

6) The intake pipe can fill a certain tank in 6 h when the outlet pipe is closed, but with the outlet pipe open it takes 9 h. How long would it take the outlet pipe to empty a full tank?

$\frac{\text{together}}{\text{alone}}$

Let x = outlet time alone

$$\frac{9}{6} - \frac{9}{x} = 1$$

$$\frac{3}{2} - \frac{9}{x} = 1$$

8) Helped by a strong jet stream, a Los Angeles-to-Boston plane flew 10% faster than usual and made the 4400 km trip in 30 min less time than usual. At what speed does the plane usually fly?

30 min $\frac{1}{2}$ hr

$d=rt$ $t=\frac{d}{r}$ Let x = rate

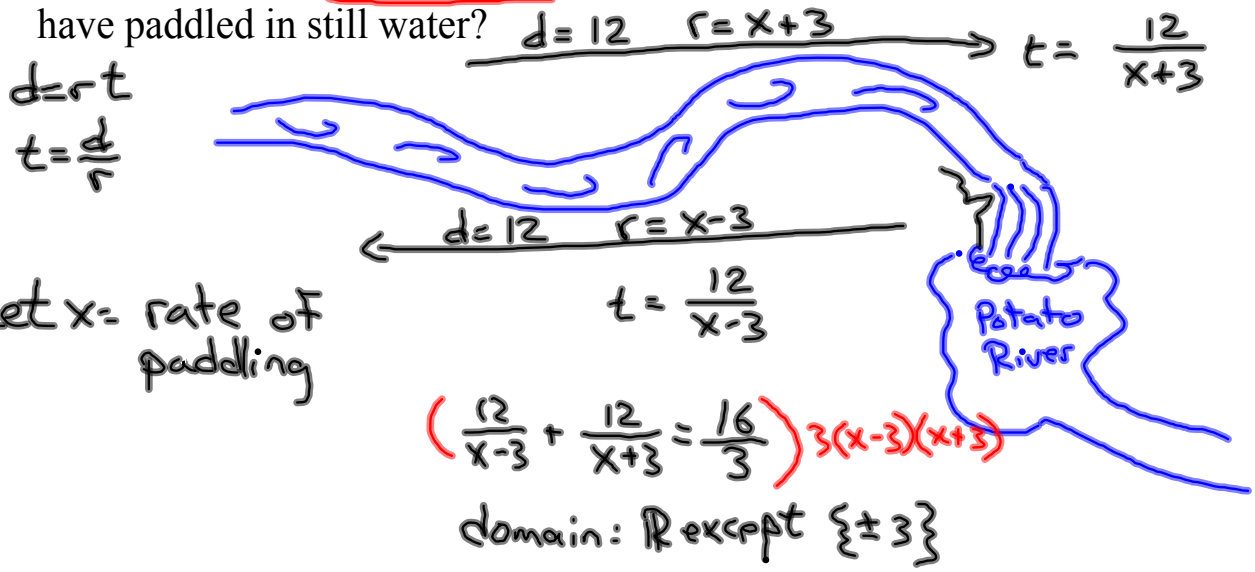
$t=\frac{4400}{1.1x}$

$t=\frac{4400}{x}$

$$\left(\frac{4400}{1.1x}=\frac{4400}{x}-\frac{1}{2}\right)2(1.1x)$$

10) Tim paddled his kayak 12 km upsteam against a 3 km/h current and back again in 5 h and 20 min. In that time, how far could he have paddled in still water?

$5\frac{1}{3} = \frac{16}{3}$



$\left(\frac{12}{x-3} + \frac{12}{x+3} = \frac{16}{3}\right) 3(x-3)(x+3)$

domain: $\mathbb{R}$ except $\{\pm 3\}$

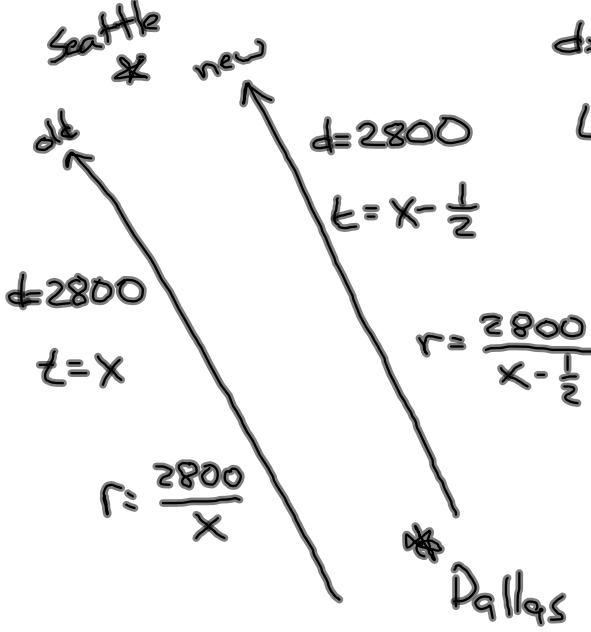
12) Members of the Ski Club contributed equally to obtain $1800 for a holiday trip. When 6 members found that they could not go, their contributions were refunded and each remaining member then had to pay $10 more to raise the $1800. How many went on the trip?

Let x = # on trip

$$\left(\frac{1800}{x} = \frac{1800}{x+6} + 10\right) x(x+6)$$

domain: $\mathbb{R}$ except $\{0, -6\}$

14) When Ace Airlines changed to planes that flew 100 km/h faster than its old ones, the time of its 2800 km Dallas-Seattle flight was reduced by 30 min. Find the speed of the new planes.



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

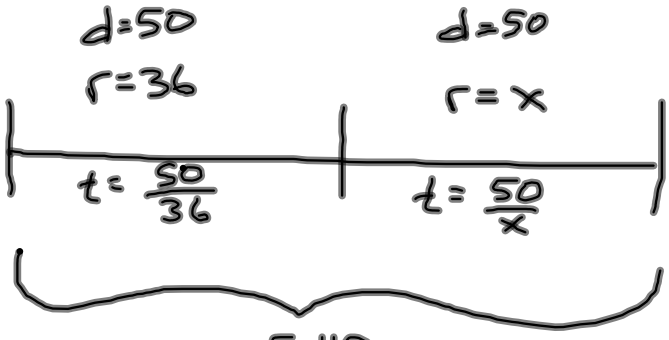
Let x = time of old

domain: $\mathbb{R}$ except $\{\frac{1}{2}, 0\}$

$$\left(\frac{2800}{x-\frac{1}{2}} - 100 = \frac{2800}{x}\right) x(x-\tfrac{1}{2})$$

16) Elizabeth drove the first half of a trip at 36 mph. At what speed should she cover the remaining half in order to average 45 mph for the whole trip?

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



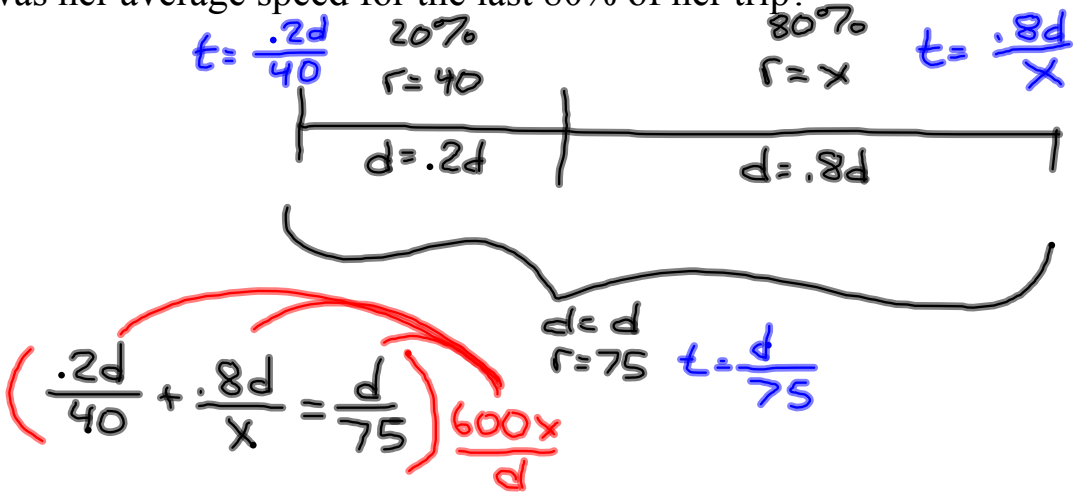
$\left(\frac{25}{18} + \frac{50}{x} = \frac{20}{9}\right) 18x$

$r = 45$

$d = 100$

$t = \frac{100}{45} \div 5 \div 5$

18) Because of traffic, Maria could average only 40 km/h for the first 20% of her trip, but she averaged 75 km/h for the whole trip. What was her average speed for the last 80% of her trip?



20) An elevator went from the bottom to the top of a 240 m tower, remained there for 12 sec, and returned to the bottom in an elapsed time of 2 min. If the elevator traveled 1 m/sec faster on the way down, find its speed going up.