Algebra I

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2)	9:40 A.M.	10)	36 km
4)	54 mi/hr	12)	400m
6)	9 mi/hr	14)	32 mi
8)	2800 mi	16)	Lap 1: 48 sec Lap 2: 51 sec

2) At 8:00 A.M. the Smiths left a campground, driving at 48 mi/h. At 8:20 A.M. the Garcias left the same campground and followed the same route, driving at 60 mi/h. At what time did they overtake the Smiths?

4) Jenny had driven for 2 h at a constant speed when road repairs forced her to reduce her speed by 10 mi/h for the remaining 1 h or her 152 mi trip. Find her original speed.

6) At 7:00 A.M. Joe starts jogging at 6 mi/h. At 7:10 A.M. Ken starts off after him. How fast must Ken run in order to overtake him at 7:30 A.M.

Note: time must be in hours, so we use 1/2 and 1/3 of an hour instead of 20 minutes and 30 minutes.

hours cancel, leaving miles.

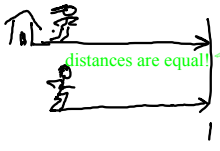
	r	×	t	=	d
Joe	$\frac{6\text{ mi}}{\text{hr}}$		$\frac{1}{2}$ hr		3 mi
Ken	$\frac{x\text{ mi}}{\text{hr}}$		$\frac{1}{3}$ hr		$(\frac{1}{3}x)$ mi

let x = Ken's rate in $\frac{\text{mi}}{\text{hr}}$

$3 = \frac{1}{3}x$ (·3)

$9 = x$

9 mi/hr



8) It takes a plane 40 min longer to fly from Boston to Los Angeles at 525 mi/h than it does to return at 600 mi/h. How far apart are the cities?

Let x = return time

$x + \frac{2}{3}$ = time there

Since it is miles per *hour*, we can't use minutes. 40 minutes is 2/3 hour (40/60).

	r	×	t	=	d
there	$\frac{525\text{ mi}}{\text{hr}}$		$x + \frac{2}{3}$ hr		$525(x+\frac{2}{3})$ mi
back	$\frac{600\text{ mi}}{\text{hr}}$		x hr		$(600x)$ mi *

Let x = time back

The trip there is equal to the trip back.

$525(x+\frac{2}{3}) = 600x$

$525x + 350 = 600x$

$525x - 525x + 350 = 600x - 525x$

$\frac{350}{75} = \frac{75x}{75}$

$4\frac{2}{3} = x$

We get 4 2/3 for *x* which is hours. The answer to the problem asks for the *distance* between the cities. We need to find the last box in the chart.

* $600(4\frac{2}{3})$

2800 mi.

10) It took Cindy 2 h to bike from Abbott to Benson at a constant speed. The return trip took only 1.5 h because she increased her speed by 6 km/h. How far apart are Abbott and Benson?

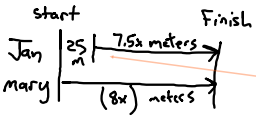
	r	×	t	=	d
there	$\frac{x\text{ km}}{\text{hr}}$		2 hr		$(2x)$ km
back	$\frac{(x+6)\text{ km}}{\text{hr}}$		1.5 hr		$1.5(x+6)$ km

Let x = rate there in km/hr

12) Jan can run at 7.5 m/s and Mary at 8.0 m/s. On a race track, Jan is given a 25 m head start, and the race ends in a tie. How long is the track?

	r	x	t	=	d
Jan	$\frac{7.5\text{ m}}{\text{sec}}$	x sec	$(7.5x)$ m		
Mary	$\frac{8.0\text{ m}}{\text{sec}}$	x sec	$(8x)$ m		

Let x = time of both in sec.



$7.5x + 25 = 8x$

Because Jan had a head start, we need to add 25 meters to Jan's distance to make it equal to Mary's.

14) An ultralight plane had been flying for 40 min when a change of wind direction doubled its ground speed. The entire trip of 160 mi took 2 h. How far did the plane travel during the first 40 min?

First, we change 40 minutes to 2/3 hours, because the whole trip took 2 *hours*.

Then the remainder of the trip is 2 hours minus 40 minutes, or 2 hours minus 2/3 hr, which is 1 1/3 hours. Make improper to 4/3 hours.

	r	x	t	=	d
slow	$\frac{x\text{ mi}}{\text{hr}}$		$\frac{2}{3}$ hrs		$\left(\frac{2}{3}x\right)$ mi
Fast	$\frac{2x\text{ mi}}{\text{hr}}$		$\frac{4}{3}$ hrs		$\frac{4}{3}(2x)$ mi

160 mi

Let x = slow speed

$\frac{2}{3}x + \frac{4}{3}(2x) = 160$

Both legs of the trip must add to the total of 160 mi.

16) Jamie ran two laps around a track in 99 s. How long did it take him to run each lap if he ran the first lap at 8.5 m/s and the second at 8.0 m/s.

	r	x	t	=	d
Lap 1	$\frac{8.5\text{ m}}{\text{sec}}$	x sec	$(8.5x)$ m		
Lap2	$\frac{8\text{ m}}{\text{sec}}$	$(99-x)$ sec	$8(99-x)$ m		

Let x = time of lap 1 in sec

99-x = time of lap 2 in sec

Anytime we split a total into two unknown parts, the first is always *x* and the second is always *total* - *x*. Thus lap one is *x* sec and lap two is 99-*x* sec.

$8.5x = 8(99-x)$

The distance of each lap is equal.