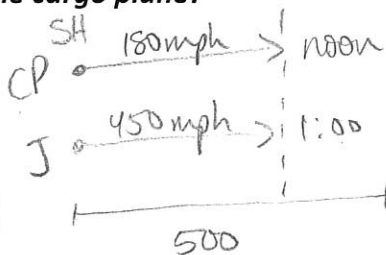**Ex. 1**:
At noon a cargo plane leaves Sky Harbor Airport and heads east at 180 mi/h for a destination 500 mi away. At 1:00 pm a jet takes off from Sky Harbor and flies east at 450 mi/h. *At what time will the jet catch up to the cargo plane?*

$D = RT$

	Rate	Time	Dist
Plane	180	T+1	180T+180
Jet	450	T	450T

SH

CP •——180mph——→ noon

J •——450mph——→ 1:00

├────────────┤
500

$180T + 180 = 450T$
$-180T \qquad -180T$
_____
$\qquad 180 = 270T$
$\qquad \dfrac{180}{270} = \dfrac{270T}{270}$
$\qquad T = \dfrac{2}{3} hr$
$\qquad$ or 40 min

The jet will catch up to the plane at 1:40 pm.

Ex. 2: Larry earned $213 in interest last year by investing $3000, some in bonds that earned 5% per year and the rest in stocks that earned 8% per year. *How much did he invest at each rate?*

$I = PRT \leftarrow$ time (years)
↑ ↑ ↖ rate (decimal)
interest principal

$x = \$$ in bonds

	P	R	T	I
Bonds	X	.05	1	.05x
Stocks	3000-x	.08	1	240-.08x
Total	3000	✕	✕	213

$213 = .05x + 240 - .08x$
$213 = 240 - 0.03x$
$-240 \qquad -240$
_____
$\dfrac{-27}{-.03} = \dfrac{-0.03x}{-0.03}$
$900 = x$

$3000 - 900 = 2,100$

Bonds: $900   Stocks: $2100

Larry invested $900 in bonds + $2100 in stocks.

$\rightarrow .25 \, hr$

Ex. 3: In a bicycle race, Lionel gives Robert a 500 m advantage and agrees to start 15 minutes after Robert. If Lionel bikes at 17 km/h and Robert at 14 km/h, *how long will it take Lionel to overtake Robert?*

500m = .5 km

R $\overset{\frown}{}$ $\longrightarrow$ 14 km/h

T+15 min or T+.25

L $\bullet$ $\longrightarrow$ 17 km/h

T

★ T = Lionel's time

	R	T	D
L	17	T	17T
R	14	T+.25	14T+3.5
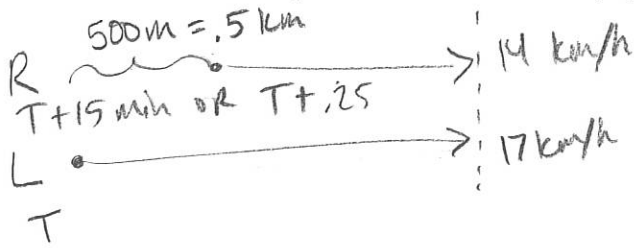
★ make the units match

$D_L = D_R + .5$ or $D_L - .5 = D_R$

$17T = (14T + 3.5) + .5$

$17T = 14T + 4$

$-14T \quad -14T$

$\overline{}$

$\dfrac{3T}{3} = \dfrac{4}{3}$

$T = \dfrac{4}{3}$

$\left(\dfrac{4}{3}\right)(60) = 80 \, min$ or

$1 \, hr, \, 20 \, min$

It will take 1 hr, 20 min for Lionel to overtake Robert.

Ex. 4: A truck left Phoenix for Yuma at 2:00 pm at a speed of 40 mi/h. At 3:15 pm, a car left Yuma for Phoenix at 55 mi/h. They passed each other exactly 2 h before the car reached Phoenix.
How far is it from Phoenix to Yuma?

Phx   Yuma

$\rightarrow$T   2:00 40mph

★longer time $\xleftarrow{}$ 55mph 3:15 C

2 hr   82.5 mi

2(55) = 110 mi

The distance from Phoenix to Yuma is 192.5 miles.
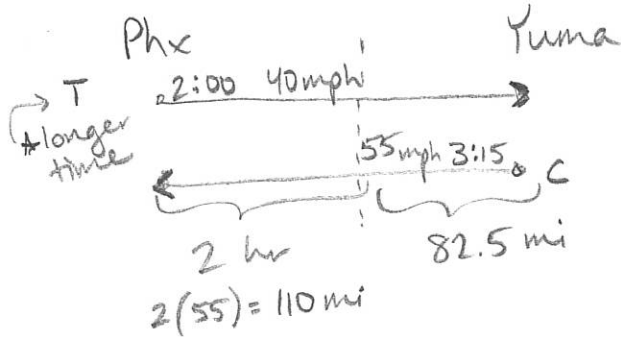
Truck:

$D = RT$

$\dfrac{110}{40} = \dfrac{40T}{40}$

$2.75 = T$

$\downarrow$

2 hr, 45 min

+ 2:00

$\overline{}$

4:45 → when they pass

Car: 3:15 → 4:45 = 1.5 hr

$D = RT$

$D = (55)(1.5)$

$D = 82.5$

$82.5 + 110 = 192.5 \, miles$