

THE GOVERNING FORMULA FOR "RATE" problems is:

$$d = rt$$

WHERE: d = distance (UNITS OF length, e.g. ft, mi., km, etc)
 r = rate (UNITS OF length per time e.g. mph, $\frac{km}{sec}$, etc)
 t = time

Of course ALL UNITS MUST BE CONSISTENT BEFORE EVALUATING the formula. You frequently have to change something like ft per sec. to miles per hour.

The TRANSITIVE PROPERTY: "If $a = b$ and $b = c$ then $a = c$ " CAN be used to solve rate problems that look, AT first glance, like they CANNOT be solved. IF, for example, the distance " d " is the same for 2 trips, then each " rt " is equal to the other AND you do NOT need to know the ACTUAL distance travelled.

(EX) Bus trip TO AND from Green Bay. ON way, Averaged 60 mph. BACK home, Averaged 40 mph. Trip home took 45 min. longer. How long was trip EACH way?

Let t = time (hrs) for trip to G. Bay. $\therefore t_{Home} = t + \frac{3}{4}$ ↘ CONVERT TO HOURS

Since: $d_{To} = r_{To} t = 60t$

$d_{Home} = r_{Home} (t + \frac{3}{4}) = 40(t + \frac{3}{4})$

AND $d_{To} = d_{Home} = d$

Then: $60t = d$ $d = 40(t + \frac{3}{4})$ $\{ 60t = 40(t + \frac{3}{4}) \}$

$a = b$ $b = c$ $\therefore a = c$

TRANSITIVE PROPERTY

SOLVE FOR t

$60t = 40t + 30 \quad \therefore 20t = 30$

$t = 1\frac{1}{2}$ hrs
 $t_{Home} = 2\frac{1}{4}$ hrs

* Practice: Same Problem, Speed To = 55 mph, home = 35 mph, + home = 1 hr. slower