id=22366038

m horse n friend problem?
Solve m=1 then start increasing m=2,3,...n
Then increase m and find the general solution?

Answer: $m=1$, $n=2$

In order them to require same amount of time both should walk same distance and on horse same amount of time.

$$d-x = \frac{x}{v_h} v_m + \frac{\left(x - \frac{x}{v_h} v_m\right) v_m}{v_h + v_m}$$

$$= \frac{x}{v_h} v_m + \frac{x (v_h - v_m) v_m}{v_h (v_h + v_m)}$$

$$= \frac{x v_m \left[(v_m + v_h) + (v_h - v_m)\right]}{v_h (v_h + v_m)}$$

$$= \frac{2x v_m v_h}{v_h (v_h + v_m)}$$

$$\Rightarrow d = \frac{2x v_m v_h + x v_h (v_h + v_m)}{v_h (v_h + v_m)}$$

$$\therefore x = \frac{d\, v_h (v_h + v_m)}{v_h \left[2v_m + (v_h + v_m)\right]}$$

$$= \frac{d (v_h + v_m)}{(v_h + 3v_m)}$$

now: $n=1$, $n=3$

here,

2nd friend walks $\frac{x}{v_n} v_m + \frac{\left(x - \frac{x}{v_n} v_m\right) v_m}{v_m + v_n}$

the 2nd fraction is for the horse to go back.

so, 3rd friend's equation will be

$$d - x = 2\left[\frac{x}{v_n} v_m + \frac{\left(x - \frac{x}{v_n} v_m\right) v_m}{v_m + v_n}\right]$$

$$x = \frac{d(v_n + v_m)}{v_n + 5v_m}$$

As we increase the value of n we can see the following generic equation.

$$x = \frac{d(v_n + v_m)}{v_n + (2n-1)v_m}$$