

MHF4U1 5.E Creating a Model

	d	S	t
outbound (tailwind)	1000	$325 + 75$ $= 400$	$\frac{1000}{400}$ $= 2.5$
return trip (headwind)	1000	$325 - 75$ $= 250$	$\frac{1000}{250}$ $= 4$

Change to find wind speed if round trip is 6.5 h.  
\* Harder if find plane speed given wind speed + 6.5 total.

	d	S	t
bus	160	b	$\frac{160}{b}$
car	$430 - 160$ $= 270$	$b + 10$	$\frac{270}{b + 10}$
total	430		5

Let b represent the speed of the bus, in km/h.

$\frac{160}{b} + \frac{270}{b+10} = 5$   $b \neq 0, -10$   
 $LCD = b(b+10)$

$$b(b+10) \left[ \frac{160}{b} + \frac{270}{b+10} \right] = b(b+10) [5]$$

$$160b + 1600 + 270b = 5b^2 + 50b$$

$$0 = 5b^2 + 50b - 430b - 1600$$

$$= 5b^2 - 380b - 1600$$

$$= 5(b^2 - 76b - 320)$$

$$= 5(b - 80)(b + 4)$$

$\therefore b = 80$  or  $b = -4$  inadmissible  
 $\therefore$  the speed of the car is 90 km/h.

or  $\frac{160}{c-10} + \frac{270}{c} = 5$

$$160c + 270c - 2700 = 5c^2 - 50c$$

$$5c^2 - 480c + 2700 = 0$$

$$5(c^2 - 96c + 540) = 0$$

$$5(c - 6)(c - 90) = 0$$

$c = 6$  or  $c = 90$   $\rightarrow$   
inadmissible

$$t_F = t_A - 1 \text{ minute}$$

$$= t_A - \frac{1}{60} \text{ hour}$$

$$\frac{4}{A+1} = \frac{4}{A} - \frac{1}{60}$$

	d	S	t
Frank	4	$A + 1$	$\frac{4}{A + 1}$
Anatole	4	A	$\frac{4}{A}$

$$60A(A+1) \left[ \frac{4}{A+1} \right] = 60A(A+1) \left[ \frac{4}{A} \right] - 60A(A+1) \left[ \frac{1}{60} \right]$$

$$240A = 240A + 240 - A^2 - A$$

$$A^2 + A - 240 = 0$$

$$(A + 16)(A - 15) = 0$$

Let A represent the speed Anatole can ski in km/h.

$\therefore A = -16$  or  $A = 15$   $\therefore$  Anatole skis 15 km/h +  
inadmissible Frank skis 16 km/h.

creating a model

4

$$\frac{20}{n-4} - \frac{20}{n} = 0.25$$

Let  $n$  represent the original number of students  
number who contributed

Check if  $n=20$

$$0(n-4)\left[\frac{20}{n-4}\right] - n(n-4)\left[\frac{20}{n}\right] = n(n-4)[0.25]$$

$$LS = \frac{20}{20-4} - \frac{20}{20}$$

$$20n - 20(n-4) = 0.25(n^2 - 4n)$$

$$= \frac{20}{16} - 1$$

$$20n - 20n + 80 = 0.25n^2 - n$$

$$= 1.25 - 1$$

$$0 = 0.25n^2 - n - 80$$

$$= 0.25$$

$$0 = 0.25(n^2 - 4n - 320)$$

$$= 0.25(n-20)(n+16)$$

$$\therefore n=20 \text{ or } n=-16$$

$\therefore$  there were originally 20 students,  
but  $n-4=16$  students contributed.

Original per =  $\frac{20}{n}$       After per $\uparrow$  =  $\frac{20}{n-4}$

$$\frac{20}{n} = \frac{20}{n-4}$$

#5 Let  $p$  represent the price per share, in dollars,  
and  $n$  represent the number of shares.

$$p = \frac{1875}{n} \quad \frac{1740}{n-15} = p+4$$

$$\therefore \frac{1740}{n-15} = \frac{1875}{n} + 4 \quad n \neq 15, 0$$

$$n(n-15)\left[\frac{1740}{n-15}\right] = n(n-15)\left[\frac{1875}{n}\right] + n(n-15)[4]$$

$$1740n = 1875n - 28125 + 4n^2 - 60n$$

$$0 = 4n^2 + 75n - 28125$$

$$0 = (4n+375)(n-75)$$

$$\therefore n = -\frac{375}{4}$$

inadmissible

$$\text{or } n = 75$$

$\therefore$  Brendan bought 75 shares