$g(x) = x^2 - 4x$

x	-2	-1	0	1	2	3	4	5
$y = g(x)$	12	5	0	-3	-4	-3	0	5

(1)

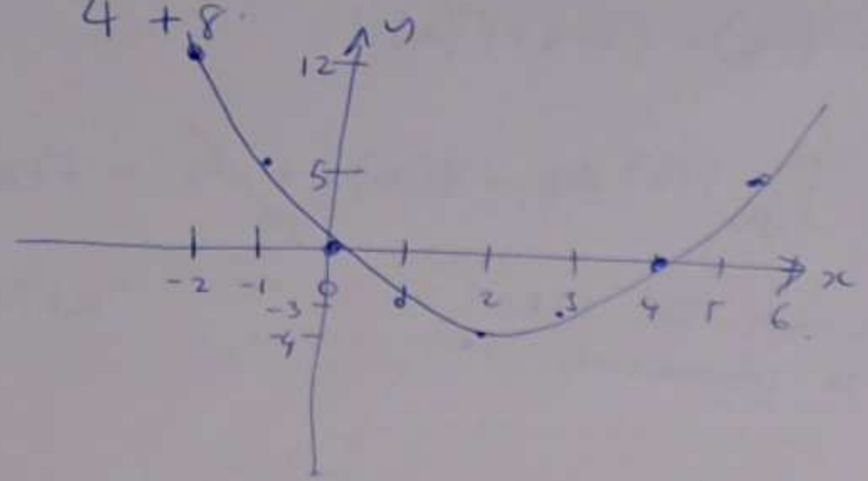
$(-2)^2 - 4(-2)$

$4 + 8$

$(-1)^2 - 4(-1)$

$1 + 4$

(-2, 12)
(-1, 5)
(0, 0)



Q20 ②.

$$\frac{3}{t-3} + \frac{5}{t+2}$$ ← common denominator

$$(t-3)(t+2)$$

$$\frac{3}{(t-3)} \times \frac{(t+2)}{(t+2)} + \frac{5}{(t+2)} \times \frac{(t-3)}{(t-3)}$$

$$\frac{3t+6}{(t-3)(t+2)} + \frac{5t-15}{(t+2)(t-3)} = \frac{3t+6+5t-15}{(t-3)(t+2)}$$

$$= \frac{8t-9}{(t-3)(t+2)}$$

$$\frac{3}{t-3} + \frac{5}{t^2-9}$$ ← common denominator.

$$(t-3)(t^2-9)$$

better choice

Remark: $t^2-9 = (t-3)(t+3)$

common pattern: difference of two squares.

$$a^2-b^2 = (a-b)(a+b)$$

can choose common denominator to be $(t-3)(t+3) = t^2-9$.

$$\frac{3}{t-3} + \frac{5}{(t-3)(t+3)}$$ ← common denominator (3) $(t-3)(t+3)$.

$$\frac{3}{(t-3)} \times \frac{(t+3)}{(t+3)} + \frac{5}{(t-3)(t+3)}$$

$$\frac{3t+3}{(t-3)(t+3)} + \frac{5}{(t-3)(t+3)} = \frac{3t+8}{(t-3)(t+3)}$$

(4)

$$\frac{x+\frac{1}{x+2}}{x+3}$$

step 1 $\quad \frac{x}{1}+\frac{1}{x+2}$

$$\frac{x}{1}\times\frac{(x+2)}{(x+2)}+\frac{1}{x+2}$$

$$\frac{x^2+2x}{x+2}+\frac{1}{x+2}$$

$$\frac{x^2+2x+1}{x+2}$$

$$\frac{\frac{x^2+2x+1}{x+2}}{x+3}$$

$$= \frac{x^2+2x+1}{(x+2)(x+3)} = \frac{(x+1)^2}{(x+2)(x+3)}$$

Q31 Helen earns $7.50/hour for first 35 hours. overtime is $1\frac{1}{2}$ regular pay. (5)

In one week she earned $325.50.

---

10 hours $7.50 \times 10 = \$75.00$

20 hours $7.50 \times 20 = \$150.00$

⋮

35 hours $7.50 \times 35 = \$262.50$

36 hours $7.50 \times 35 = 262.50$

$+ \underbrace{1.5 \times 7.5}_{11.25} \times$ ~~55~~ $1 \quad 11.25$

273.75

(6)

earned $325.50 > $262.50 = 35 × 7.5

if we work overtime: $35 \times 7.5 + x \times 11.25$

x

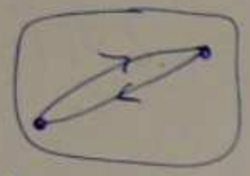
$\$325.50 = 262.50 + 11.25x$

$325.50 - 262.50 = 11.25x$

$\frac{63}{11.25} = \frac{11.25x}{11.25}$

$x = \frac{63}{11.25} = 5.6$ hours.

(7)



Montreal

LA

2500 miles.

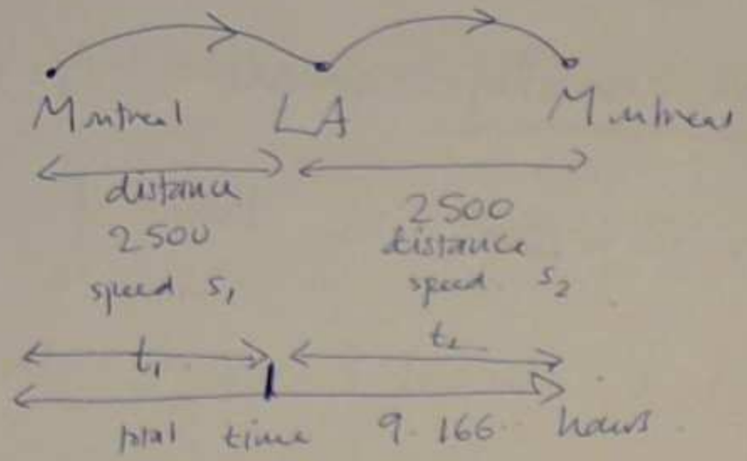
return trip is 20% faster — (2)

round trip 9 hours 10 min — (1)

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$s_1 = \frac{2500}{t_1}$$

$$s_2 = \frac{2500}{t_2}$$



① $t_1 + t_2 = 9.1666$ ② $s_2 = 1.2 s_1$

(8)

$S_1 = \frac{2500}{t_1}$ $\quad S_2 = \frac{2500}{t_2}$

$t_1 + t_2 = 9.1666\ldots$

$S_2 = 1.2 S_1$

$1.2 S_1 = \frac{2500}{t_2}$

$S_1 = \frac{2500}{t_1} = \frac{2500}{1.2 t_2}$

$1.2 t_2 \times 2500 = 2500 \times t_1$

$1.2 t_2 = t_1$

$t_1 + t_2 = 9.1666$

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(9)

$s_1 = \frac{2500}{t_1}$

$t_1 + t_2 = 9.1666\ldots$

$t_1 = 1.2\,t_2$

$t_2 = \frac{t_1}{1.2}$

$t_1 + \frac{t_1}{1.2} = 9.1666\ldots$

$t_1\left(1 + \frac{1}{1.2}\right) = 9.1666\ldots$

$t_1 = \frac{9.1666\ldots}{1 + \frac{1}{1.2}}$

$s_1 = \frac{2500}{9.166\ldots}$

$1 + 1/1.2 = 6/5 = 11/5$

$s_1 = \frac{2500}{9.1666 \times \frac{5}{11}} = \frac{2500 \times 11}{9.1666\ldots \times 5} = 600$

Joseph Maher

(10)

check

600 mp/h.

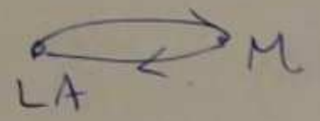
$\frac{2500}{600}$

4.1666...

720 mp/h.

$\frac{2500}{720}$

3.47222...



$s_1 = \frac{2500}{t_1}$ $s_2 = \frac{2500}{t_2}$

$t_1 + t_2 = 9.166$

$s_2 = 1.2 s_1$

$\frac{2500}{t_2} = 1.2 \frac{2500}{t_1}$

$t_2 = 1.2 t_1$

$t_1 \times 2500 = 1.2 \times 2500 \times t_2$

$\frac{t_1}{1.2} = \frac{1.2 t_2}{1.2}$

$t_2 = \frac{t_1}{1.2}$

$t_1 + t_2 = 9.1666$

$t_1 + \frac{t_1}{1.2} = 9.166$

$t_1 \left(1 + \frac{1}{1.2}\right) = 9.166$

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(12)

check $s_1 = 500$

$s_2 = 600$

$\frac{2500}{500} + \frac{2500}{600}$

$5 + 4.166 = 9.166\ldots$

(11)

$s_1 = \frac{2500}{t_1}$ $\quad s_2 = \frac{2500}{t_2}$

$t_1 + t_2 = 9.166$

$s_2 = 1.2\, s_1$

$s_1 = \frac{2500}{5} = 500$ mph

$\frac{2500}{t_2} = 1.2\, \frac{2500}{t_1}$

$t_1 \times 2500 = 1.2 \times 2500 \times t_2$

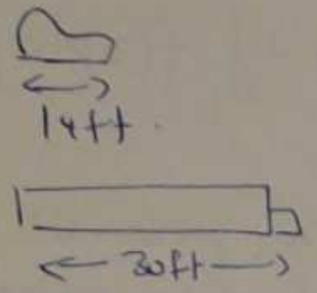
$\frac{t_1}{1.2} = \frac{1.2\, t_2}{1.2}$

$t_2 = \frac{t_1}{1.2}$ $\quad t_1 = \frac{9.166}{1 + \frac{1}{1.2}}$

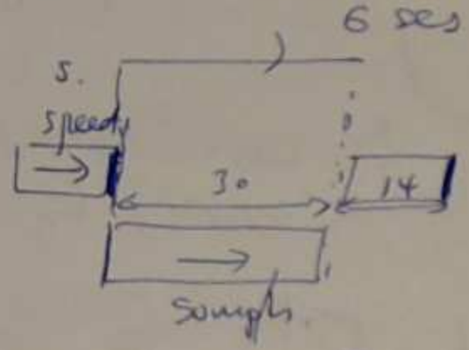
$t_1 + t_2 = 9.1666$

Joseph Maher

Q72.



pass in 6 secs.



Q. at speed ~~s~~ s mph how long does it take to pass the truck?

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

from truck's point of view.

distance car goes is 30 + 14 = 44ft

$$s - 50 = \frac{44\text{ft}}{\text{time}}$$

how fast is the car going s − 50 mph.

(14)

$$S - 50\text{mph} = \frac{44\text{ft}}{6\text{ secs}}.$$

$$S - 50 = \frac{44 / 5280}{6 / 60 \times 60}.$$

$$S = 50 + \frac{44}{6} \times \frac{60 \times 60}{5280} = 50 + 5$$

$$= 55\text{ mph}.$$

Check car 55 mph

truck 50 mph.

how far do they go in 6 seconds.

$\frac{55 \times 6}{60 \times 60} \times 5280$ (15)

$\frac{50 \times 6}{60 \times 60} \times 5280$.

speed = $\frac{\text{distance}}{\text{time}}$

distance = speed x time.

car 484 ft

truck 440 ft.

difference is 44ft.

(16)

car s mph 6 seconds $440 + 44 = 484$.

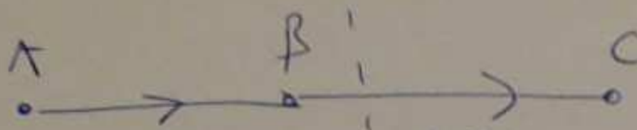
truck 50 mph 6 seconds distance

$= \frac{6}{60 \times 60}$ hours. $\frac{50 \times 6}{60 \times 60} \times 5280 = 440$ ft.

car speed $s = \frac{484 \text{ ft}}{6 \text{ seconds}}$ $\frac{484/5280}{6/60 \times 60}$

$= 55$

Q7)



(17)

speed = distance / time

$\frac{6}{60}$ hours

speed s mp/h. s+10 mp/h.

time t. time t + 6 mins.

$s = \frac{120}{t}$ $\quad s+10 = \frac{150}{t+0.1}$

$st = 120$ $\quad (s+10)(t+0.1) = 150$

$t = \frac{120}{s}$ $\quad (s+10)\left(\frac{120}{s}+0.1\right) = 150$

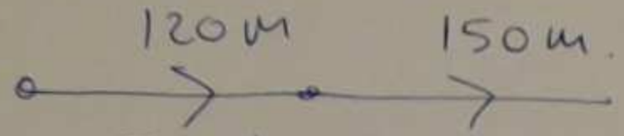
```
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[Previously saved workspace restored]

> 35 * 7.5
[1] 262.5
> 1.5 * 7.5
[1] 11.25
> 325.5 - 262.5
[1] 63
> 63 / 11.25
[1] 5.6
> 10 / 60
[1] 0.1666667
> 1 / 1.2
[1] 0.8333333
> 2500 * 11 / 9.1666666 / 5
[1] 600
> 2500 / 600
[1] 4.166667
> 2500 / 720
[1] 3.472222
> 2500 / 720 + 2500 / 720
[1] 6.944444
> ( 2500 / 720 )+ 2500 / 720
[1] 6.944444
> ( 2500 / 600 )+ 2500 / 720
[1] 7.638889
> 1 + 1/1.2
[1] 1.833333
> 9.1666 / (1 + 1/1.2)
[1] 4.999964
> 9.16666 / (1 + 1/1.2)
[1] 4.999996
> 2500 / 6
[1] 416.6667
> 2500 / 600
[1] 4.166667
> 44 / 6 * 60 * 60 / 5280
[1] 5
```

check



(18)

speed = $\frac{\text{dist}}{\text{time}}$

time = $\frac{\text{dist}}{\text{speed}}$

Time	2.4 hrs.	2.5 hrs.
	240 mph	250 mph
	0.5 hrs.	0.6 hrs.