Chapter 6 – MORE WORD PROBLEMS

Exercise 1 :

Zakk needs to stamp the envelopes for his wedding invitations.
By himself, it would take him 4h.
His friend Tate is happy to help him.
Together, it took them 2h28min.
How long would it have taken Tate if he had done it alone?

Fraction of work completed in 1 min

Let x be the time it would take Tate by himself (in min)

Zakk $\frac{1}{240}$
Tate $\frac{1}{x}$
Together $\frac{1}{148}$

$$\frac{1}{240} + \frac{1}{x} = \frac{1}{148}$$

$$148x + 240 \times 148 = 240x$$
$$92x = 35520$$
$$x = \frac{35520}{92}$$

$x \simeq 386$ min

$\Rightarrow$ 6h26 min

Exercise 2 :

Alex' grand parents live 50km from his house.
Yesterday, it took him 20 minutes more than usual to go there with his moped because of the rain, which forced him to drive 10km/h slower than usual.
What is his usual average speed?

	dist (km)	time (h)	speed (km/h)
usually	50	t	v
yesterday	50	$t+\frac{1}{3}$	$v-10$

$t = \frac{d}{v}$

$t = \frac{50}{v}$ $\quad t + \frac{1}{3} = \frac{50}{v-10}$

$$\frac{50}{v} + \frac{1}{3} = \frac{50}{v-10}$$

$$150(v-10) + v(v-10) = 150v$$
$$v^2 - 10v - 1500 = 0$$
$$\Delta = 6100$$

$$v = \frac{10 \pm \sqrt{6100}}{2}$$

~~-34~~

44

usual speed : 44km/h approx

Exercise 3 :

Your friend Julian needs to distribute some ad for a fundraiser.
You want to go fishing with him afterwards, so you decide to help him to save some time.
It would take him 4h if he did it by himself.
It would take you 5h if you did it by yourself.
How much time is it going to take you if you work together?

	Fraction of work Completed in 1h
Julian	$\frac{1}{4}$
You	$\frac{1}{5}$
Together	$\frac{1}{x}$

Let x be the time it's going to take together (in h)

$$\frac{1}{4} + \frac{1}{5} = \frac{1}{x}$$

$$5x + 4x = 20$$

$$9x = 20$$

$$x = \frac{20}{9}$$

$\Rightarrow$ **2h13 min**

Exercise 4 :

Your English teacher gave you a 240 pages novel to read over March break (16 days).
After reading half of the book, you realize that you have to pick up the pace to finish it in time. You need to read 20 more pages per day to succeed.
How many pages a day on average were you reading at the start?

	pages	days	pages/day
start	120	t	v
end	120	$16-t$	$v+20$

$t = \frac{d}{v}$

$$t = \frac{120}{v} \qquad 16 - t = \frac{120}{v+20}$$

$$16 - \frac{120}{v} = \frac{120}{v+20}$$

$$16v(v+20) - 120(v+20) = 120v$$

$$16v^2 + 320v - 120v - 2400 = 120v$$

$$16v^2 + 80v - 2400 = 0$$

$$16(v^2 + 5v - 150) = 0$$

$$16(v+15)(v-10) = 0$$

$v = -15$ ~~$v = -15$~~ $\qquad v = 10$

$\Rightarrow$ **10 pages/day**