DAY 6 - Word Problems

1. John bought a new television. The total cost includes a delivery charge of $120, plus taxes of 13%.
   a. Assign variables and create an equation for this problem.
   b. Determine the cost of the television before the delivery charge and the taxes if the total cost was $540.

@ Let x be cost of TV
let y be total

$$y = 1.13(x + 120)$$

ⓑ $$540 = 1.13x + 135.60$$
$$404.4 = 1.13x$$
$$357.88 = x$$

∴ TV cost 357.88 before tax.

2. The movie theatre charges $5 per children and $10 per adults for one movie.
   a. Assign variables and create an equation for this problem.
   b. How many child tickets were sold, if the total sales was $2500 and 150 adult tickets were sold?

@ let A be # of adults
let C be # of children
let T be total cost.

$$T = 5C + 10A$$

ⓑ $$2500 = 5C + 10(150)$$
$$2500 = 5C + 1500$$
$$1000 = 5C$$
$$200 = C$$

∴ 200 child tickets sold

3. Ted and Ben are swimming laps in a pool that is 50 m in length. They start at opposite ends of the pool at the same time. Ted swims 10 m/min faster than Ben does. After 2 min they swim by each other.
   a. Assign variables and create an equation for this problem.
   b. How fast is each person swimming?

@

	D	V	T
Ted	$2(x+10)$	$x+10$	2
Ben	$2x$	x	2

├────── 50m ──────┤

$$2(x+10) + 2x = 50$$

ⓑ $$2x + 20 + 2x = 50$$
$$4x + 20 = 50$$
$$4x = 30$$
$$x = 7.5$$

∴ Ben swims at 7.5 m/min and Ted at 17.5 m/min

4. Lin is tracking the progress of her plant's growth. Today the plant is 5cm high. The plant grows 1.5cm per day.
   a. Assign variables and create an equation for this problem.
   b. What is the height of the plant after 2 weeks?
   c. Find how many days have passed if the plant is 20cm tall?

@ let x be # of days
let y be total height

$$y = 5 + 1.5x$$

ⓑ $$y = 5 + 1.5(14)$$
$$y = 5 + 21$$
$$y = 26$$ ∴ 26cm high

ⓒ $$20 = 5 + 1.5x$$
$$15 = 1.5x$$
$$10 = x$$ ∴ after 10 days

5. Flight 47 leaves Toronto Pearson International Airport en route to Vancouver. It travels at an average speed of 500 km/h. One hour later, a cargo flight leaves Pearson for Vancouver, travelling at an average speed of 750 km/h. Let t represent the time in hours that Flight 47 has flown. Solve the equation $500t = 750(t - 1)$ to find out when the cargo plane catches up with Flight 47.

$$500t = 750t - 750$$
$$-250t = -750$$
$$t = 3$$
∴ it takes 3 hrs.

6. Jack and Diane are bus drivers who drive the same route. Jack drives the regular bus, which travels at an average speed of 35 km/h. Diane drives the express bus, which travels at an average speed of 60 km/h. Diane completes her route in $\frac{3}{4}$ h less time tha Jack does. Solve the equation $60(t - 0.75) = 35t$ to find the length of time Jack takes to complete the route. How long does Diane take?
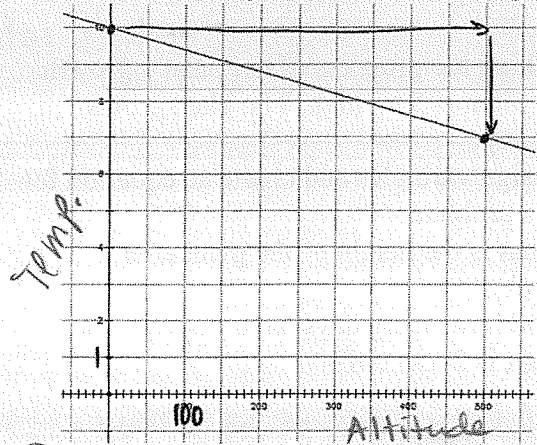
$$60(t - 0.75) = 35t$$
$$60t - 45 = 35t$$
$$-45 = -25t$$
$$1.8 = t$$
it takes 1.8 hours.

7. With every increase in altitude of 1000 m, the temperature decreases by about 6°C. At the base of a mountain the temperature is 10°C.
   a) Write an equation to model the temperature on the mountain.
   b) The temperature outside the tents at the first camp for climbers is −10°C. How high up the mountain is the camp?

(a) let x be altitude
    let y be temperature

$$y = \frac{-6}{1000}x + 10$$

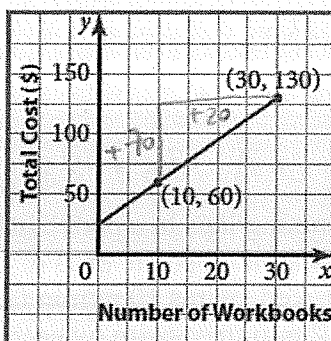(b) $$-10 = \frac{-6}{1000}x + 10$$
$$-20 = \frac{-3}{500}x$$
$$-10\,000 = -3x$$
$$3333 = x$$ ∴ up at altitude of 2...

8.

Number of Workbooks

The graph shows how the total cost, in dollars, to ship workbooks is related to the number of workbooks.
   a) Write an equation in the form $y = mx + b$ for this relation.
   b) What do the values of m and b represent?
   c) Jee-Yun has a budget of $200 for workbooks. How many can she buy?

$$m = \frac{70}{20}$$
$$m = \frac{7}{2} = 3.5$$

(a) let x be # of workbooks
    let y be total cost

$$y = 3.5x + 25$$

(b) $m = 3.5$ $b = 25$
    represents   rep. initial
    $3.50/book   cost.

(c) $$200 = 3.5x + 25$$
$$175 = 3.5x$$
... ∴ she can buy ...