

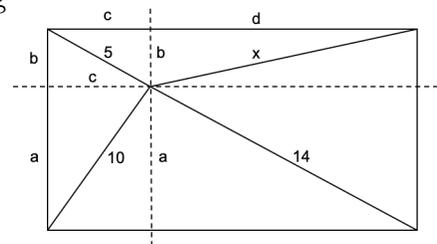
1. Cassandra's watch measured 2 hours, 55 minutes and 30 seconds (or 10530 seconds) while in reality 3 hours passed (or 10800 seconds). Thus, when her watch says 11 pm there will have passed:

$$X = \frac{10800}{10530} 43200 = 44307.7 \text{ seconds}$$

Thus, the real time is 11:18:28.

2. Following the figure, we want to find x . Using Pythagoras theorem we have:

$$\begin{aligned} c^2 &= 10^2 - a^2, & d^2 &= 14^2 - a^2, \\ b^2 &= 5^2 - c^2 = 5^2 - 10^2 + a^2, \\ x^2 &= b^2 + d^2 = 5^2 - 10^2 + 14^2. \\ \implies x &= 11 \end{aligned}$$



3. The mode is always 2 and the mean is $(25 + x)/7$. The median will depend on the value of x and where it lies among the list: $\{2, 2, 2, 4, 5, 10\}$. The median is 2 (when $x \leq 2$), 3 (when $x = 3$), or 4 (when $x \geq 4$). Thus, $x \geq 3$.

If $x = 3$, then the mode is 2, the median is 3 and the mean is $28/7 = 4$. And $\{2, 3, 4\}$ is a non-constant arithmetic progression. Thus, $x = 3$ is a solution.

If $x \geq 4$, then the mode is 2, the median is 4, and the mean is $(25 + x)/7$. To be an arithmetic progression, we need $4 - 2 = (25 + x)/7 - 4$. Thus, the only other solution is $x = 17$.

Thus, the sum of the solutions is 20.

4. Let's refer to each person by their initial, and let's call x the total amount of snow. Then, each of them shoves snow at a rate per hour of:

$$K = \frac{x}{12}, \quad D = \frac{x}{8}, \quad J = \frac{x}{6}, \quad A = \frac{x}{4}.$$

Thus, all of them together shove $\frac{x}{12} + \frac{x}{8} + \frac{x}{6} + \frac{x}{4} = \frac{15x}{24}$ snow per hour. Then, it will take them a total time of $\frac{x}{\frac{15x}{24}}$ hours to shove all the snow. Then, it takes them 1.6 hours, or 96 minutes, to shove all the snow.

5. Ask “Are is the Toggler?”.

CASE 1: the answer is “yes”: Then you asked to a liar or the Toggler (and he said the true). In any case, the person will lie for the next question. Then ask “who is not the Toggler?”, and the person he/she point is the Toggler.

CASE 2: the answer is “no”: Then you asked to a truth teller or the Toggler (and he lied). In any case, the person will say the truth for the next question. Then ask “who is the Toggler?”, and the person he/she point is the Toggler.