Teaching for problem solving, about problem solving or via problem solving

Short Workshop
Ho Kai Fai
kfho@nie.edu.sg

When you teach a topic e.g. fractions or rates, how do you go about it?

100m Race
In a race over 100 metres, Fatimah can beat her younger brother Ahmad by 5 metres. If she offers to start 5 metres behind the starting line, who will win the 100-metre race?
Given info:
Fatimah runs 105m; Ahmad 100m. Who takes less time?

Solve a simpler version of the problem/Solve part of the problem
F runs 100m, Ahmad 95m.

So by the time F runs 100m, she has 5 more m to go
And A would have run 95m; he has 5 more m to go

Since F runs faster than A, she needs less time to finish the last 5 m.
So she wins.

Pose a problem
• How about Fatimah starting at 6m behind instead?
• At what distance must Fatimah start behind for both of them to finish at the same time?
• What about a longer race? Let’s say Ahmad can run at the same speed for 200m, whereas Fatimah slows down after 100m to lose to Ahmad by 5m. At which point did Ahmad overtake Fatimah?
Fraction wearing spectacles

In a primary school, three quarters of the boys and two fifths of the girls wear spectacles. The Principal finds that the numbers of boys and girls wearing spectacles are the same. What fraction of students in the school wear spectacles?

**Solution**

1. **Draw a model**
   - B: Boys with spectacles
   - G: Girls with spectacles

   2 units of G = 3 units of B. Subdivide to make a common unit
   - B: 1 1 1 1
   - G: 1 1 1 1 1 1

   So total common units = 4 X 2 + 5 X 3 = 23
   - No. of common units of students wearing spectacles = 6 X 2 = 12
   - Fraction of students wearing spectacles = 12/23

2. **Use algebra/form an equation**
   - Let B be the number of boys and G the number of girls
   - So \( \frac{3}{4} B = \frac{2}{5} G \) ⇒ \( B = \frac{2}{3} G \times \frac{4}{3} = \frac{8}{9} G \)
   - The fraction of students wearing specs = \( \frac{\frac{3}{4} B + \frac{2}{5} G}{B + G} = \frac{\frac{3}{4} \times \frac{8}{9} G + \frac{2}{5} G}{\frac{8}{9} G + G} = \frac{\frac{12}{9} G + \frac{2}{5} G}{\frac{17}{9} G} = \frac{\frac{12}{9} + \frac{2}{5}}{\frac{17}{9}} = \frac{\frac{12}{9} + \frac{2}{5}}{\frac{17}{9}} = \frac{\frac{12}{9} + \frac{2}{5}}{\frac{17}{9}} = \frac{\frac{12 + 18}{45}}{\frac{17}{9}} = \frac{\frac{30}{45}}{\frac{17}{9}} = \frac{30 \times 9}{45 \times 17} = \frac{12}{23} \)

   - Does the answer make sense? What does it mean?
More resources at

http://mps.crpp.nie.edu.sg

Databank of questions
Search-able by level, topic, heuristics

Your contributions and feedback are welcome!

Thanks!