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(TOPICS • PROBLEM SOLVING HEURISTICS)

*More challenging problems especially for advanced pupils.

2.2 Part-Whole Unit Model Concept

Example 1

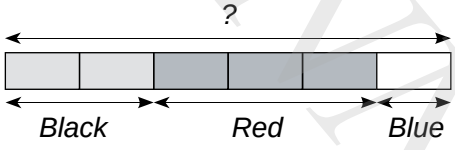
$\frac{1}{3}$ of the markers in a box are black, $\frac{1}{2}$ of them are red and the rest are blue.
There are 96 more red markers than blue markers.
How many markers are there altogether in the box?

Solution:

THINK

Convert $\frac{1}{3}$ and $\frac{1}{2}$ to like fractions before drawing a model with 6 equal units representing the total number of markers. (6 is the smallest common multiple of 3 and 2.)

$\frac{1}{3} = \frac{2}{\mathbf{6}}$ (Black); $\frac{1}{2} = \frac{3}{\mathbf{6}}$ (Red)



3 - 1 = 2 units (Red - Blue)

2 units → 96 6 units → 3 x 96 = 288 (Total)

There are 288 markers altogether in the box.

* Example 2

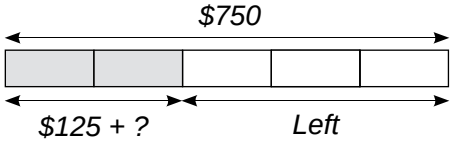
Alice had $750. She spent $125 on a handbag and some on a watch.
If she had $\frac{3}{5}$ of her money left, what was the cost of the watch?

Solution:

THINK

Draw a model with 5 equal units representing the total amount of money Alice had at first.

Since 3 equal units represent the amount left, 2 equal units represent the total amount spent.



5 units → $750 (Total) 1 unit → $750 ÷ 5 = $150

2 units → 2 x $150 = $300 (Handbag + Watch)

Cost of the watch = $300 - $125 = $175

The watch cost $175.

Worksheet 2.2

Solve the problems. Show your working clearly.

1. Tim spent $\frac{1}{2}$ of his monthly income on transport, $\frac{2}{5}$ of it on food and saved the rest. If he saved $600 each month, how much did he earn in a month?

2. $\frac{1}{3}$ of a pole was painted blue, $\frac{4}{9}$ of it was painted red and the remaining pole was painted yellow. If 36 cm of the pole was painted yellow, what was the length of the pole?

3. $\frac{3}{5}$ of the balls in a basket are white, $\frac{1}{3}$ of them are orange and the rest are purple. There are 176 more white balls than purple balls. How many balls are there in the basket altogether?

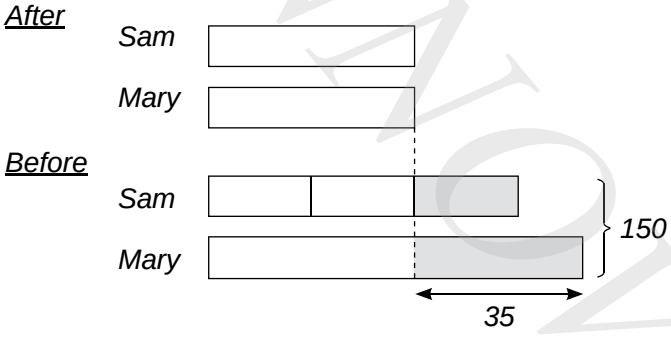
*2.6 Before-After Model Concept

* Example 1

Sam and Mary had 150 envelopes altogether.
After Sam used $\frac{1}{3}$ of his envelopes and Mary used 35 envelopes, they had the same number of envelopes left.
How many envelopes did each of them have at first?

Solution:

Draw a model to help visualise the problem.



THINK

From the model, we can see:
Before
Sam → 3 units; Mary → 2 equal units + 35;
Total → 5 equal units + 35 = 150.

Subtract 35 from 150 to get the value of 5 equal units (Make-A-Whole Model Concept).

Before

5 units → 150 - 35 = 115

1 unit → 115 ÷ 5 = 23

3 units → 3 x 23 = 69 (Sam)

Number of envelops Mary had = 150 - 69 = 81

Sam had 69 envelopes and Mary had 81 envelopes at first.

Worksheet 2.6

Solve the problems. Show your working clearly.

*1. Mark and Linda had 90 sweets altogether. After Mark ate $\frac{1}{3}$ of his sweets and Linda ate 25 sweets, they had an equal number of sweets left. How many sweets did each of them have at first?

*2. Roger and Danny had 136 stamps altogether. Roger used $\frac{1}{4}$ of his stamps and Danny used 38 stamps. After that, they had an equal number of stamps left. How many stamps did each of them have at first?