Parents' learning day

P3&4 MATHEMATICS

Objective of workshop

To equip parents with skills to support the students' learning in using model drawing and heuristics as tools for problem solving

Outline

What are thinking skills and heuristics?

Heuristics - Model Drawing

Heuristics – Before and After Concept

Essential basic skills to master

Thinking Skills are skills that can be used in a thinking process, *such as classifying, comparing, sequencing, analyzing parts and wholes, identifying patterns and relationships, induction, deduction and spatial visualization*

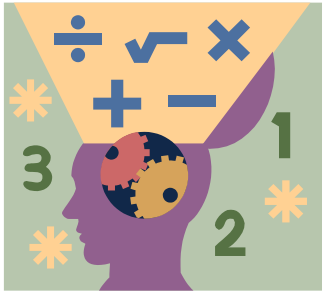
Heuristics - a way of thinking

Thinking Skills and Heuristics

Thinking skills and heuristics are strategies/tools used to solve problems.

Not all problems require the use of heuristic(s) to solve, especially when the problem is simple, familiar or routine in nature.

There is usually more than one way of solving a problem. Using appropriate heuristics often results in obtaining a solution more efficiently.



Thinking Skills and heuristics

Giving a representation	Draw a diagram/ model Make a list
Making calculated guess	Guess and Check Look for a pattern Making supposition
Going through the process	Act it Out Work Backwards Before and After concept
Changing the problem	Restate the Problem Simplify the Problem Solve part of the problem

Heuristics: Draw A Diagram/Model

One of the most popular heuristics for primary school pupils :

- helps pupils visualise situations,
- creates concrete pictures from abstract situations,
- satisfies the pupils' learning through seeing and doing it.
- transforms words into recognisable pictures for young minds.

Word Problems at P3 and P4

Primary 3

Whole Numbers

- *Solve up to 2-step word problems involving the 4 operations*

Primary 4

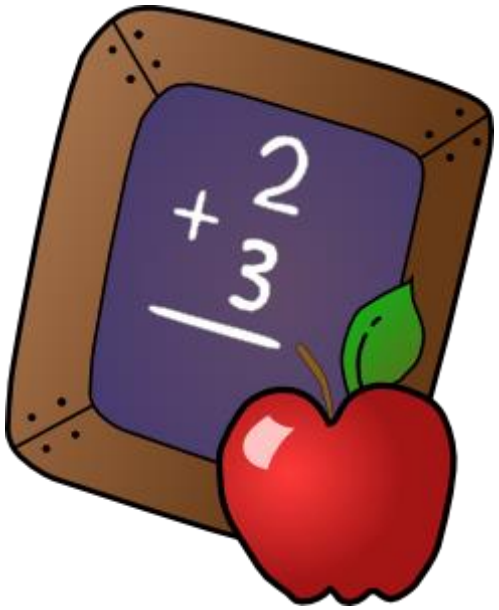
Whole Numbers

- Solve up to 3-step word problems involving 4 operations

Fractions

- Solve up to 2-step word problems involving addition, subtraction and fraction of a set

4 steps to problem solving



UNDERSTAND the problem

Break up the problem into smaller section

- **Identify** the keyword/ topic/ concept/ tool
- **Interpret** information given
  - Re-state or organize the information in simpler ways
- **Infer** other information
  - uncover hidden information

Questioning

PLAN what to do/Devise a plan

- Find the connection between the given information, the unknowns and the goal.
- Consider some possible actions or heuristics
- Choose a heuristic to use to solve the problem

DO/Carry out the plan

- Implement the strategy or strategies chosen.
- Carry out the necessary actions or computations. Use logical reasoning.
- Modify plan and choose a new strategy if necessary until the problem is solved

CHECK the solution/Look back

- Check that the solution is reasonable and satisfies the original problem.
- Examine whether there is another easier method to find the solution.
- Extend the method to other problems.

Model Drawing

Equal and Difference Concept

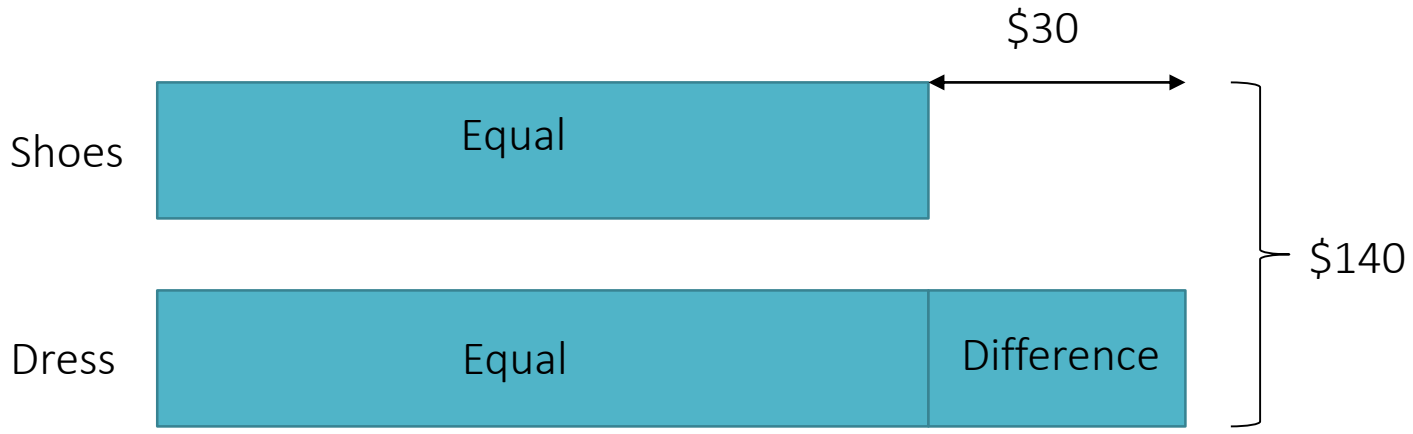
More than/less than/fewer

Question 1

Source: P3 My Pals Workbook

Mrs Tang spent $140 on a pair of shoes and a dress.
The pair of shoes cost $30 less than the dress.
How much did Mrs Tang spend on the shoes?

U √ Identify key information, interpret and organise
P √ Draw comparison models



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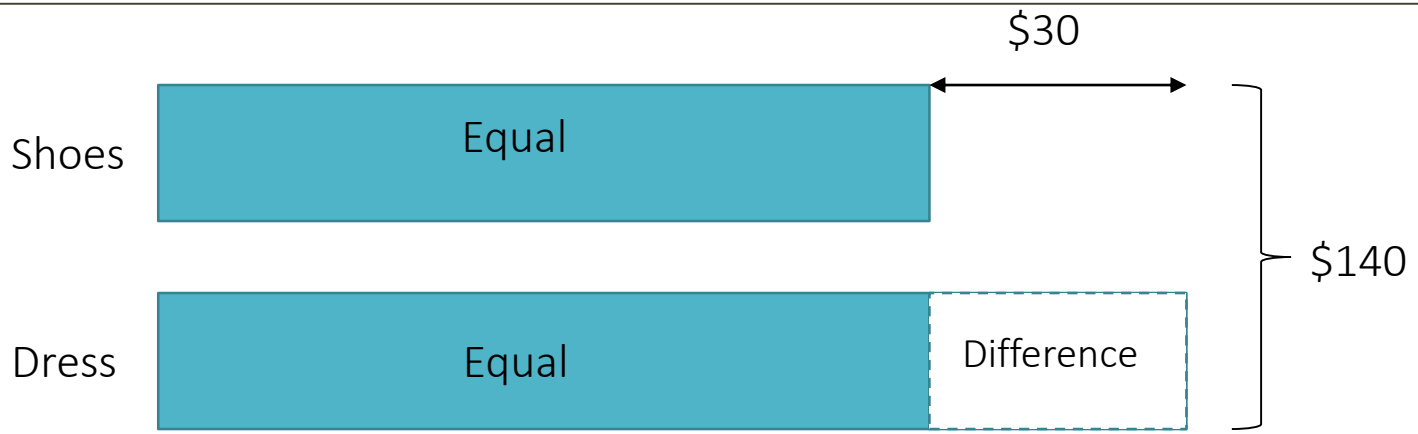

2 units = $140 - $30 = $110

Mrs Tang spent $140 on a pair of shoes and a dress.
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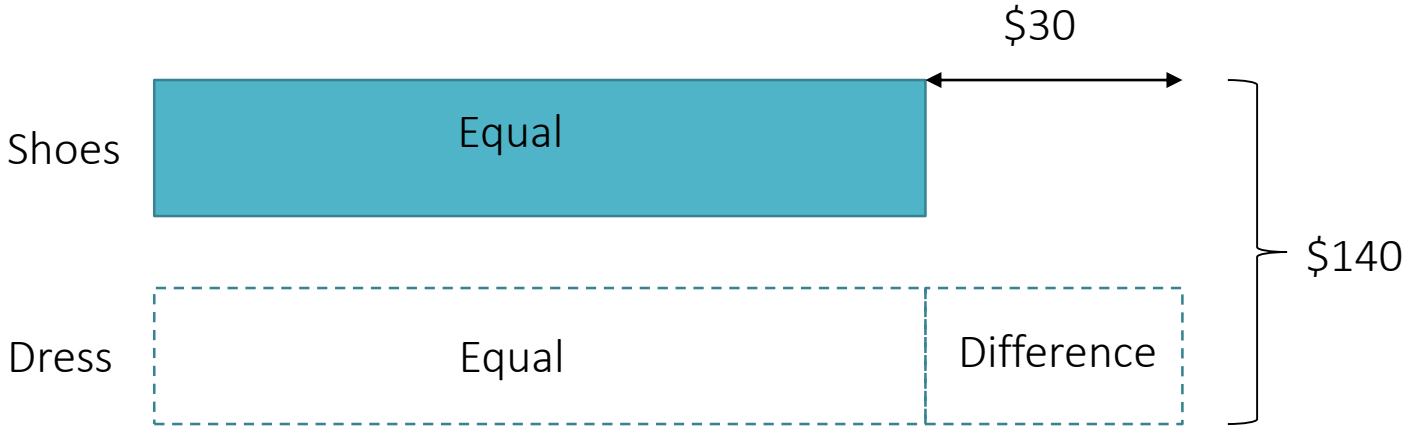
How much did Mrs Tang spend on the shoes?

U √ Identify key information, interpret and organise
P √ Draw comparison models
D √ Carry out the plan
C √ Does the answer make sense? Can I work backwards to check if my answer is right?



2 units = $140 - $30 = $110
1 unit = $110 ÷ 2 = $55

Answer: $55

Question 2

Mrs Tang spent $140 on a pair of shoes and a dress.
The pair of shoes cost $30 less than the dress.
How much did Mrs Tang spend on the dress?

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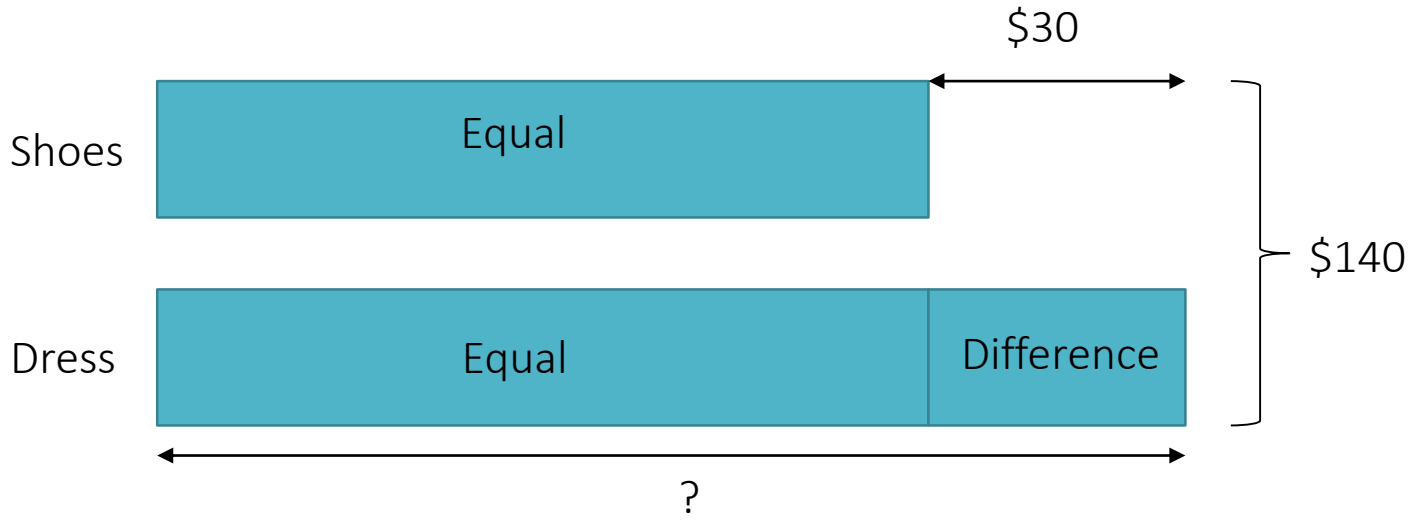
P √ Draw comparison models



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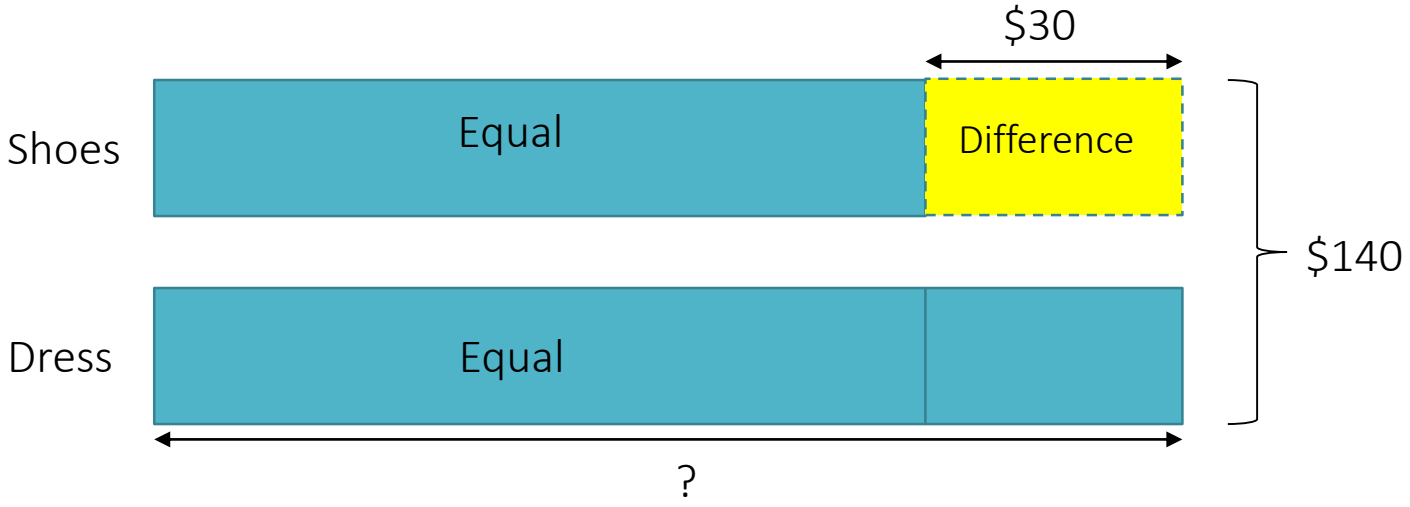

2 big units/ 2 parts = $140 + $30 = $170

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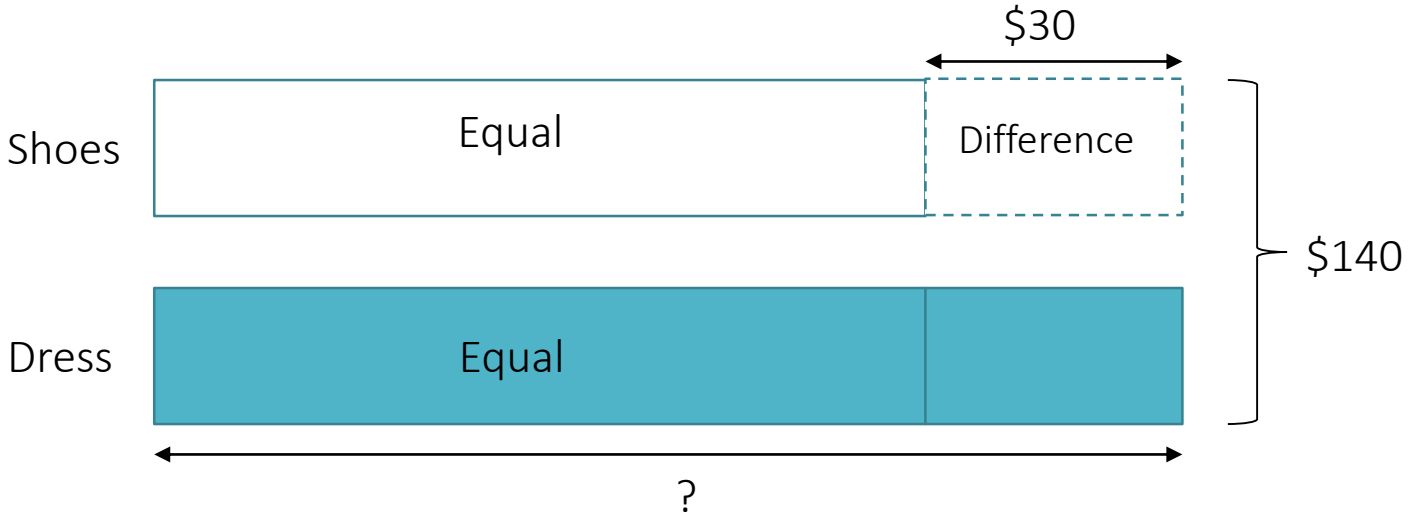


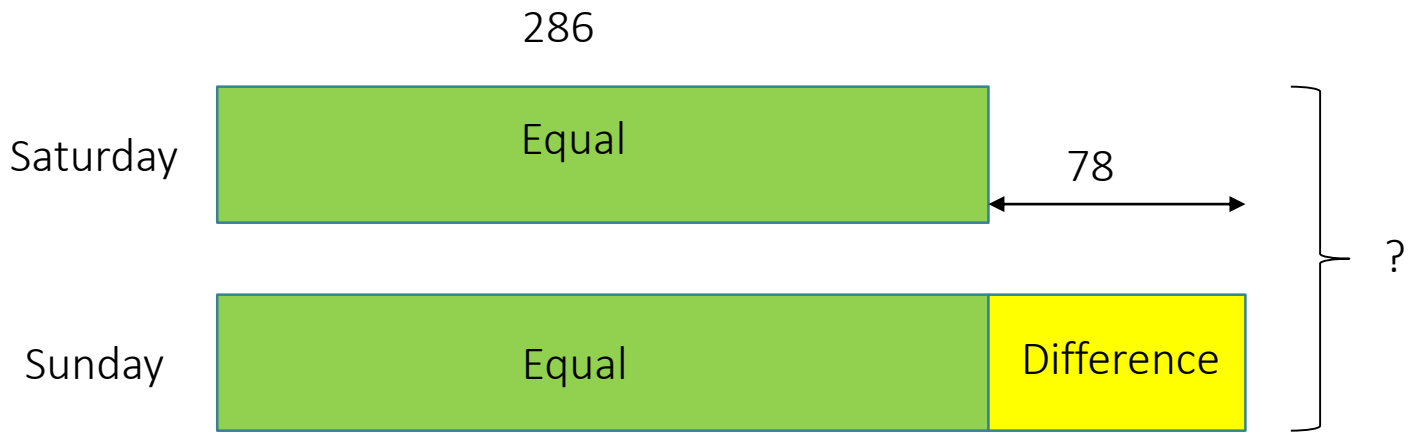
2 big units/ 2 parts = $140 + $30 = $170
1 big unit/ 1 part = $170 ÷ 2 = $85

Answer: $85

Question 3

Source: P3 2017 SA1 , Section C

A baker baked 286 loaves of bread on Saturday. He baked 78 fewer loaves of bread on Saturday than on Sunday. How many loaves of bread did he bake on both days?



Method 1

2 units = 286 x 2 = 572

Sat & Sun → 572 + 78 = 650

Answer: 650 loaves of bread

Method 2

Sunday → 286 + 78 = 364

Sat & Sun → 364 + 286 = 650

Answer: 650 loaves of bread

Model Drawing

Equal and Difference Concept

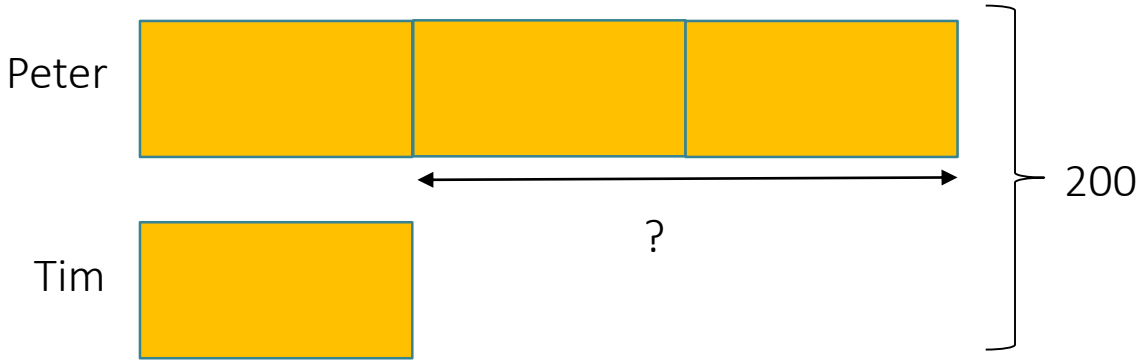
&

Multiple Concept

Question 4

Source: P3 Heuristics Booklet

Both Peter and Tim had a total of 200 cards.
Peter had 3 times as many cards as Tim.
How many more cards did Peter have than Tim?



4 units = 200
1 unit = 200 ÷ 4 = 50
2 units = 50 x 2 = 100
Answer: 100 more cards

Alternatively:
4 units = 200
2 unit = 200 ÷ 2 = 100
Answer: 100 more cards

Question 5

A 300-m wire is cut into three pieces A, B and C.
A is 45 m shorter than B.
C is 3 times as long as B. How long is A?

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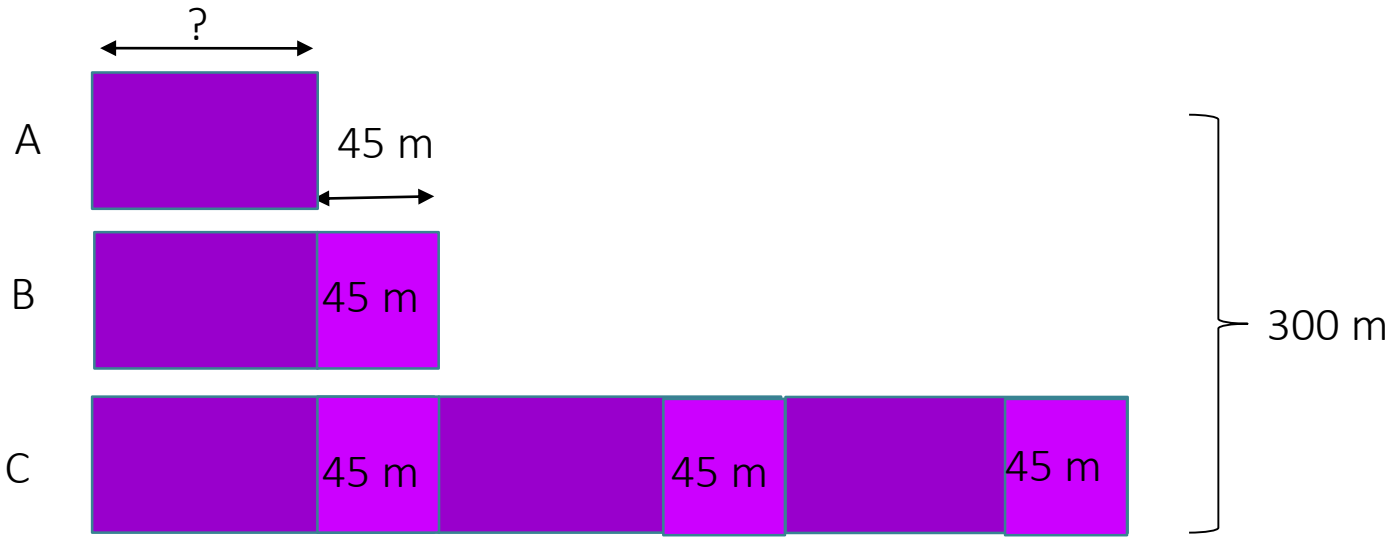

4 small units = 45 x 4 = 180
5 big units = 300 – 180 = 120
A = 120 ÷ 5 = 24

Answer: A is 24 m long

Question 6

A 300-m wire is cut into three pieces A, B and C.
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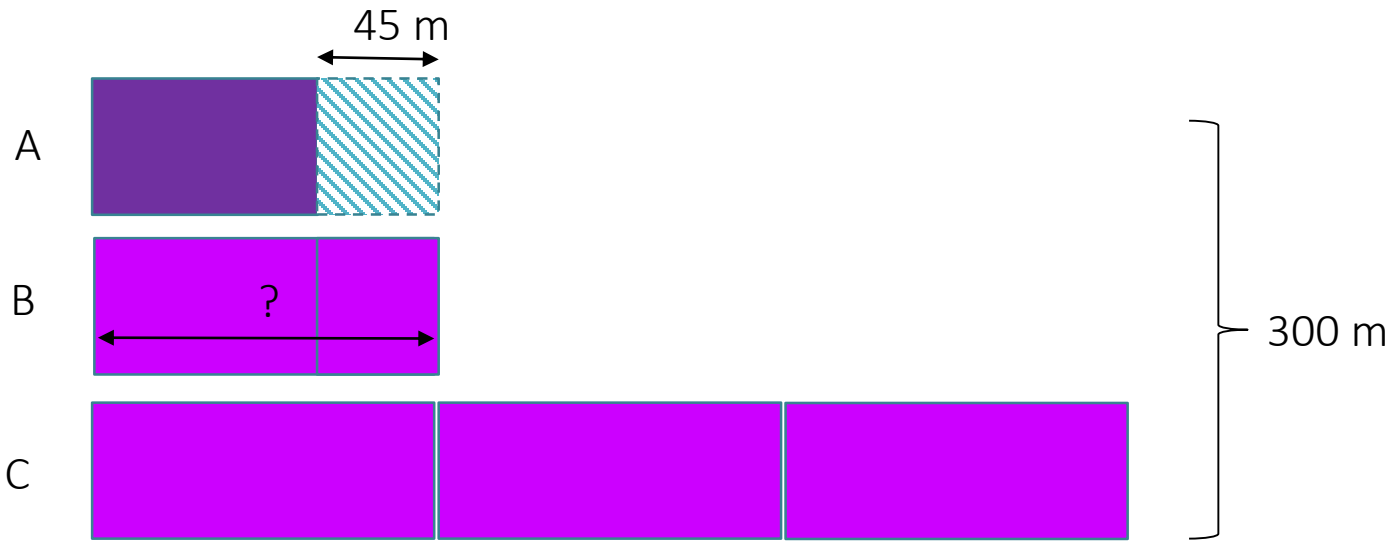


5 big units = 300 + 45 = 345
B = 345 ÷ 5 = 69

Answer: B is 69 m long

Model Drawing

Transfer Concept

Question 7

Source: P4 Heuristics Booklet

Adam has 789 more marbles than Zack.
Adam gave Zack 98 marbles.
How many more marbles does Adam have than Zack now?

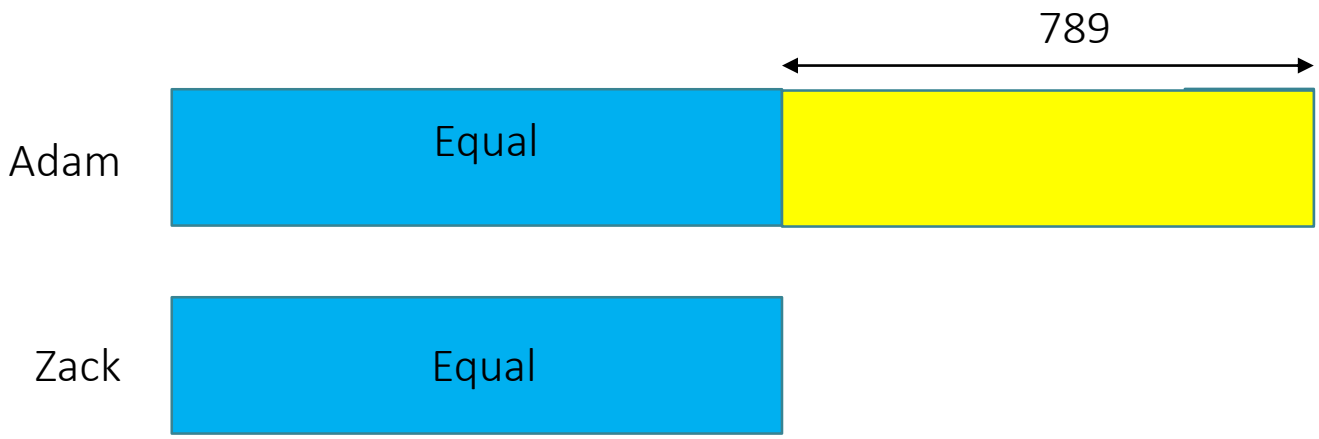
Question 8

Adam has 789 more marbles than Zack.

Adam gave Zack 98 marbles.

How many more marbles does Adam have than Zack now?

U √
P √



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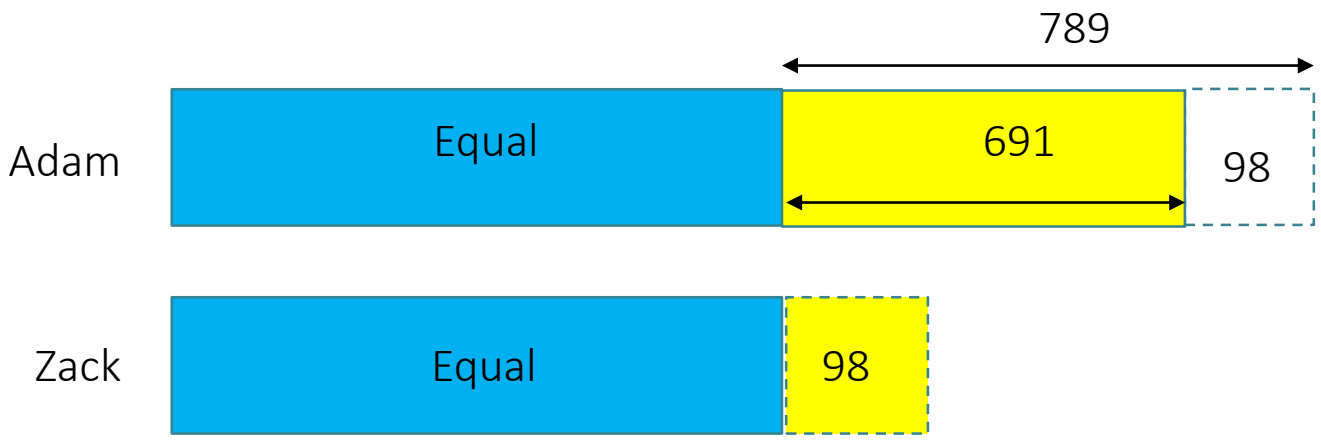

789 – 98 = 691

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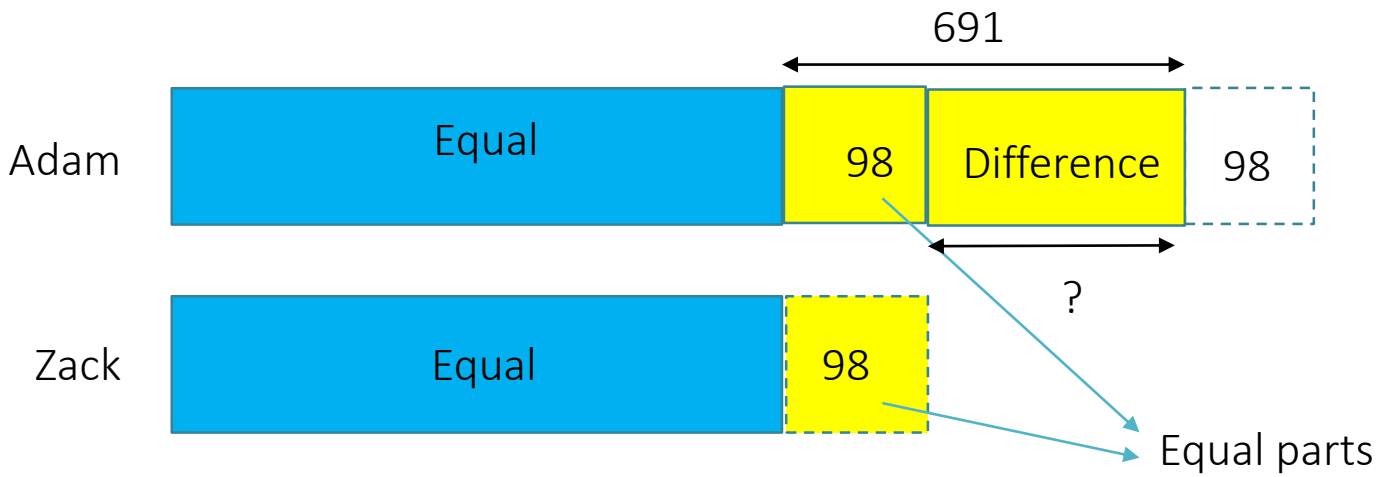
How many more marbles does Adam have than Zack now?

U √
P √
D √



789 – 98 = 691
691 – 98 = 593

Answer: 593 marbles

Question 9

Yi Ting and Jed had some storybooks. After Yi Ting gave 16 storybooks to Jed, she had 30 more storybooks than him. How many more storybooks did Yi Ting have than Jed at first?

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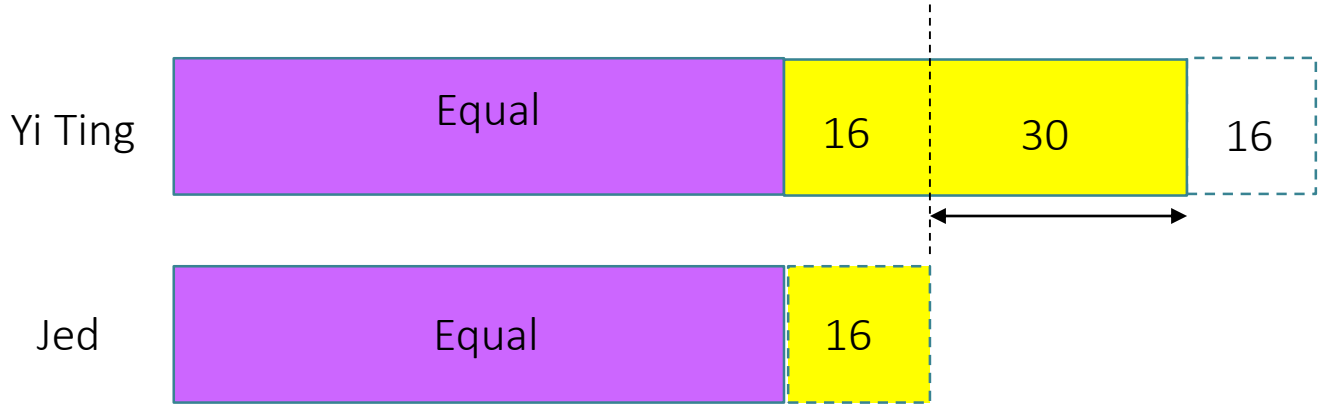

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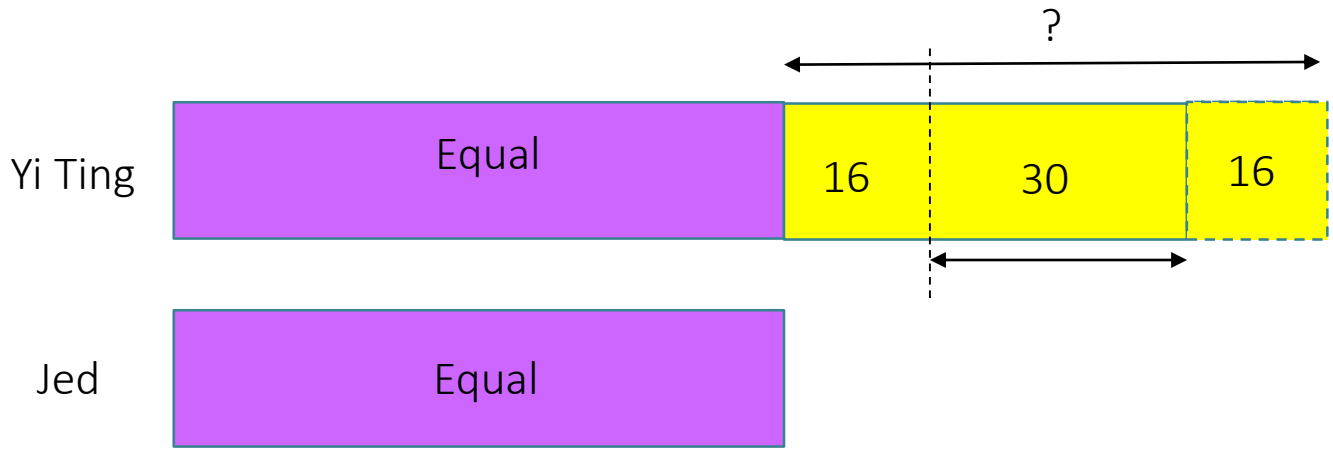

16 + 16 + 30 = 62

Answer: 62 more storybooks

Before and After

Equal Stage Concept

Question 10

At a party, there were an equal number of boys and girls at first. Halfway during the party, 12 boys left the party and 8 girls joined the party. In the end, there were thrice as many girls as boys. How many boys were there at the party at first?

U √ Identify key information, interpret and organise
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Before

Boys

Girls

Question 10

At a party, there were an equal number of boys and girls **at first**. Halfway during the party, 12 boys left the party and 8 girls joined the party. In the end, there were thrice as many girls as boys. How many boys were there at the party at first?

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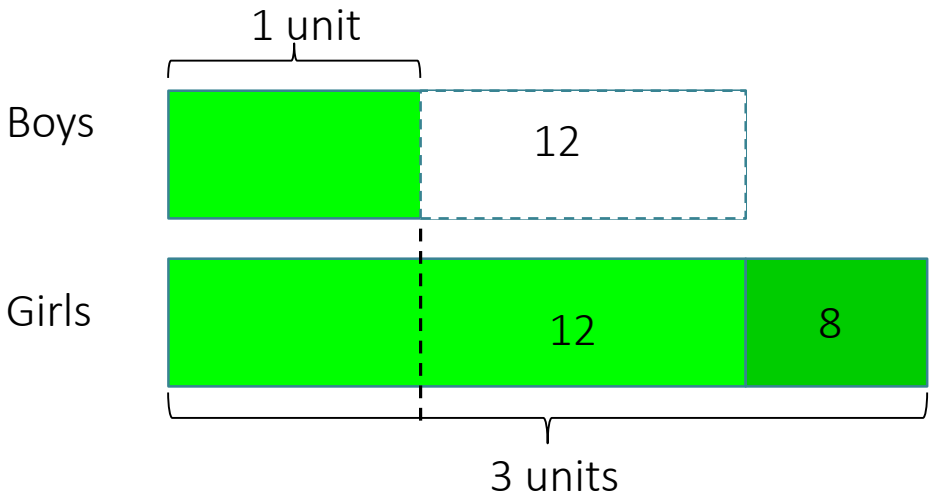

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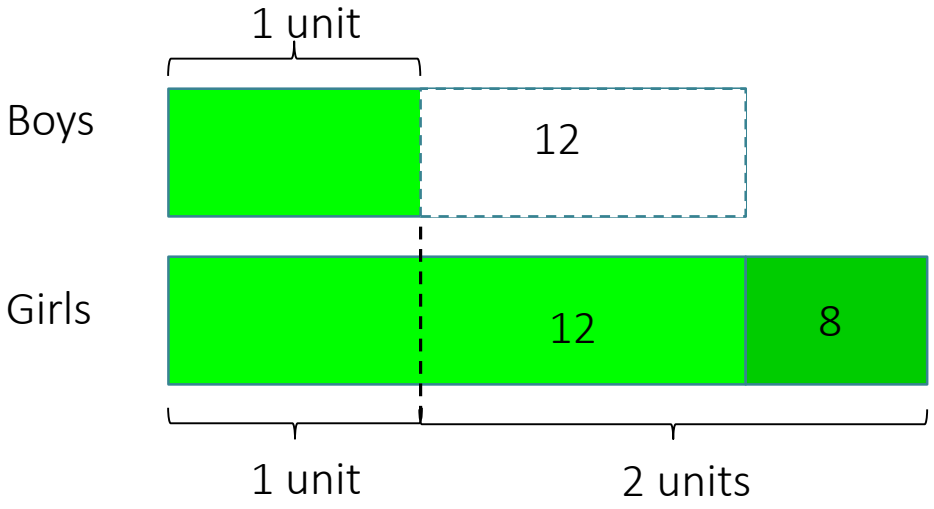
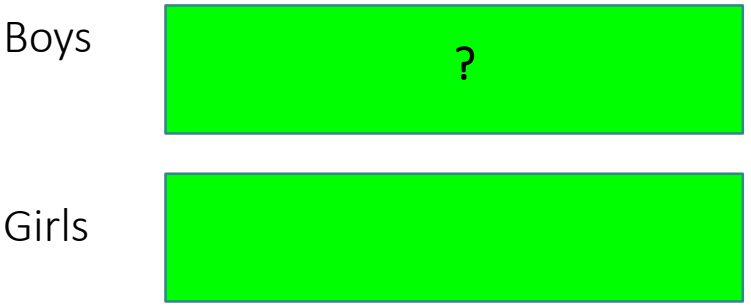
D √ Carry out the plan

Infer that 2 units = 12 + 8

After



Before



2 units = 12 + 8 = 20
1 unit = 20 ÷ 2 = 10
At first → 10 + 12 = 22

Check √ *Is my answer reasonable?*
Can I work backwards to check my answer?

Answer: 22 boys

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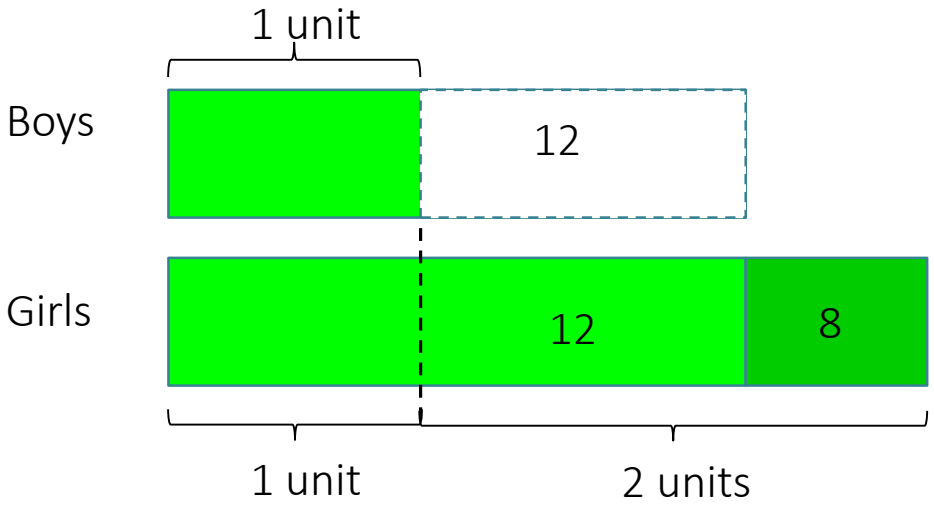

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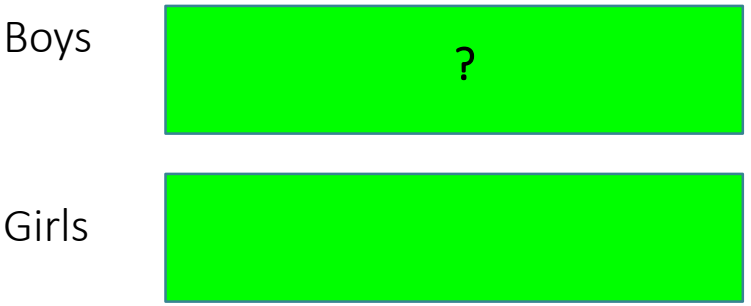

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Answer: 22 boys

Check √
At first
22 boys
22 girls

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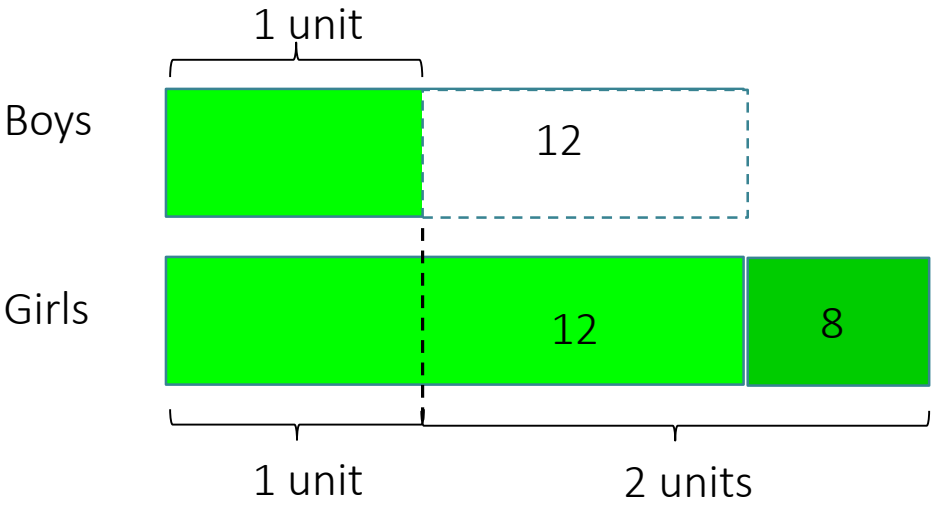

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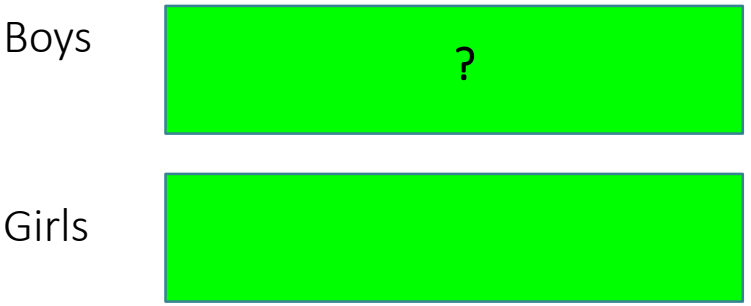

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Check √

At first	*After*
22 boys	*22 boys – 12 boys = 10 boys*
22 girls	*22 girls + 8 girls = 30 girls*

Question 10

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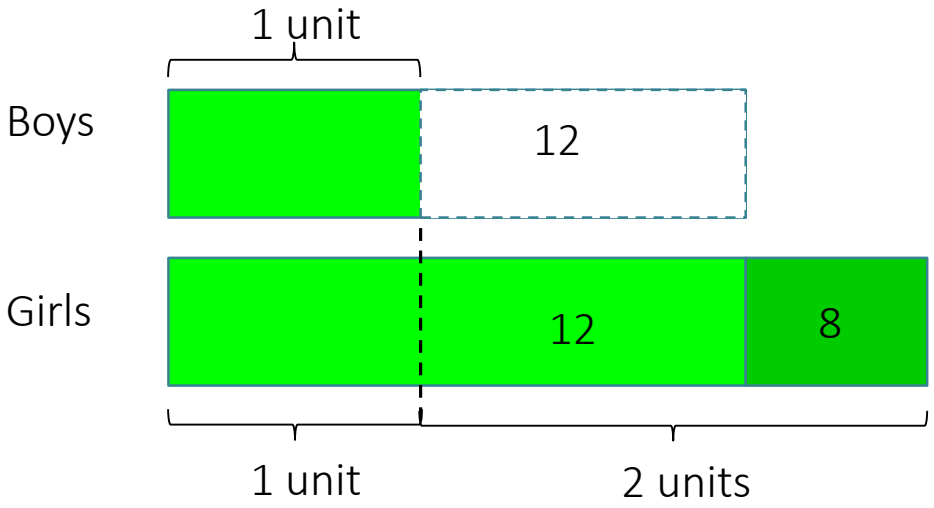

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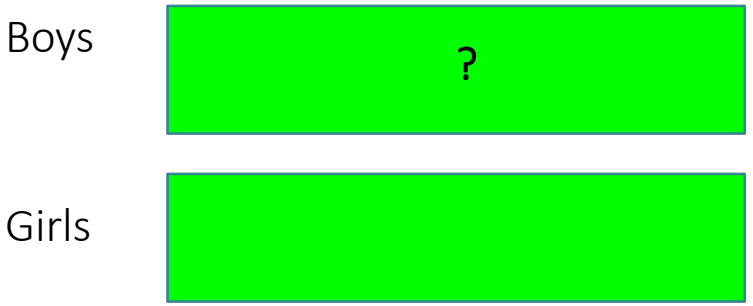

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Answer: 22 boys

Check √

At first

22 boys

22 girls

After

22 boys – 12 boys = 10 boys

22 girls + 8 girls = 30 girls

30 ÷ 10 = 3 times ☺

Question 11

The badminton club had thrice as many members as the bowling club. However, after 36 members had left the badminton club and 4 members had left the bowling club, the two clubs had the same number of members.
How many members did each of the clubs have in the end?

U √ Identify key information, interpret and organise
P √ Draw comparison models

Before

Badminton

Bowling

Question 11

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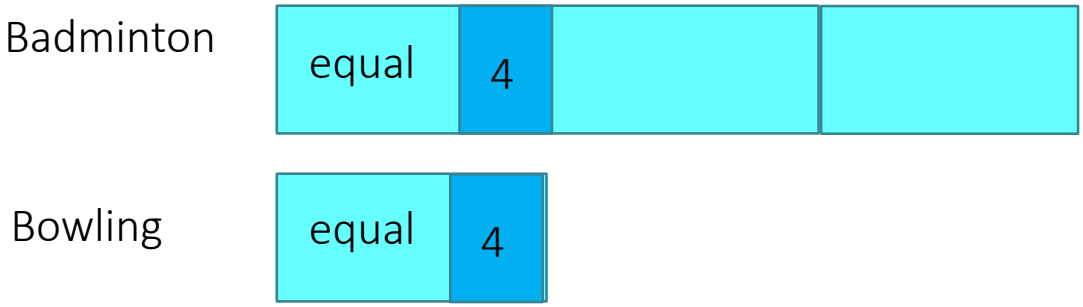

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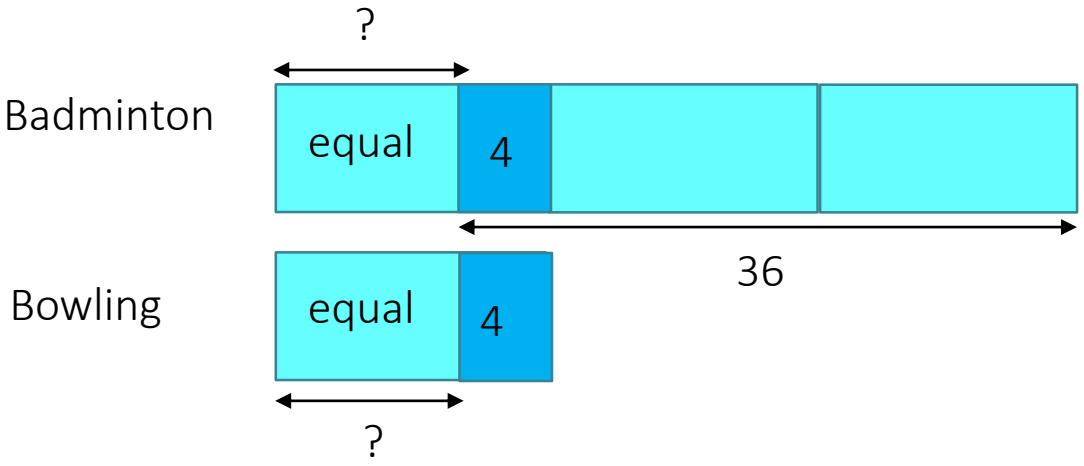

2 units = 36 - 4 = 32
1 unit = 32 ÷ 2 = 16
Members at the end:
16 – 4 = 12

Answer: 12 members

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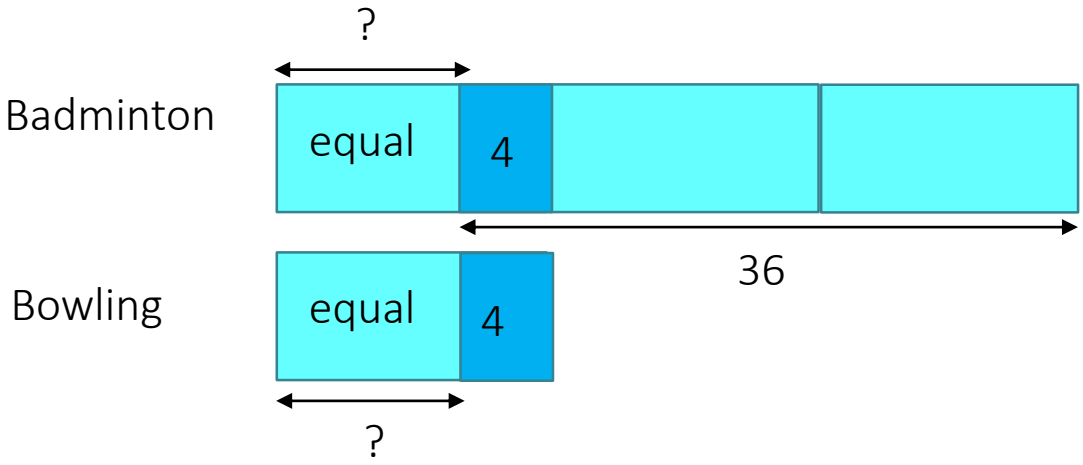
How many members did each of the clubs have **in the end**?

After



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Check √

At the end

Badminton club → 12 members

Bowling club → 12 members

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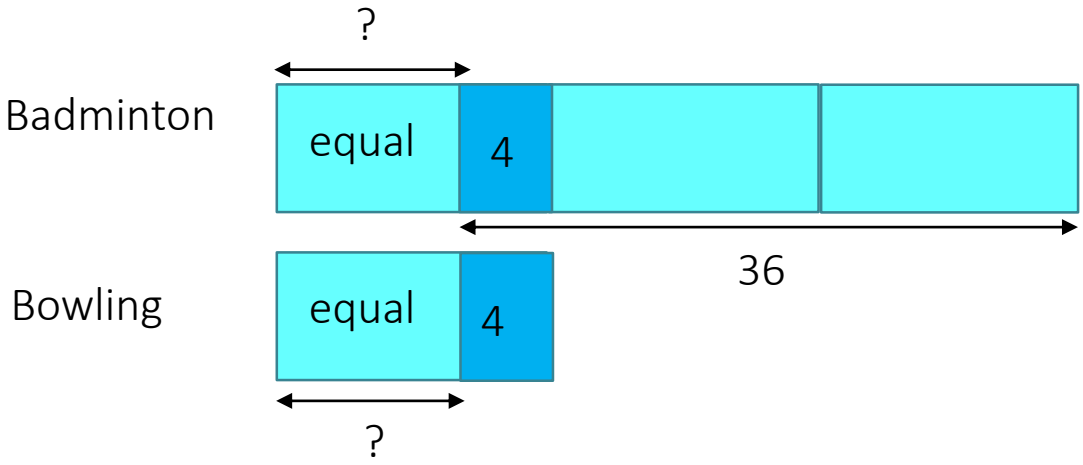

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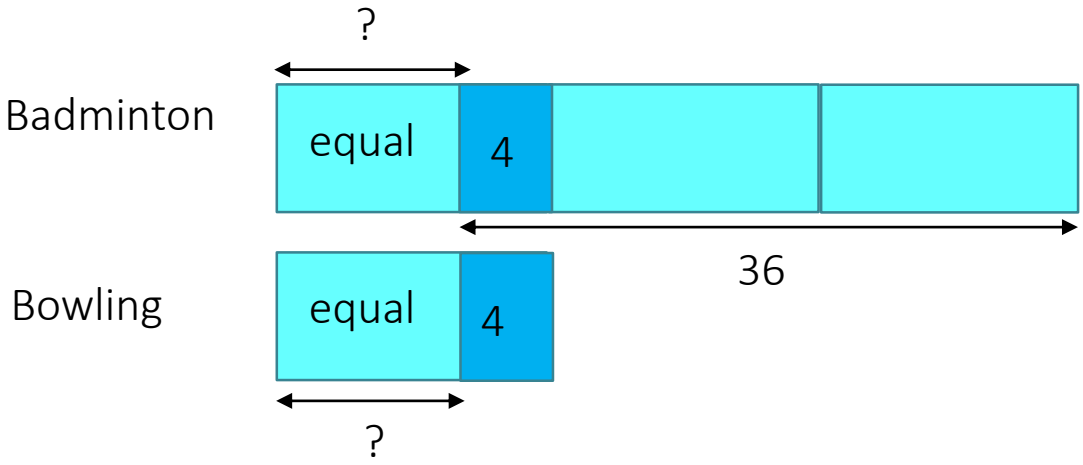
Check √
At the end
Badminton club → 12 members
Bowling club → 12 members

Check √
Working backwards
12 members + 36 members = 48 members

Question 11

The badminton club had thrice as many members as the bowling club. However, after 36 members had left the badminton club and **4 members had left the bowling club**, the two clubs had the same number of members.
How many members did each of the clubs have in the end?

After



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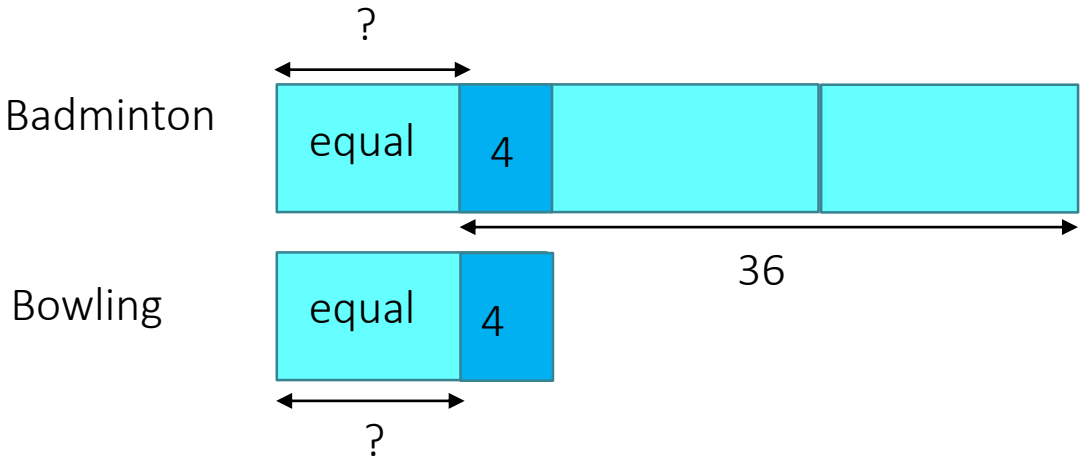

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12 members + 36 members = 48 members

12 members + 4 members = 16 members

48 ÷ 16 = 3 times ☺

Before and After

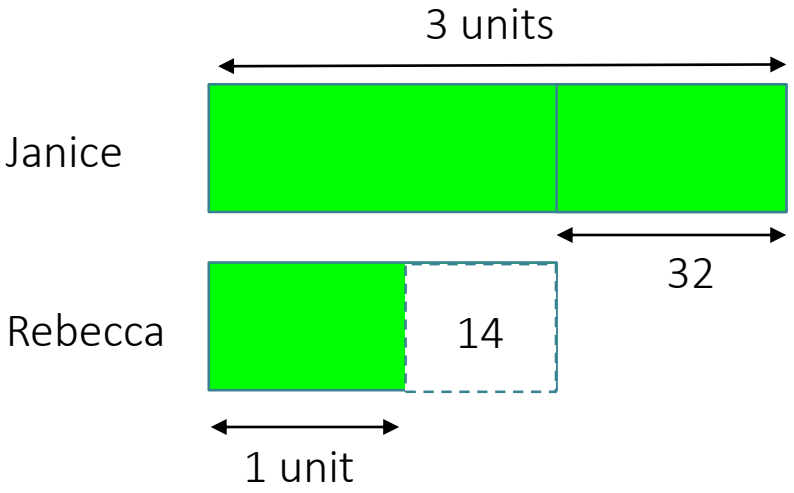
One Item Unchanged

Question 12

Janice had 32 more sweets than Rebecca at first. After Rebecca had eaten 14 of her sweets, Janice had thrice as many sweets as Rebecca. How many sweets did Janice have at first?

U √ Identify key information, interpret and organise
P √ Draw comparison models

Before

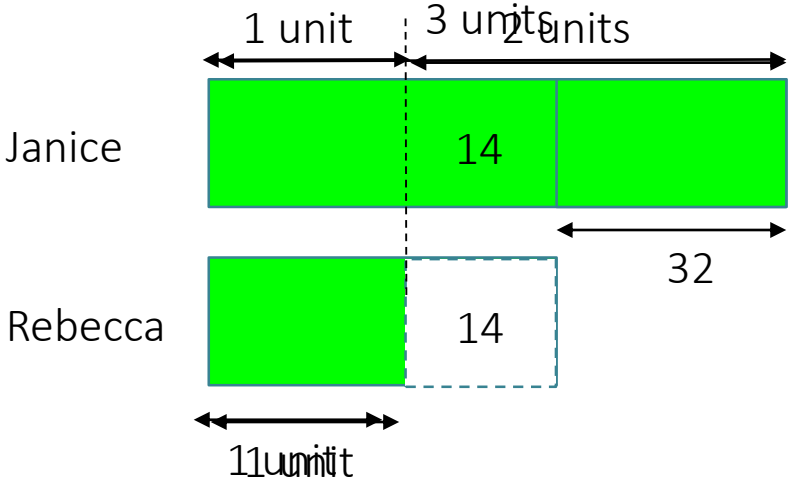


Question 12

Janice had 32 more sweets than Rebecca at first. After Rebecca had eaten 14 of her sweets, Janice had thrice as many sweets as Rebecca. How many sweets did Janice have at first?

U √ Identify key information, interpret and organise
P √ Draw comparison models
D √ Carry out the plan

Before

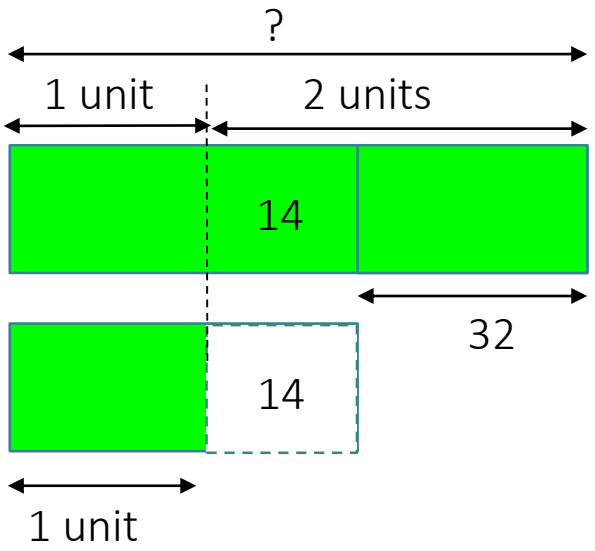


Question 12

Janice had 32 more sweets than Rebecca at first. After Rebecca had eaten 14 of her sweets, Janice had thrice as many sweets as Rebecca. How many sweets did Janice have at first?

U √ Identify key information, interpret and organise
P √ Draw comparison models
D √ Carry out the plan

Before



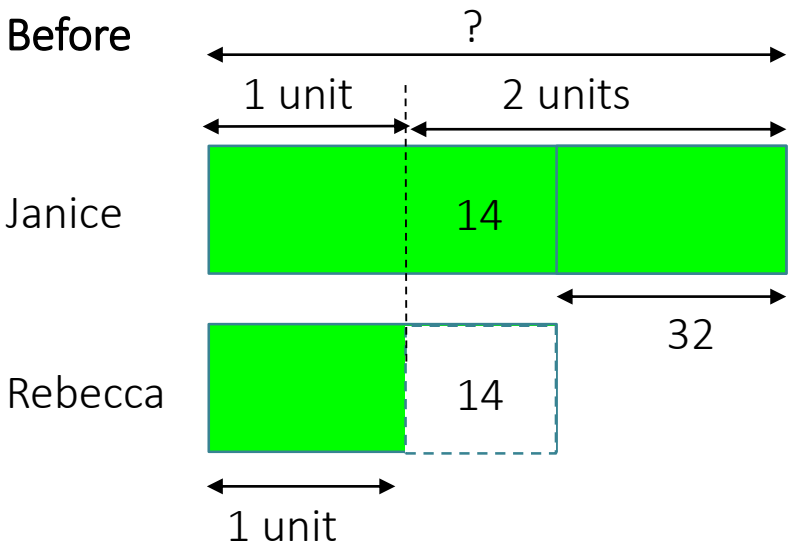
Infer that 2 units = 32 + 14

2 units = 32 + 14 = 46
1 unit = 46 ÷ 2 = 23
3 units = 23 x 3 = 69

Answer: 69 sweets

Question 12

Janice had 32 more sweets than Rebecca at first. After Rebecca had eaten 14 of her sweets, Janice had thrice as many sweets as Rebecca. How many sweets did Janice have at first?



Infer that 2 units = 32 + 14

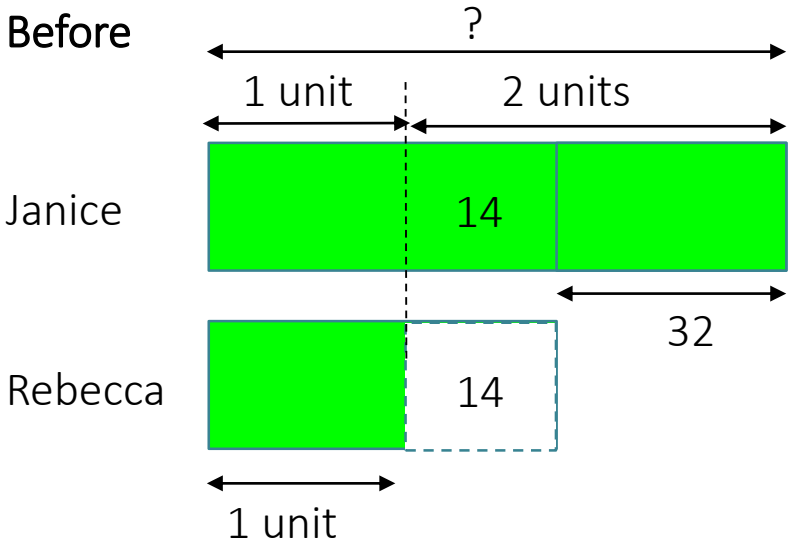
2 units = 32 + 14 = 46
1 unit = 46 ÷ 2 = 23
3 units = 23 x 3 = 69

Answer: 69 sweets

Check √
At first
Janice → 69 sweets
Rebecca → 69 sweets – 32 sweets = 37 sweets

Question 12

Janice had 32 more sweets than Rebecca at first. **After Rebecca had eaten 14 of her sweets, Janice had thrice as many sweets as Rebecca**. How many sweets did Janice have at first?



Infer that 2 units = 32 + 14

2 units = 32 + 14 = 46
1 unit = 46 ÷ 2 = 23
3 units = 23 x 3 = 69

Answer: 69 sweets

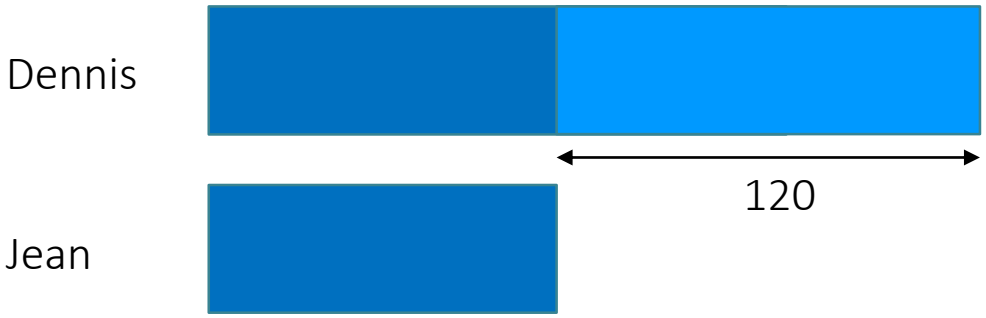
Check √
At first
Janice → 69 sweets
Rebecca → 69 sweets – 32 sweets = 37 sweets

Check √
After
Rebecca → 37 sweets – 14 sweets = 23
Janice → 23 sweets x 3 = 69 sweets ☺

Question 13

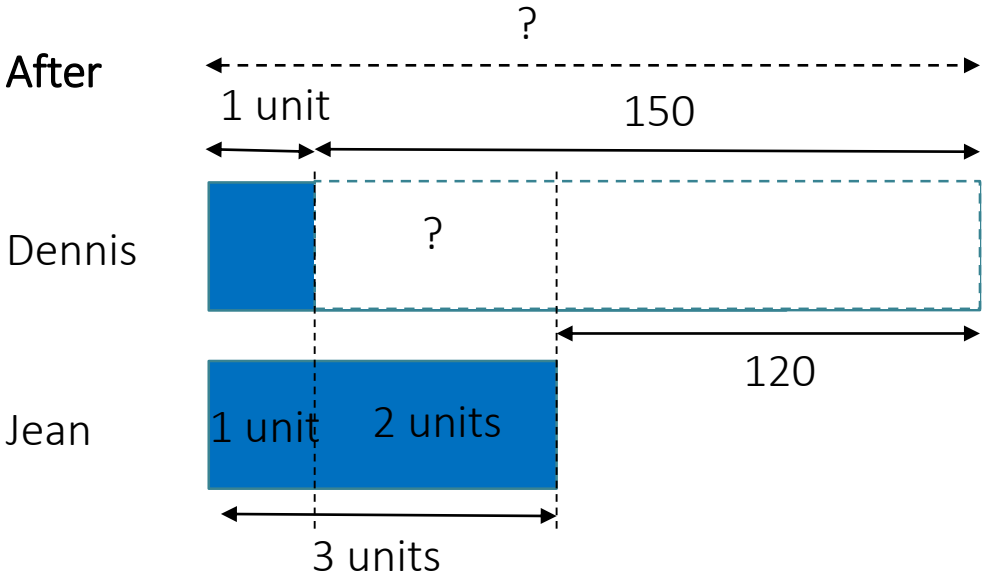
Dennis had 120 marbles more than Jean at first. After Dennis had given away 150 of his marble, Jean had thrice as many marbles as Dennis. Find the number of marbles Dennis had at first?

Before



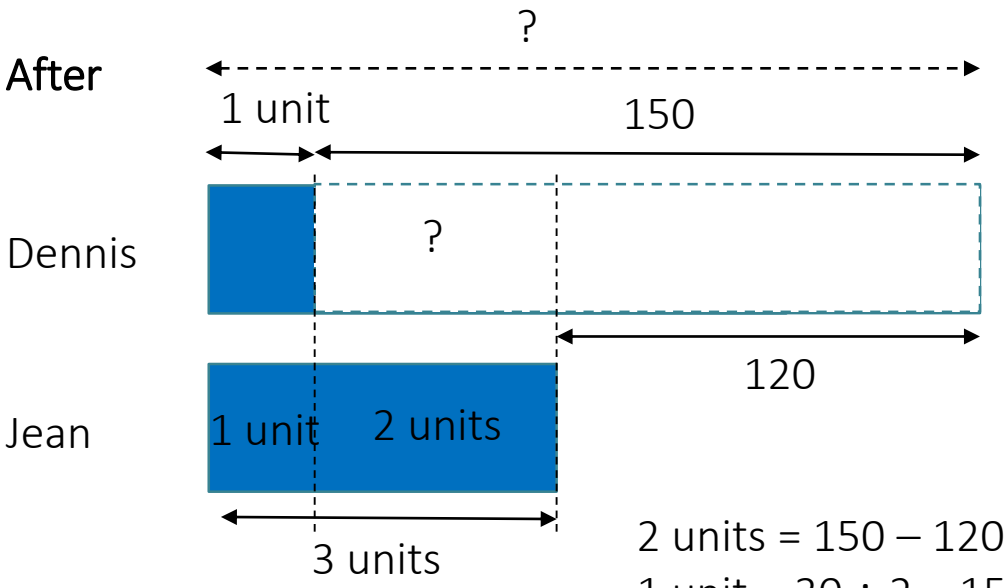
Question 13

Dennis had 120 marbles more than Jean at first. After Dennis had given away 150 of his marble, Jean had thrice as many marbles as Dennis. Find the number of marbles Dennis had at first?



Question 13

Dennis had 120 marbles more than Jean at first. After Dennis had given away 150 of his marble, Jean had thrice as many marbles as Dennis. Find the number of marbles Dennis had at first?



2 units = 150 – 120 = 30

1 unit = 30 ÷ 2 = 15

Dennis → 150 + 15 = 165 marbles

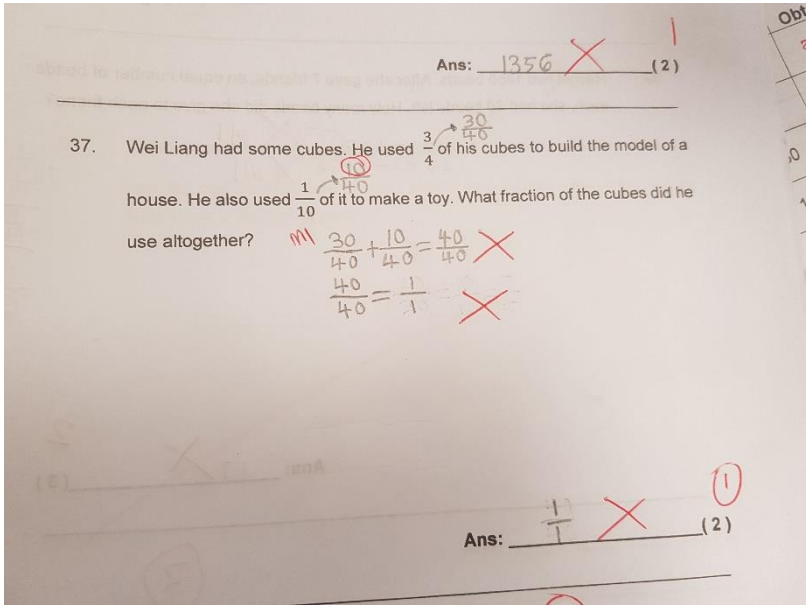
Answer: 165 marbles

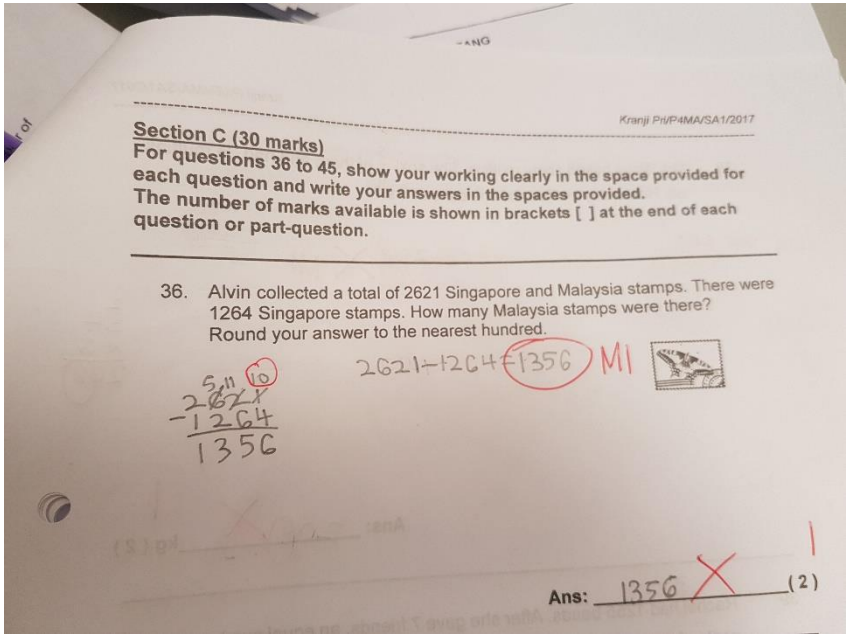
Mastery of Basic Skills

Mastery of Basic Skills

Multiplication and Division

- Give the Math facts related to multiplication and division quickly
- Give multiples and factors of given number(s) accurately
- Work out multiplication up to 3 digits by a 1-digit number accurately
- Work out long division accurately





Mastery of Basic Skills

Commit Math Facts to memory

- **20 x 5 = 100**
- **25 x 4 = 100**
- **25 x 3 = 75**
- **50 x 2 = 100**
- **125 x 8 = 1000**

Mastery of Basic Skills

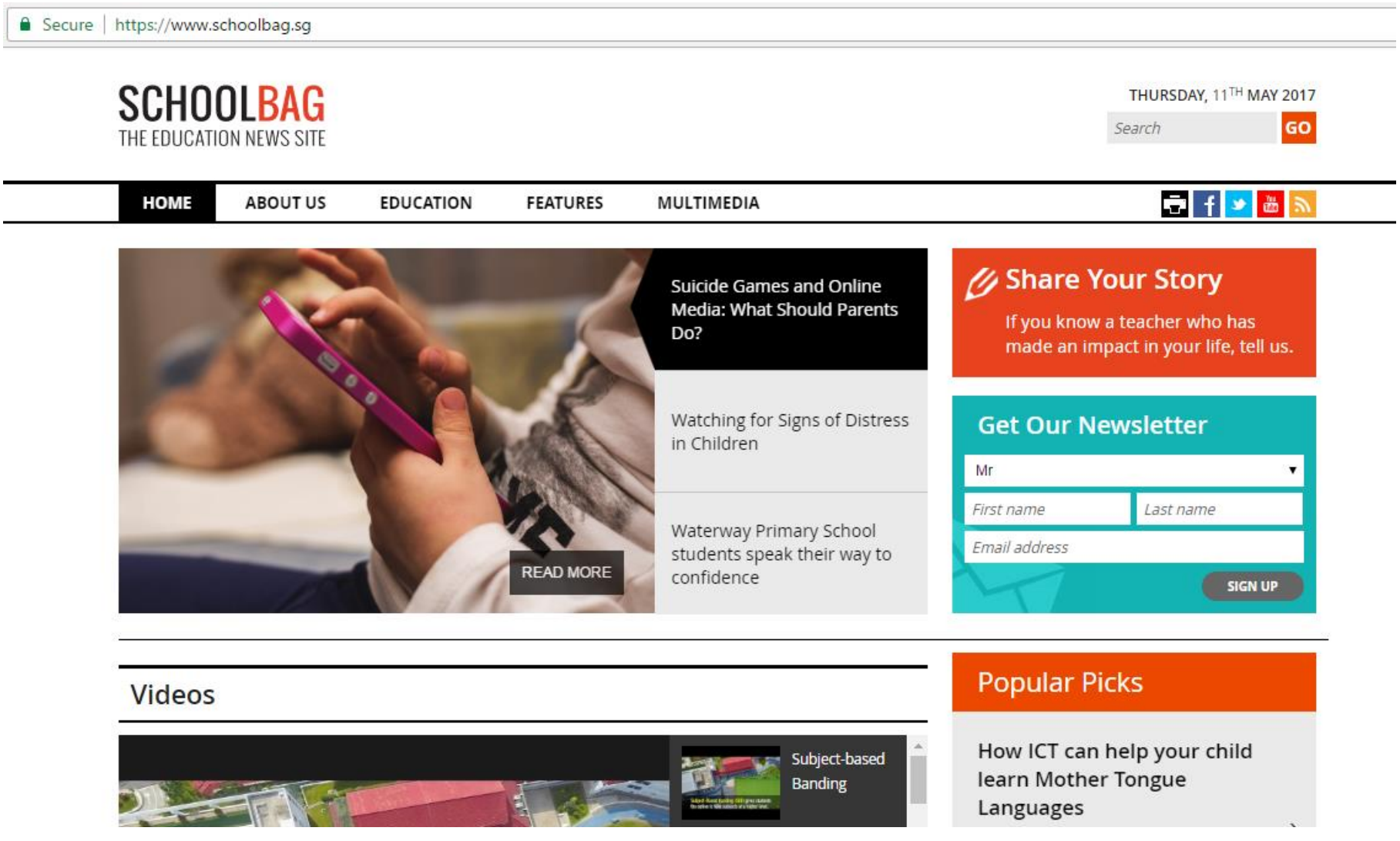
Commit Math Facts to memory

- $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$
- $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15}$
- $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} = \frac{5}{20}$

- $0.2 = \frac{1}{5}$
- $0.4 = \frac{2}{5}$
- $0.6 = \frac{3}{5}$
- $0.5 = \frac{1}{2}$
- $0.75 = \frac{3}{4}$

Resources

https://www.schoolbag.sg/



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THANK YOU!