

$$\begin{aligned} B^3 &= CD + DA \\ B^3 &= (D - C \sin B) \\ B^3 &= D^2 - 3A \cos B^3 + A \sin B \\ B^3 &= D^2 - 4A \cos B^3 + C \sin B \\ B^3 &= C^3 - A^2 - 3 \cos B \end{aligned}$$



Making Sense of Math: Model Drawing for Young Learners

22 May 2026

$$x_2^4 + x_3^2 = (x_2 + x_3)$$



Slides will be uploaded
onto the school website

Contents

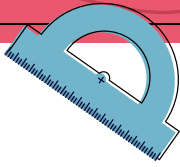
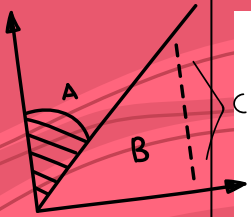
- 1 Objectives for today's sharing session
- 2 Quick recap on Problem-Solving Process
- 3 Math Made Visual: Guiding your child through model drawing
- 4 Summary and Q & A

Objectives

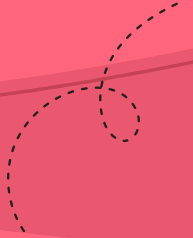
$$(-3\sqrt{2}) - 4(3)(-3M+2)$$

To use **model drawing** as a problem-solving strategy in solving word problems.

To understand common difficulties when doing word problems and elicit your child's reasoning and inference skills through **questioning prompts**.



$$\frac{3 \sin 4/8}{\sqrt{3 \cdot 2 \cdot 4 + 2}}$$



2021 Primary Mathematics Syllabus

Primary Mathematics Curriculum

Primary education is a stage where students acquire important basic numeracy as well as develop logical reasoning and problem-solving skills that are required in many disciplines. It lays the foundation for the learning of mathematics for all students, equipping them with a tool for everyday life and the knowledge and skills for learning mathematics at the next level. It is also a stage where students' confidence and interest in the subject are built and their attitudes towards the discipline are shaped.

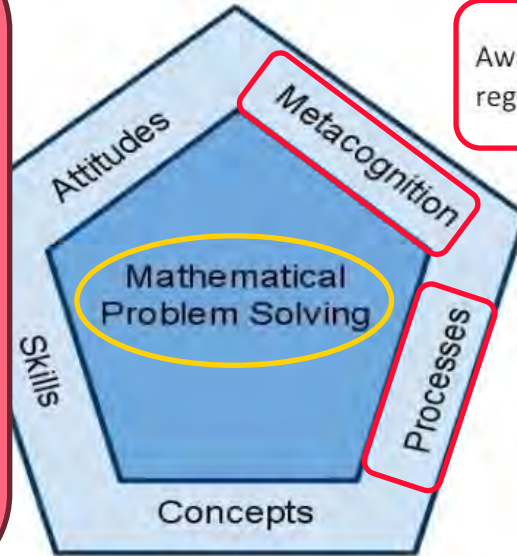
For these reasons, the Primary Mathematics Syllabus aims to enable all students to:

- acquire mathematical concepts and skills for everyday use and continuous learning in mathematics;
- develop thinking, reasoning, communication, application and metacognitive skills through a mathematical approach to problem solving; and
- build confidence and foster interest in mathematics.

Mathematics Curriculum Framework

Problem Solving

Refers to mathematical tasks that have the potential to provide intellectual challenges for enhancing students' mathematical understanding and development (NCTM, 2010).



Awareness, monitoring and regulation of thought processes

Competencies in abstracting and reasoning, representing and communicating, applying and modelling

Understanding of the properties and relationships, operations and algorithms

Thinking Aloud With Your Child

Mathematical Reasoning

Refers to the ability to think, understand and form opinions or judgements that are based on facts

Communication

Refers to the ability to use mathematical language to express mathematical ideas and arguments precisely, concisely and logically

Thinking Aloud With Your Child

What if?

Can you give me
another example of ...?



How do you know?
Is there another
solution / method?

Students are encouraged to take the R.I.G.H.T action



PRO
SOL

Model
Equation
Working
Answer
Statement

Read

Topic

What is known/unknown?
What do you need to find?

Identify
Keywords

Type of
Question

Are there any keywords that leads to the type of question?

Get A Plan

Heuristics

Have you seen it before?
What strategy would you use?

Have It
Done

M.E.W.A.S

Is each step correct?
Can you prove that each step is correct?

Triple
Check

N.T.U.C

Is the solution reasonable? Can you show that your solution is correct?

Number
Transfer
Units
Calculation

Math Made Visual through Model Drawing



Draw a bar model to create a pictorial representation of the problem.



The bar model is based on the known and unknown quantities involved in the problem.



Provides a visual tool that enables students to determine which operation ($\times$, $\div$, $+$, $-$) to use.

Types of Model Drawing

Part-Whole Model

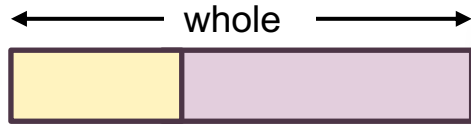
Shows the various parts that make up a whole

Comparison Model

Shows the relationship between 2 or more quantities when they are compared

Types of Model Drawing

Part-Whole Model

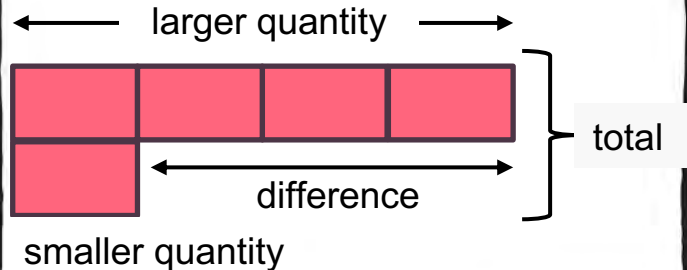
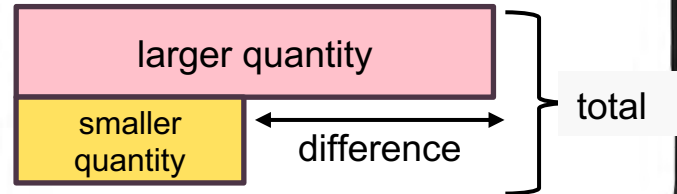


← part → ← part →



← part → ← part → ← part →

Comparison Model



Part-Part-Whole

What challenges do you think your child might have?

Primary 2

There were 900 people at a concert.

500 were men and the rest are women.

How many more men than women are there?



Primary 5

There were 1500 people at a concert.

There were two times as many adults as children.

How many adults are there at the concert?

What constitute “people”?

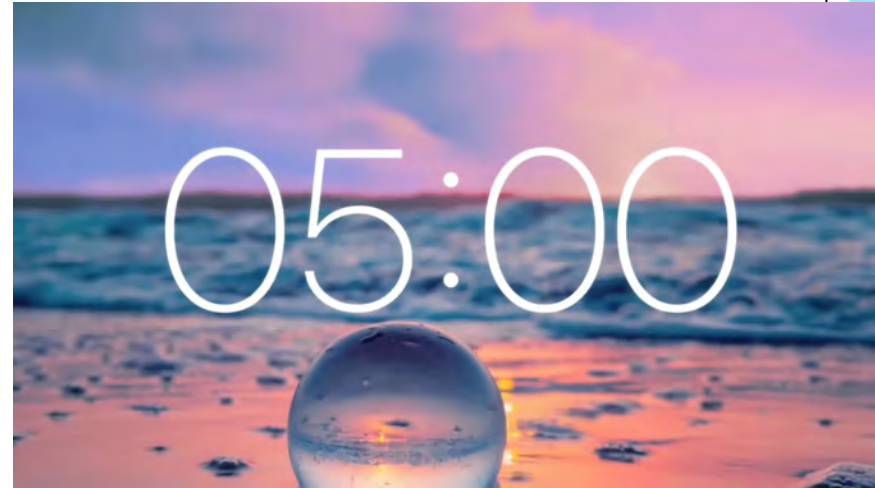
What does “the rest” or “two times as many as” mean?

Activity

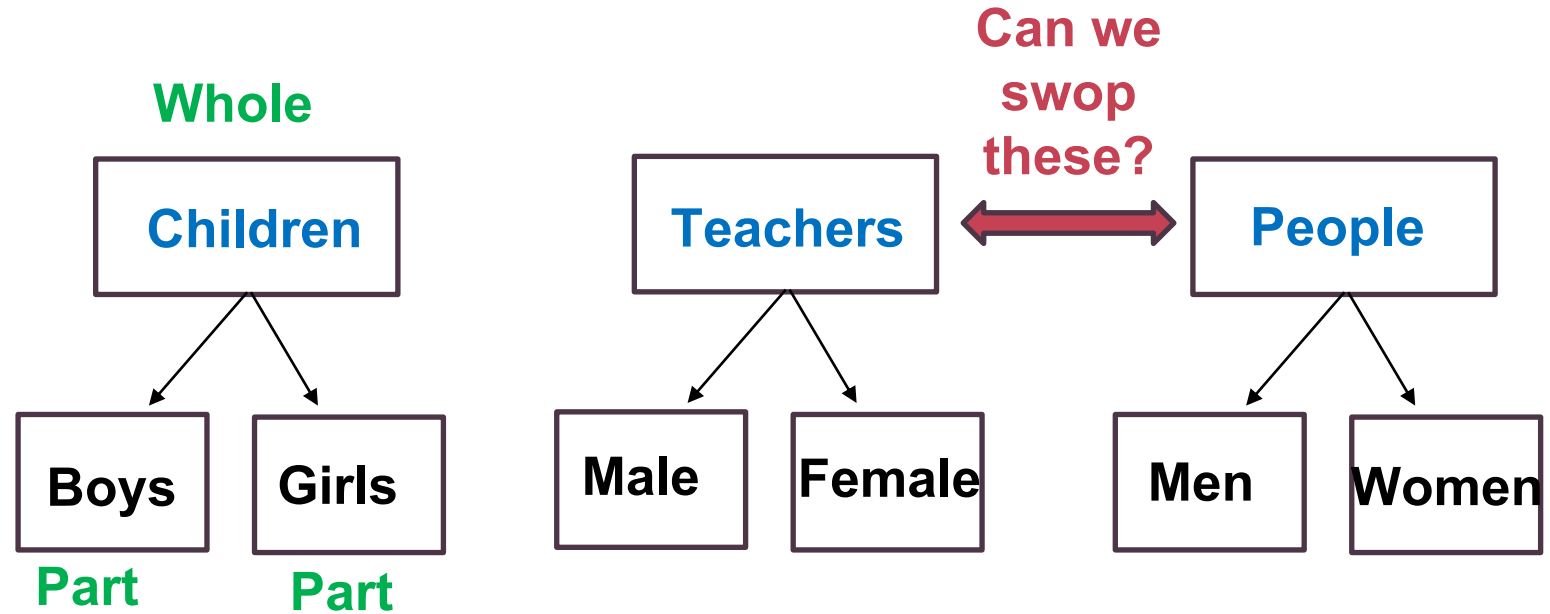
Instructions

As a group, discuss

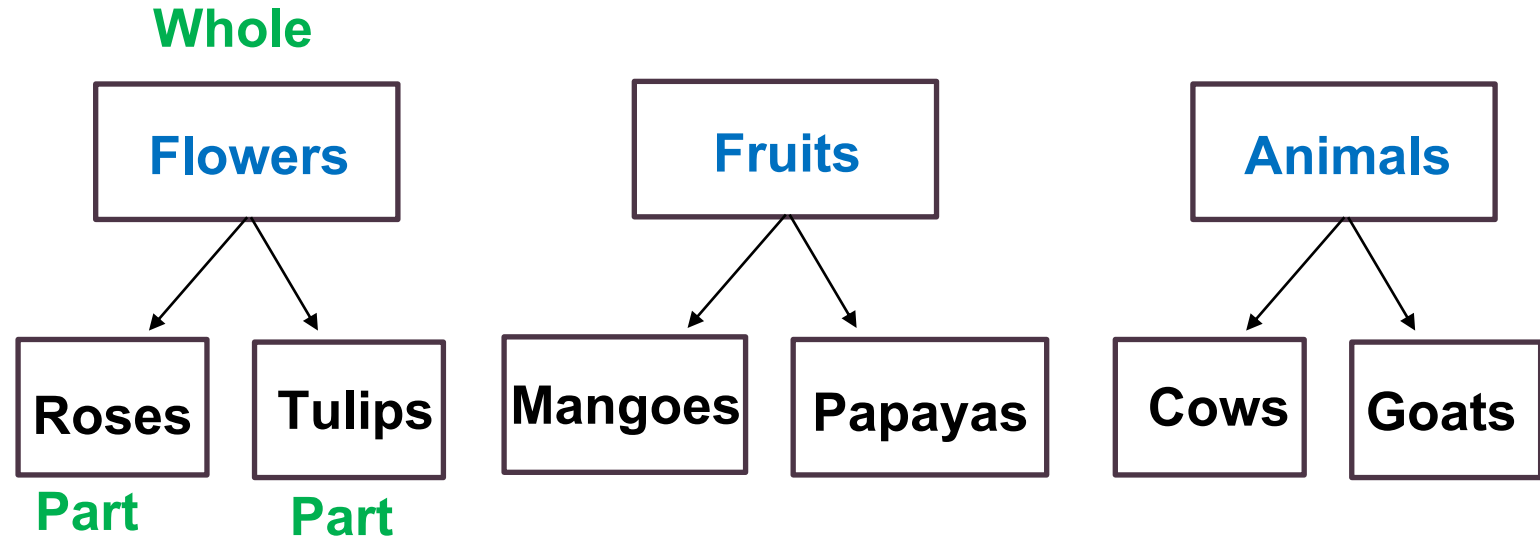
- How would you categorise the cut-outs?
- How do you think such learning experience can impact your child's learning?



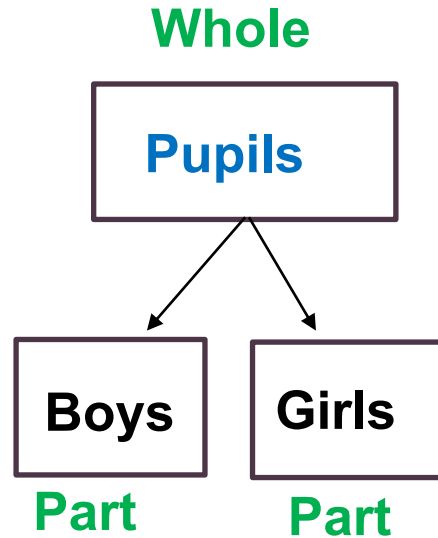
Set A



Set A



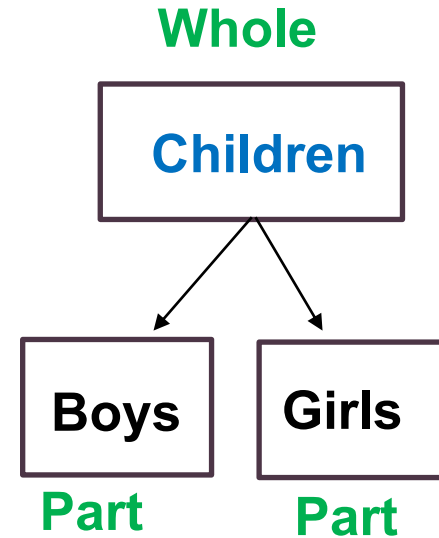
Set B



VS



Set A

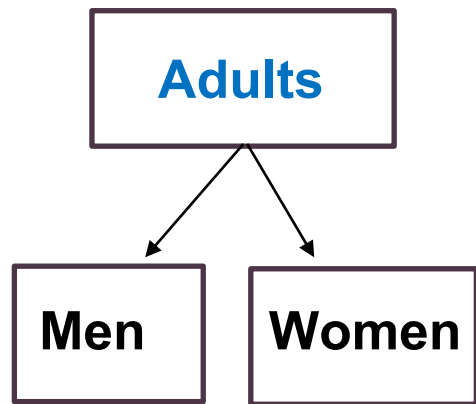


Adaptive Thinking

Set B

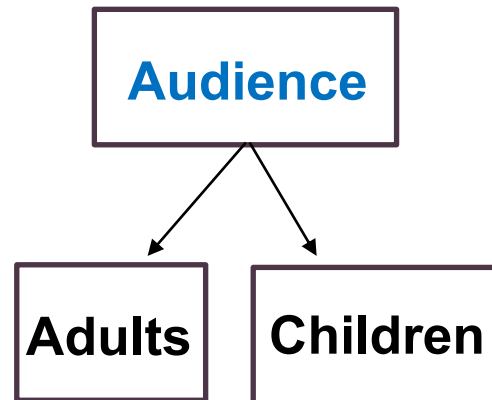
What do you notice?

Whole



The same word (e.g. adult) can represent a whole (men and women) or a part (adult and children as audience) in different context.

Audience



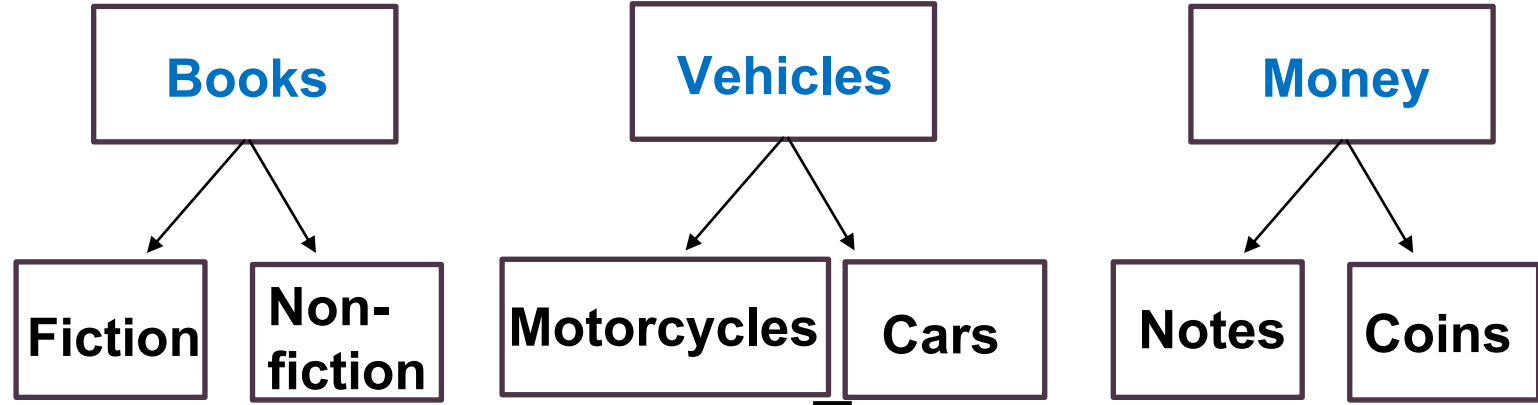
Part

Critical and Adaptive Thinking: Assess different contexts and describe the change, identify similarities and differences.

Set B

Adaptive Thinking: Encourage different perspectives e.g translation among different representations

Whole



Part

Part



Vehicles



From Tree Diagram to Model Drawing

**Understanding
part-part-whole**

```
graph LR; A[Understanding part-part-whole] --> B[Understand the question]; A --> C[Critical and Adaptive Thinking]
```

Understand the question

Relating the information.

What is the whole? What are the parts?

Critical and Adaptive Thinking

Interpreting parts/whole in context.

Mrs Tan had 235 bookmarks. She gave 123 bookmarks to her students. How many bookmarks did Mrs Tan have left?

READ

What is known?

Estimate that she would have less than 235 bookmarks left.

What is unknown?

What do you need to find?

- How many bookmarks did Mrs Tan have at first?
- How many bookmarks did she give to her students?
- Do you think she will have more or less bookmarks left?
- Do we know how many bookmarks did Mrs Tan have left??
- What is the question asking for?

Given:

She had 235 bookmarks at first.

Given:

She gave 123 bookmarks to her students.

Find:

The number of bookmarks left

Whole
Total

Part

Mrs Tan had 235 bookmarks. She gave 123 bookmarks to her students. How many bookmarks did Mrs Tan have left?

Part

IDENTIFY KEYWORDS

Are there any keywords that leads to the type of question?



The words 'gave' and 'left' shows this is a 'Part-Whole' type of question.

Whole

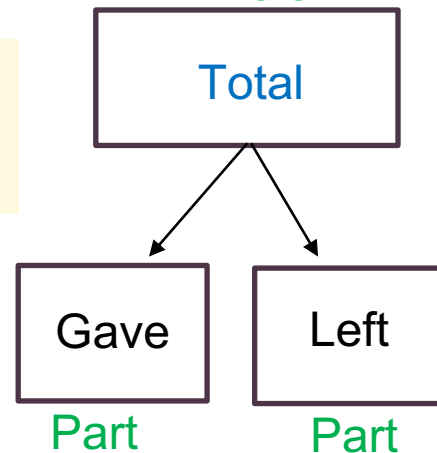
Total

Gave

Part

Left

Part



Whole
Total

Part

Mrs Tan had 235 bookmarks. She gave 123 bookmarks to her students. How many bookmarks did Mrs Tan have left?

Part

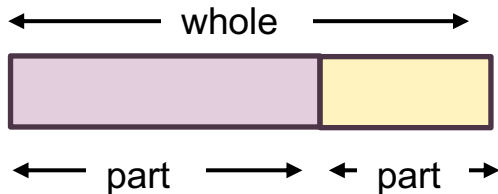
GET A PLAN

Have you seen it before?

What strategy would you use?

- Would you draw a part-whole model or comparison model?
- What makes you say that?

Draw a part-whole model.



Whole
Total

Part

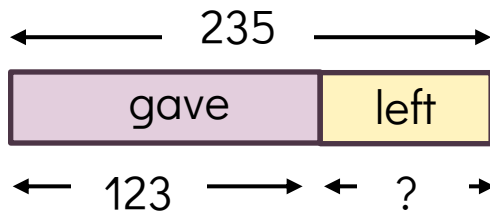
Mrs Tan had 235 bookmarks. She gave 123 bookmarks to her students. How many bookmarks did Mrs Tan have left?

Part

HAVE IT DONE

Is each step correct?
Can you prove that
each step is correct?

Where will you put the values in the model?



$$235 - 123 = 112$$

Mrs Tan had 112 bookmarks left.

Working

$$\begin{array}{r} 235 \\ - 123 \\ \hline 112 \end{array}$$

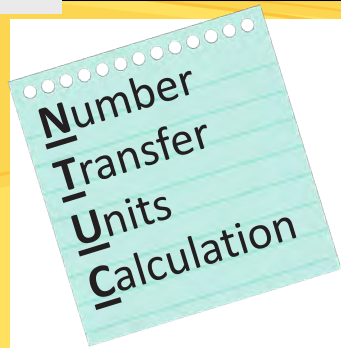
Model

Equation

Working

Answer

Statement



$$235 - 123 = 112$$

Mrs Tan had 112 bookmarks left.

TRIPLE CHECK

Is the solution reasonable?

Can you show that your solution is correct?

COMMON MISCONCEPTION/DIFFICULTIES

Your child may put the values wrongly at the bar model.

1. Check back on your estimate. Is your answer less than 235?

$$112 < 235$$



Work Backwards

2. Using your answer, can you check if the total is 235?

Since 123 bookmarks were given and 112 bookmarks were left, will you get 235 when you add 123 to 112?

$$112 + 123 = 235$$



What If?

CHANGE THE GIVEN INFORMATION

- RE-EXAMINE THE TASK

- ANALYSE THE EFFECT THESE CHANGES

HAVE ON THE SOLUTION PROCESS AS

WELL AS ANSWER

PROBLEM POSING

- GENERATION OF NEW PROBLEM

What If?

Rename 2 tens 1 one to 1 ten 11 ones

Rename 3 hundreds to 2 hundred 11 tens

Mrs Tan had 321 bookmarks.

She gave 123 bookmarks to her students.

How many bookmarks did Mrs Tan have left?

What if Mrs Tan had 321 bookmarks?

Did my method change? Why or why not?

Did the level of difficulty change? Why or why not?

What If?

Rename 2 tens 1 one to 1 ten 11 ones

Subtract 2-digit
number from 3-
digit number

Rename 3 hundreds to 2 hundred 11 tens

Mrs Tan had 321 bookmarks.

She gave 98 bookmarks to her students.

How many bookmarks did Mrs Tan have left?

What if Mrs Tan gave 98 bookmarks to her students?

Did my method change? Why or why not?

Did the level of difficulty change? Why or why not?

What If?

Mrs Tan had 321 bookmarks.

She bought 98 bookmarks .

How many bookmarks did Mrs Tan have altogether?

What if Mrs Tan bought another 98 bookmarks?

What if the question asks for the total number of bookmarks she had?

Did my method change? Why or why not?

Anna walked 300 metres. Jason walked 120 metres
more than her. How many metres did Jason walk?

difference
more
less
compare
Anna

$$300 + 120 = 420$$

Jason walked 420 m.

We often hear 'more than'
and think of 'addition'...

Is that always true?

Can you give
me an
example?

Anna walked 300 metres. She walked 120 metres more than Jason. How many metres did Jason walk?

more *difference*
less
compare

READ

What is known?

- How far did Anna walk?
- Who does 'she' refer to?
- Who walked more?
How many metres more?
- Then who walked less?
How many metres less?

Estimate that Jason walked less than 300 m

What is unknown?

- Do we know how far Jason walked?

What do you need to find?

Given:

Anna walked 300 m.

Relationship:

Anna walked more.
Anna walked 120 m more than Jason.

Jason walked less.
Jason walked 120 m less than Anna.

Find:

The distance that Jason walked

Anna walked 300 metres. She walked 120 metres
more than Jason. How many metres did Jason walk?

Annotations: A red arrow points from the word 'more' to the word 'compare' below it. The word 'more' is circled in pink. The word 'difference' is written above the word '120'. The word 'less' is written above the word 'Jason'. The word 'compare' is written below the word 'more than'.

IDENTIFY KEYWORDS

Are there any keywords that leads to the type of question?



The word 'more than' shows this is a 'More than/Less than' type of question.

Anna walked 300 metres. She walked 120 metres more than Jason. How many metres did Jason walk?



compare

GET A PLAN

Have you seen it before?

What strategy would you use?

- Would you draw a comparison model or part-whole model?
- What makes you say that?

- Who has a longer bar?
- Then who has a shorter bar?

Draw a comparison model.

Since Anna walked more than Jason, then Jason walked less than Anna.

Length of Anna's bar → longer
Length of Jason's bar → shorter
Difference → 120 m

Anna walked 300 metres. She walked 120 metres more than Jason. How many metres did Jason walk?

difference

more

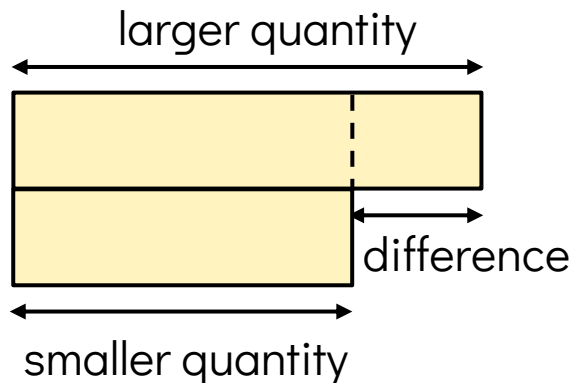
less

compare

HAVE IT DONE

Is each step correct?
Can you prove that
each step is correct?

Model
Equation
Working
Answer
Statement



Anna walked 300 metres. She walked 120 metres more than Jason. How many metres did Jason walk?

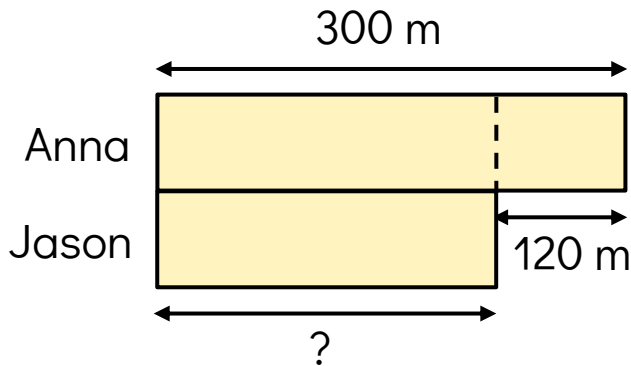
compare

Where will you put the values in the model?

HAVE IT DONE

Is each step correct?
Can you prove that each step is correct?

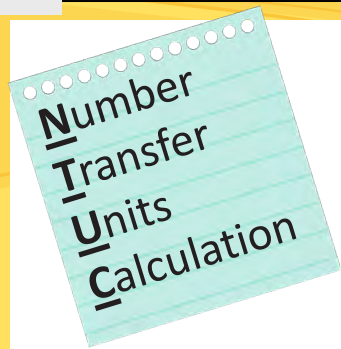
Model
Equation
Working
Answer
Statement



$$300 - 120 = 180$$

Jason walked 180 m.

$$\begin{array}{r} 210 \\ 300 \\ - 120 \\ \hline 180 \end{array}$$



$$300 - 120 = 180$$

Jason walked 180(m).

TRIPLE CHECK

Is the solution reasonable?

Can you show that your solution is correct?

COMMON MISCONCEPTION/DIFFICULTIES

Your child may just 'add' when they see the word 'more than'.

Your child may put the values wrongly at the bar model.

1. Check back on your estimate. Is your answer less than 300 m?

$$180 < 300$$



Work Backwards

2. Using your answer, can you check if Anna walked 120 m more than Jason?

Since Jason walked 180 m,
 $300 - 180 = 120$



3. Since Anna walked 120 m more, if you add 120 m to 180 m, will you get 300 m?

$$180 + 120 = 300$$



What If?

Anna walked 300 metres. She walked 120 metres more than Jason. How many metres did Jason walk?

Annotations: A red bracket above the text spans from "300 metres" to "120 metres" with the word "more" in blue above it. A red circle is around "120 metres" with the word "difference" in blue above it. A red circle is around "Jason" with the word "less" in blue below it.

Estimate that Jason walked less than 300 m

Anna walked 300 metres.

She walked 120 metres less than Jason.

Annotations: The word "less" is in blue above "120 metres". The word "difference" is in blue above "120 metres". The word "compare" is in blue below "less". The word "more" is in blue above "than".

How many metres did Jason walk?

Estimate that Jason walked more than 300 m

What if Anna walked less than Jason?

Did my method change? Why or why not?

Did the level of difficulty change? Why or why not?

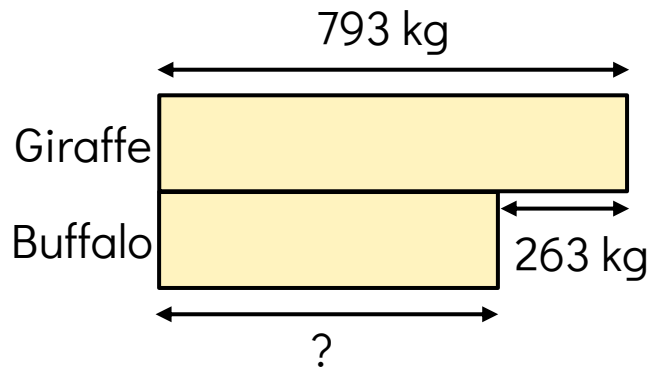
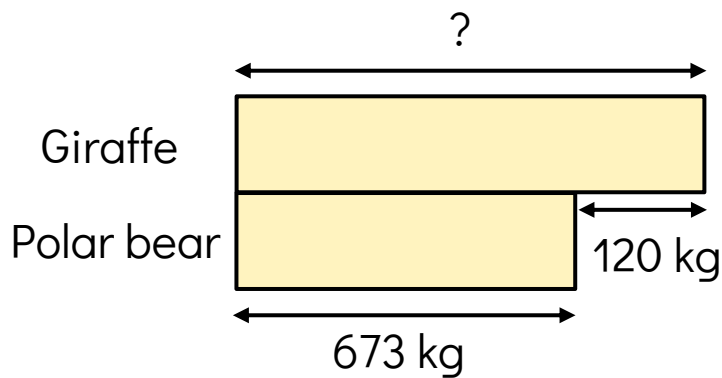
Semester 2

A polar bear weighs 673 kg.

A giraffe weighs 120 kg more than the polar bear.

A buffalo weighs 263 kg less than the giraffe.

Comparison within 3 quantities.



Semester 2

A polar bear weighs 673 kg.

A giraffe weighs 120 kg more than the polar bear.

A buffalo weighs 263 kg less than the giraffe.

- (a) How much does the giraffe weigh?
- (b) How much does the buffalo weigh?

Two-step word problem

Scaffolded to part (a) and (b)

Semester 2

There were 900 people at a concert.

500 were men and the rest are women.

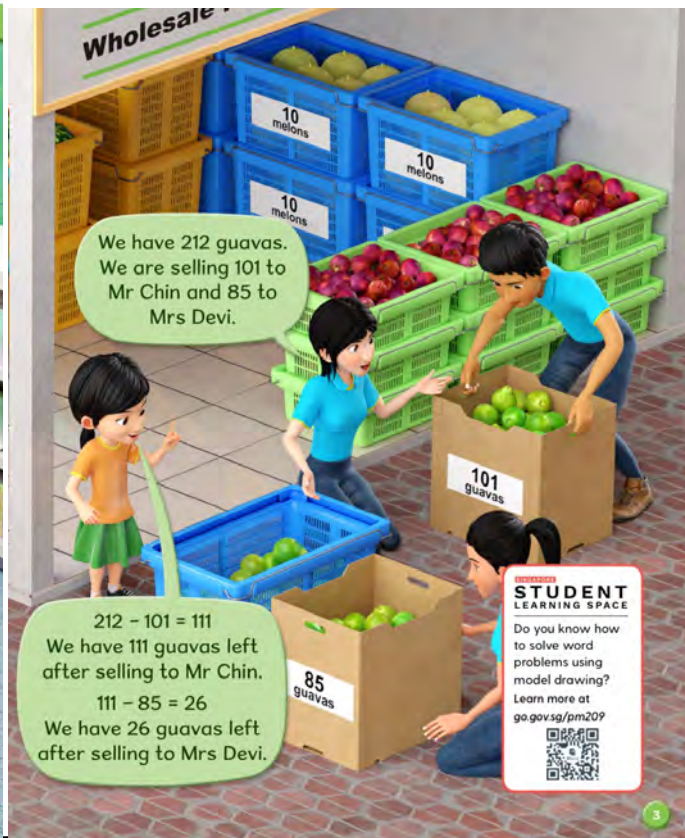
How many more men than women are there?

Two-step word problem

1. Find the number of women. (part-whole model)
2. Find the difference between the number of men and the number of women. (comparison model)

Resources

SLS videos



Students are encouraged to take the R.I.G.H.T action

Model
Equation
Working
Answer
Statement

Read

Topic

What is known/unknown?
What do you need to find?

Identify
Keywords

Type of
Question

Are there any keywords that leads to the type of
question?

Get A Plan

Heuristics

Have you seen it before?
What strategy would you use?

Have It
Done

M.E.W.A.S

Is each step correct?
Can you prove that each step is correct?

Triple
Check

N.T.U.C

Is the solution reasonable? Can you show
that your solution is correct?

Number
Transfer
Units
Calculation

ON THE TABLE: TAKE-HOME RESOURCES



A sheet protector



A laminated copy of question prompts

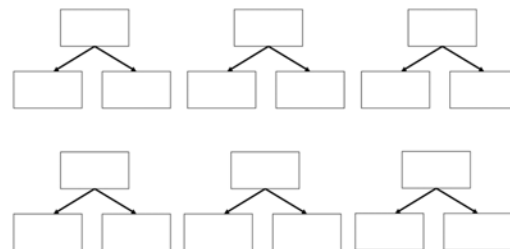
Part-Whole Activity

Children	Teachers	People
Boys	Male	Men
Girls	Female	Women
Flowers	Fruits	Animals
Roses	Mangoes	Cows
Tulips	Papayas	Goats

Set A

Pupils	Adults	Audience
Boys	Men	Adults
Girls	Women	Children
Books	Vehicles	Money
Fiction	Motorcycles	Notes
Non-fiction	Cars	Coins

Set B



Empty Tree Diagram

**Thank
You!**