

Introduction to Bar Models

Lesson 7: Comparison Model for Subtraction

Australian Curriculum: Mathematics (Year 5)

ACMNA291: Use efficient mental and written strategies and apply appropriate digital technologies to solve problems (Year 5).

Lesson abstract

This lesson introduces the comparison model for subtraction problems. The examples use only whole numbers. In a comparison context, variation comes from changing which of the three relevant quantities (larger, smaller and difference) are known or to be found, and by expressing the comparison using different language (e.g. fewer than, increased to). Consolidation problems use larger numbers and contain more information.

Mathematical purpose (for students)

The comparison bar model is useful in problems about the difference between quantities.

Mathematical purpose (for teachers)

This lesson introduces students to the use of the comparison bar model to solve word problems involving subtraction, in contrast to the part-whole model featured in Lesson 2 for slightly different subtraction contexts. The examples provided are straightforward exemplars of how to construct and use a comparison bar model for subtraction, with variations involving which one of the two quantities or their difference is unknown. There are also language differences in the expression of the comparison (e.g. fewer than more than difference between). The tasks that students complete involve larger numbers to provide greater challenge during the activities. Some students will be able to focus more on learning about the model if they use a calculator - others can calculate by hand.

Lesson Length 60 minutes approximately

Vocabulary Encountered

- Comparison Model

Lesson Materials

- Slideshow *ST4_BarModelIntro_7a_CompSub.pptx*
- [Student Sheet 1 - Bar Model Examples 7A](#) (1 per student)
- [Student Sheet 2 - Bar Model Examples 7B](#) (1 per student)
- Calculators as appropriate

We value your feedback after these lessons via <https://www.surveymonkey.com/r/G6VGPZ8>



Introducing the Comparison Bar Model

This lesson introduces the comparison model in simple contexts involving the subtraction of whole numbers. Emphasis is placed on how the comparison model helps students to visualise the differences between quantities as well as the relationships between quantities in word problems.

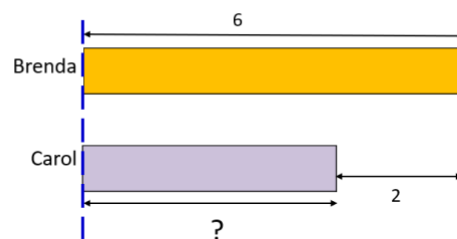
Solutions to all examples are included in the slideshow *ST4_BarModelIntro_7a_CompSub.pptx*, which can be used during class discussion. Hand out [Student Sheet 1 - Bar Model Examples 7A](#). Students should write solutions to these examples, for future reference.

Example 1

Read Example 1 with the class and discuss how the model emerges from the drawings of the muffins. Show the slideshow to demonstrate how the model is built.

Brenda has 6 muffins.
Carol has 2 muffins fewer than Brenda.
How many muffins does Carol have?

Sample Solution



$$6 - 2 = \underline{4}$$

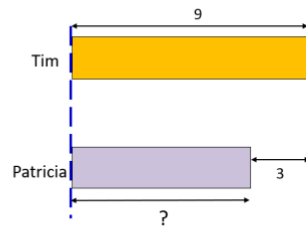
Carol has 4 muffins.

Example 2

Students could try to draw the model themselves, before discussing as a group. The quantities involved have been kept deliberately simple, to focus attention on the construction of the bar model.

Tim has 9 muffins.
Tim has 3 muffins more than Patricia.
How many muffins does Patricia have?

Sample Solution



$$9 - 3 = \underline{6}$$

Patricia has 6 muffins.

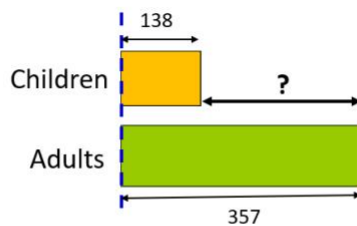
Example 3

This example uses the comparison model with larger numbers. Note that the lengths of the bars do not have to be in correct proportion. A bar model is a sketch, not a scale drawing!

357 adults and 138 children took part in a school event.

How many fewer children than adults took part in the school event?

Sample Solution



$$357 - 138 = \underline{219}$$

219 fewer children than adults took part in the school event.

Consolidating and Concluding

Further Practice

Students work through selected tasks from [Student Sheet 2 - Bar Model Examples 7B](#) either individually, in pairs or in groups. Note that the problems in the tasks use larger numbers than those in the examples, and there is more information to deal with.

Discuss solutions as time permits. Worked solutions are provided in [Teacher Sheet - Bar Model Solutions 7B](#). Solutions to Tasks 1 to 4 are also included in the slideshow *ST4_BarModelIntro_7a_CompSub.pptx*

Conclusion

Summarise the learning points for the lesson, asking students to add their own observations:

- The comparison model can be used for subtraction situations.
- The bars need to be aligned on one end, and dotted lines are useful to show equal amounts.

Example 1

Brenda has 6 muffins.

Carol has 2 muffins fewer than Brenda.

How many muffins does Carol have?

Example 2

Tim has 9 muffins.

He has 3 muffins more than Patricia.

How many muffins does Patricia have?

Example 3

357 adults and 138 children took part in a school event.

How many fewer children than adults took part in the school event?

Draw bar models to represent the situations below and use them to solve the problems.

Task 1

A train left Burswood Station in Perth carrying 609 adults and 94 children.
How many more adults were on the train than children?

Task 2

A supermarket warehouse has 240 boxes of red apples and 187 boxes of green apples.

- How many more boxes of red apples than green apples does the warehouse have?
- Some extra boxes of red apples arrived at the warehouse. There are now 300 boxes of red apples. How many extra boxes arrived?

Task 3

10 578 adults and 5138 children took part in a carnival on Saturday.

- How many fewer children than adults took part in the carnival on Saturday?
- How many adults and children took part in the carnival on Saturday?
- 15 966 adults and children took part in the same carnival on Sunday.
How many more adults and children took part in the carnival on Sunday compared to Saturday?

Task 4

On Monday afternoon, 362 Australians and some overseas tourists got off a train at Cottlesloe Station near Perth. There were 174 fewer tourists than Australians who got off the train. There were 15 more tourists who got off the train, than the number of tourists who then boarded for the next trip.

- a. How many tourists got off the train at Cottlesloe Station?
- b. How many tourists boarded the train for the next trip?

Task 5

A seller has 670 boxes of red pens.
He also has 422 boxes of blue pens.

- a. How many more boxes of red pens than blue pens does the seller have?
- b. The seller bought more boxes of red pens. There are now 878 boxes of red pens. How many additional boxes of red pens did he buy?

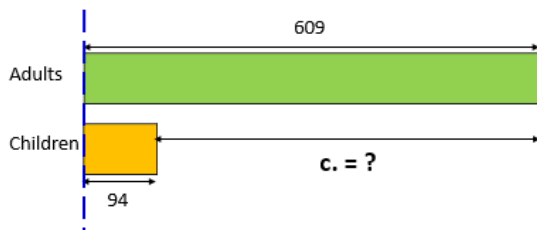
Task 6

9060 adults and 6079 children took part in a marathon in June.

- a. How many fewer children than adults took part in the marathon in June?
- b. How many adults and children took part in the marathon in June?
- c. 16 000 adults and children took part in another marathon in December.
How many more adults and children took part in the marathon in December compared to the one in June?

Task 1

A train left Burswood Station in Perth carrying 609 adults and 94 children.
How many more adults were on the train than children?



$$609 - 94 = 515$$

There were 515 more adults than children on the train.

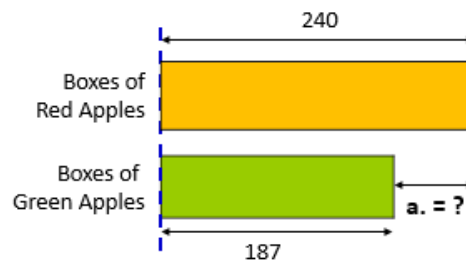
Task 2

A supermarket warehouse has 240 boxes of red apples and 187 boxes of green apples.

- How many more boxes of red apples than green apples does the warehouse have?
- Some extra boxes of red apples arrived at the warehouse. There are now 300 boxes of red apples. How many extra boxes arrived?

(a) $240 - 187 = 53$

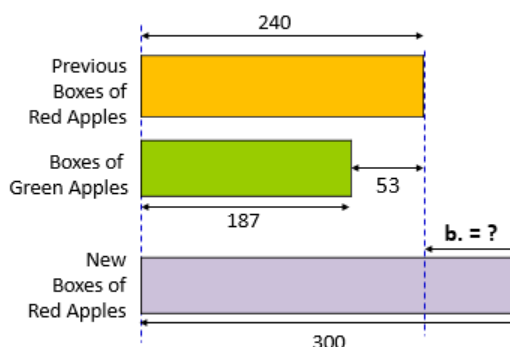
The warehouse has 53 more boxes of red apples than green apples.



(b) $300 - 240 = 60$

The warehouse got 60 extra boxes of red apples.

Note: Students have to be aware the “whole” representing the number of red apples has increased with the extra boxes being bought. Dotted lines are added (as appropriate) to help see the alignment of the bars and to highlight the difference between bars.



Task 3

10 578 adults and 5138 children took part in a carnival on Saturday.

- How many fewer children than adults took part in the carnival on Saturday?
- How many adults and children took part in the carnival on Saturday?
- 15 966 adults and children took part in the same carnival on Sunday. How many more people took part on Sunday compared with Saturday?

Note: This is a comparison model (for subtraction) nested within part-whole model. Students should be careful with the numbers they choose to add to work out the answer for (b).

(a) $10\,578 - 5138 = 5440$

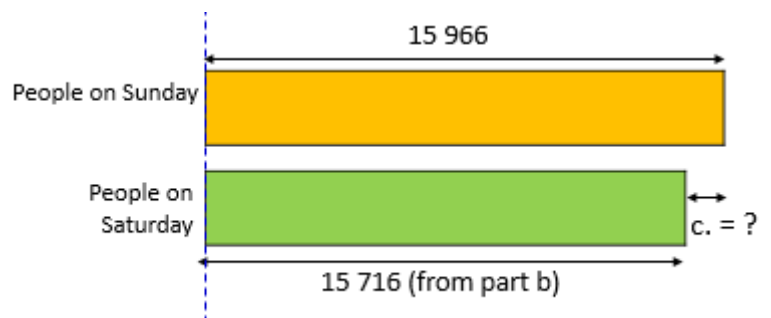
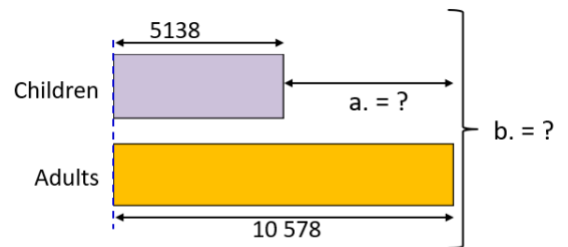
There were 5440 fewer children than adults who took part in the carnival.

(b) $5138 + 10\,578 = 15\,716$

A total of 15 716 adults and children took part in the carnival on Saturday.

(c) $15\,966 - 15\,716 = 250$

250 more people took part in the carnival on Sunday compared to Saturday.

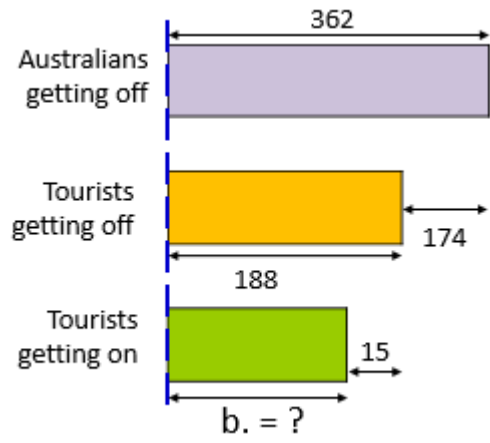


Task 4

On Monday afternoon, 362 Australians and some overseas tourists got off a train at Cottlesloe Station near Perth. There were 174 fewer tourists than Australians who got off the train. There were 15 more tourists who got off the train, than the number of tourists who then boarded for the next trip.

- a. How many tourists got off the train at Cottlesloe Station?
- b. How many tourists boarded the train for the next trip?

- (a) $362 - 174 = 188$
188 tourists got off the train at Cottlesloe Station.
- (b) $188 - 15 = 173$
173 tourists boarded the train at Cottlesloe Station.



Task 5

- A seller has 670 boxes of red pens.
He also has 422 boxes of blue pens.
- a. How many more boxes of red pens than blue pens does the seller have?
 - b. The seller bought more boxes of red pens. There are now 878 boxes of red pens. How many additional boxes of red pens did he buy?

<p>(a) $670 - 422 = 248$</p> <p>The seller has <u>248</u> more boxes of red pens than blue pens.</p>	<p>Previous Number of Boxes of Red pens = 670</p> <p>Boxes of Blue pens = 422</p> <p>(b) = ?</p> <p>(a) = ?</p>
<p>(b) $878 - 670 = 208$</p> <p>The seller bought an additional <u>208</u> boxes of red pens.</p>	<p>New Number of Boxes of Red pens = 878</p>

Task 6

9060 adults and 6079 children took part in a marathon in June.

- a. How many fewer children than adults took part in the marathon in June?
- b. How many adults and children took part in the marathon in June?
- c. 16 000 adults and children took part in another marathon in December.
How many more adults and children took part in the marathon in December compared to the one in June?

<p>(a)</p> $9060 - 6079 = 2981$ <p>There were <u>2982</u> fewer children than adults who took part in the marathon in June.</p> <p>(b)</p> $9060 + 6079 = 15\,139$ <p>A total of <u>15 139</u> adults and children took part in the marathon in June.</p>	
<p>(c)</p> $16\,000 - 15\,139 = 861$ <p><u>861</u> more adults and children took part in the marathon in December compared to the one in June.</p>	<p>Number of Adults and Children in marathon in Dec = 16 000</p> <p>Number of Adults and Children in marathon in June = 15139</p> <p>Dotted lines are added (as appropriate) to help see the alignment of the bars and to highlight the difference between bars.</p>