

# Reasoning and Problem Solving

## Step 6: Subtracting Lengths

### National Curriculum Objectives:

Mathematics Year 3: (3M9b) [Add and subtract lengths \(m/ cm/ mm\)](#)

### Differentiation:

Questions 1, 4 and 7 (Reasoning)

**Developing** Find and explain the mistake when subtracting one length from another given length. Subtractions involve some mixed units and no exchanges. Lengths are in multiples of 5.

**Expected** Find and explain the mistake when subtracting one length from another given length. Subtractions involve mixed units with only one conversion.

**Greater Depth** Find and explain the mistake when subtracting one length from another given length. Subtractions involve mixed units and mixed conversions. Includes use of one quarter, one half and three quarters.

Questions 2, 5 and 8 (Problem Solving)

**Developing** Solve a word problem by subtracting lengths from a given total. Subtractions involve some mixed units and no exchanges. Lengths are in multiples of 5.

**Expected** Solve a word problem by subtracting lengths from a given total. Subtractions involve mixed units with only one conversion.

**Greater Depth** Solve a word problem by subtracting lengths from a given total. Subtractions involve mixed units and mixed conversions. Includes use of one quarter, one half and three quarters.

Questions 3, 6 and 9 (Reasoning)

**Developing** Explain whose method is correct when subtracting one length from another. Subtractions involve some mixed units and no exchanges. Lengths are in multiples of 5.

**Expected** Explain whose method is correct when subtracting one length from another. Subtractions involve mixed units with one conversion.

**Greater Depth** Explain whose method is correct when subtracting one length from another. Subtractions involve mixed units and mixed conversions. Includes use of three quarters.

More [Year 3 Length and Perimeter](#) resources.

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## Subtracting Lengths

## Subtracting Lengths

1a. Ben has completed his homework.

A.  $175\text{mm} - 25\text{mm} = 150\text{mm}$

B.  $290\text{cm} - 80\text{cm} = 150\text{cm}$

C.  $135\text{mm} - 20\text{mm} = 115\text{mm}$

D.  $345\text{cm} - 110\text{cm} = 235\text{cm}$

Explain the mistake that Ben has made.



R

1b. Jenny has completed her homework.

A.  $90\text{cm} - 60\text{cm} = 30\text{cm}$

B.  $4\text{m and } 95\text{cm} - 250\text{mm} = 470\text{cm}$

C.  $125\text{cm} - 120\text{cm} = 50\text{mm}$

D.  $15\text{m} - 10\text{m} = 5\text{cm}$

Explain the mistake that Jenny has made.



R

2a. Kathryn has two different ribbons. One ribbon is red and the other is blue.



Kathryn

The red ribbon is 25cm longer than the blue ribbon.

In total, the ribbons are 2m and 5cm long.

How long is each piece of ribbon?



PS

2b. Danny has two different brooms. One broom is wooden and the other is plastic.



Danny

The plastic broom is 350mm shorter than the wooden broom.

In total, the brooms are 455cm long.

How long is each broom?



PS

3a. Pia and Finn are discussing how to subtract 50mm from 85cm.



Pia

I can work out  $50\text{mm} - 85\text{cm}$  by subtracting 50 from 85.

$85\text{cm} = 850\text{mm}$ . Now, I can subtract 50mm from 850mm.



Finn

Who do you agree with? Explain why.



R

3b. George and Kirsti are discussing how to subtract 65m from 100m.



George

I'll use my number bonds and count on. My answer is 45m.

$100\text{m} - 60\text{m} = 40\text{m}$ . 65m is 5m more than 60m so I need to subtract 5m from 40m.



Kirsti

Who do you agree with? Explain why.



R

## Subtracting Lengths

## Subtracting Lengths

4a. Tom has completed his homework.

A.  $240\text{cm} - 2\text{m} = 238\text{cm}$

B.  $376\text{cm} - 22\text{cm} = 354\text{cm}$

C.  $1\text{m and } 25\text{cm} - 115\text{cm} = 10\text{cm}$

D.  $3\text{m} - 258\text{cm} = 420\text{mm}$

Explain the mistake that Tom has made.



R

4b. Geri has completed her homework.

A.  $6\text{m and } 30\text{cm} - 328\text{cm} = 302\text{cm}$

B.  $9\text{m} - 420\text{cm} = 4\text{m and } 80\text{cm}$

C.  $180\text{cm} - 115\text{cm} = 65\text{cm}$

D.  $95\text{cm} - 110\text{mm} = 106\text{cm}$

Explain the mistake that Geri has made.



R

5a. Two friends have built toy bridges.



Peter

My bridge is between 140cm and 170cm. Its length has a digit sum of 9.



Tammy

My bridge is 26cm shorter than Rohan's bridge.

What could the length of Tammy's bridge be? Find three possible answers.



PS

5b. Two friends are measuring their beds.



Freya

My bed is 53cm shorter than Denzel's.



Abdul

My bed measures between 2m and 216cm. Its length has 3 even digits.

What could the length of Freya's bed be? Find three possible answers.



PS

6a. Arooj and Danny are discussing how to subtract 180mm from 227cm.



Arooj

The calculation is  $227\text{cm} - 180\text{mm} = 47\text{cm}$ .



Danny

The calculation is  $227\text{cm} - 18\text{cm} = 209\text{cm}$ .

Who do you agree with? Explain why.



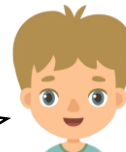
R

6b. Adam and Harry are discussing how to subtract 190mm from 3m and 39cm.



Adam

The calculation is  $339\text{cm} - 19\text{cm} = 320\text{cm}$ .



Harry

The calculation is  $339\text{cm} - 190\text{mm} = 149\text{cm}$ .

Who do you agree with? Explain why.



R

## Subtracting Lengths

7a. India has completed her homework.

A.  $339\text{cm} - 1\text{m and } 2\text{cm} = 237\text{cm}$

B.  $13\text{cm and } 4\text{mm} - 2\text{cm} = 114\text{mm}$

C.  $7\frac{1}{2}\text{m} - 500\text{cm} = 2\text{m and } 45\text{cm}$

D.  $9\frac{3}{4}\text{m} - 5\text{m and } 50\text{cm} = 4\frac{1}{4}\text{m}$

Explain the mistake that India has made.



R

## Subtracting Lengths

7b. Tariq has completed his homework.

A.  $438\text{cm} = 6\frac{3}{4}\text{m} - 196\text{cm}$

B.  $8\frac{1}{2}\text{m} - 532\text{cm} = 3\text{m and } 18\text{cm}$

C.  $271\text{cm} - 2\text{m} = 710\text{mm}$

D.  $6\text{m and } 2\text{cm} - \frac{1}{4}\text{m} = 577\text{cm}$

Explain the mistake that Tariq has made.



R

8a. A team of four people throw a javelin.



I threw the javelin 260cm.

My throw was  $\frac{1}{2}\text{m}$  less than George.



Adam



My throw was 20mm shorter than Adam's.

My throw was less than 2m.



Kirsti

They gain a total score of 8m and 46cm. How much shorter was Kirsti's throw than George's?



PS

8b. Four friends perform a triple jump.



I jumped  $\frac{1}{4}\text{m}$  less than Harry.

My jump was 430mm less than the girls' total.



Harry



My jump measured 168cm.

My jump was  $\frac{1}{2}\text{m}$  shorter than Pia's.



Sue

In total, they jumped 747cm. How much further did Finn jump than Sue?



PS

9a. Peter and Kathryn are discussing how to subtract 1m and 98cm from  $5\frac{3}{4}\text{m}$ .



The calculation is  $534\text{cm} - 198\text{cm} = 336\text{cm}$ .

Peter

The calculation is  $575\text{cm} - 198\text{cm} = 377\text{cm}$ .



Kathryn

Who do you agree with? Explain why.



R

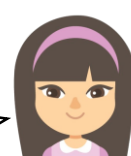
9b. Tammy and Emilie are discussing how to subtract 62mm from 96cm.



The calculation is  $960\text{mm} - 620\text{mm} = 340\text{mm}$

Tammy

The calculation is  $960\text{mm} - 62\text{mm} = 898\text{mm}$ .



Emilie

Who do you agree with? Explain why.



R

## Reasoning and Problem Solving

### Subtracting Lengths

#### Developing

- 1a. Ben has calculated statement B incorrectly because  $290\text{cm} - 80\text{cm} = 210\text{cm}$ .
- 2a. The red ribbon is 1m and 15cm and the blue ribbon is 90cm long.
- 3a. Finn's method is correct because he has realised that he needs to convert one of the lengths so that both lengths use the same units of measurement before he subtracts.

#### Expected

- 4a. Tom has calculated statement A incorrectly because he has not converted 2m into cm.  $240\text{cm} - 2\text{m} = 40\text{cm}$ .
- 5a. Tammy's bridge could be: 118cm, 127cm or 136cm long.
- 6a. Danny's method is correct because he has converted 180mm into 18cm before subtracting.

#### Greater Depth

- 7a. India has calculated statement C incorrectly because  $7\frac{1}{2}\text{m} - 500\text{cm} = 2\text{m}$  and 50cm.
- 8a. Fiz's throw was 92cm shorter than George's throw because Kirsti's throw measured 1m and 68cm or 168cm and George's throw measured 260cm or 2m and 60cm.
- 9a. Kathryn's method is correct because she has converted  $5\frac{3}{4}\text{m}$  into 575cm before subtracting.

## Reasoning and Problem Solving

### Subtracting Lengths

#### Developing

- 1b. Jenny has used calculated statement D incorrectly because the unit of measurement is incorrect.  $15\text{m} - 10\text{m} = 5\text{m}$ .
- 2b. The wooden broom is 245cm and the plastic broom is 210cm long.
- 3b. Kirsti's method is correct because she has partitioned 65m into 60m and 5m to help her complete this subtraction mentally.

#### Expected

- 4b. Geri has calculated statement D incorrectly because she added 110mm to 95cm instead of subtracting.  $95\text{cm} - 110\text{mm} = 84\text{cm}$ .
- 5b. Freya's bed could be: 149cm, 153cm or 155cm long.
- 6b. Adam's method is correct because he has converted 190mm into 19cm before subtracting.

#### Greater Depth

- 7b. Tariq has calculated statement A incorrectly because  $6\frac{3}{4}\text{m} - 196\text{cm} = 479\text{cm}$ .
- 8b. Finn jumped 1m more than Sue because he jumped 218cm and Sue jumped 118cm.
- 9b. Emilie's method is correct because she has converted 96cm into 960mm accurately before subtracting whereas Tammy has converted 62mm in 620mm incorrectly.