

# Reasoning and Problem Solving

## Step 1: Hours, Minutes and Seconds

### National Curriculum Objectives:

Mathematics Year 4: (4M4c) [Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days](#)

### Differentiation:

Questions 1, 4 and 7 (Reasoning)

**Developing** Explain whether the  $<$ ,  $>$  or  $=$  statement is true or false using hours, minutes and seconds in multiples of 10. Two statements.

**Expected** Explain whether the  $<$ ,  $>$  or  $=$  statement is true or false using two consecutive units of time, i.e. 5 hours and 35 minutes. Three statements.

**Greater Depth** Explain whether the  $<$ ,  $>$  or  $=$  statement is true or false using any two units of time and unconventional partitioning, i.e. 5 hours and 90 minutes. Three statements.

Questions 2, 5 and 8 (Reasoning)

**Developing** Explain who is correct using hours, minutes and seconds in multiples of 10.

**Expected** Explain who is correct using two consecutive units of time, i.e. 5 hours and 35 minutes.

**Greater Depth** Explain who is correct using any two units of time and unconventional partitioning, i.e. 5 hours and 90 minutes.

Questions 3, 6 and 9 (Problem Solving)

**Developing** Calculate which cake will be baked first using hours, minutes and seconds in multiples of 10. Three times to compare.

**Expected** Calculate the order in which the cakes will be ready using two consecutive units of time, i.e. 5 hours and 35 minutes. Three times to order.

**Greater Depth** Calculate the order in which the cakes will be ready using any two units of time and unconventional partitioning, i.e. 5 hours and 90 minutes. Four times to order.

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# Hours, Minutes and Seconds

# Hours, Minutes and Seconds

1a. True or false? Explain why.

A. 30 minutes  $>$  1 hour

B. 2 minutes 30 seconds  $<$  180 seconds



R

1b. True or false? Explain why.

A. 240 seconds  $=$  4 minutes

B. 3 hours  $>$  240 minutes



R

2a. Haleema says,



I ran the race in 210 seconds. I win.

Sami says,

I ran the race in 3 minutes. I win.



Explain who is correct.



R

2b. Jo says,



I ran the race in 4 hours 30 minutes. I win.

Maria says,

I ran the race in 300 minutes. I win.



Explain who is correct.



R

3a. Everyone starts baking at the same time. Which child's cake will be ready first? Which will take longest?

Child A	60 minutes
Child B	2 hours
Child C	1 hours 30 minutes



PS

3b. Everyone starts baking at the same time. Which child's biscuits will be ready first? Which will take longest?

Child A	4 minutes 30 seconds
Child B	240 seconds
Child C	5 minutes



PS

# Hours, Minutes and Seconds

# Hours, Minutes and Seconds

4a. True or false? Explain why.

A. 1 minute 15 seconds  $>$  80 seconds

B. 160 minutes  $<$  2 hours 30 seconds

C. 3 hours 10 minutes  $<$  195 minutes



R

4b. True or false? Explain why.

A. 230 seconds  $=$  3 minutes 40 seconds

B. 1 hour 55 minutes  $<$  115 minutes

C. 2 minutes 25 seconds  $>$  135 seconds



R

5a. Henry says,



I ran the race in 175 seconds. I win.

Salema says,

I ran the race in 2 minutes 45 seconds. I win.



Explain who is correct.



R

5b. Jonah says,



I ran the race in 4 hours 25 minutes. I win.

Ellen says,

I ran the race in 425 minutes. I win.



Explain who is correct.



R

6a. Everyone starts baking at the same time. Find the order in which the cakes will be ready.

Child A	130 minutes
Child B	2 hours 25 minutes
Child C	$2\frac{1}{4}$ hours



PS

6b. Everyone starts baking at the same time. Find the order in which the biscuits will be ready.

Child A	5 minutes 45 seconds
Child B	340 seconds
Child C	$5\frac{1}{2}$ minutes



PS

# Hours, Minutes and Seconds

# Hours, Minutes and Seconds

7a. True or false? Explain why.

A. 3 hours 96 minutes  $>$  216 minutes

B. 403 seconds  $=$  6 minutes 53 seconds

C. 717 minutes  $<$  11 hours 58 minutes



R

7b. True or false? Explain why.

A. 482 seconds  $<$  8 minutes 22 seconds

B. 9 hours 25 minutes  $<$  575 minutes

C. 7 minutes 76 seconds  $>$  446 seconds



R

8a. Ida says,



I ran the race in 6 hours 58 minutes. I win.

Umer says,



I ran the race in 428 minutes. I win.

Explain who is correct.



R

8b. Austin says,



I ran the race in 737 seconds. I win.

Anoushka says,



I ran the race in 12 minutes 17 seconds. I win.

Explain who is correct.



R

9a. Everyone starts baking at the same time. Calculate the order in which the chocolate cakes will be ready.

Child A	$4\frac{1}{2}$ hours
Child B	282 minutes
Child C	4 hours 27 minutes
Child D	$4\frac{3}{4}$ hours



PS

9b. Everyone starts baking at the same time. Calculate the order in which the buns will be ready.

Child A	11 minutes 44 seconds
Child B	$11\frac{3}{4}$ minutes
Child C	744 seconds
Child D	$11\frac{1}{4}$ minutes



PS

## Reasoning and Problem Solving Hours, Minutes and Seconds

### Developing

- 1a. A is false because 1 hour = 60 minutes. So 30 minutes < 1 hour. B is true.
- 2a. Sami is correct because 3 minutes = 180 seconds which is fewer than 210 seconds.
- 3a. Child A's cake will be ready first as 60 minutes = 1 hour. Child B's cake will take longest as 2 hours = 120 minutes.

### Expected

- 4a. A is false because 1 minute 15 seconds = 75 seconds which is < 80 seconds. B is false because 160 minutes = 2 hours 40 minutes which is > 2 hours 30 minutes. C is true.
- 5a. Salema is correct because 2 minutes 45 seconds = 165 seconds which is fewer than 175 seconds.
- 6a. Child A (130 minutes), Child C (135 minutes), Child B (145 minutes).

### Greater Depth

- 7a. A is true. B is false because 403 seconds = 6 minutes 43 seconds which is < 6 minutes 53 seconds. C is true.
- 8a. Ida is correct because 6 hours 58 minutes = 418 minutes which is fewer than 428 minutes.
- 9a. Child C (267 minutes), Child A (270 minutes), Child B (282 minutes), Child D (285 minutes).

## Reasoning and Problem Solving Hours, Minutes and Seconds

### Developing

- 1b. A is true. B is false because 3 hours = 180 minutes. So 3 hours < 240 minutes.
- 2b. Jo is correct because 4 hours 30 minutes = 270 minutes which is fewer than 300 minutes.
- 3b. Child B's biscuits will be ready first as 240 seconds = 4 minutes. Child C's biscuits will take longest as 5 minutes = 300 seconds.

### Expected

- 4b. A is false because 230 seconds = 3 minutes 50 seconds which is > 3 minutes 40 seconds. B is false because 1 hour 55 minutes = 115 minutes so they are both equal. C is true.
- 5b. Jonah is correct because 4 hours 25 minutes = 265 minutes which is fewer than 425 minutes.
- 6b. Child C (330 seconds), Child B (340 seconds), Child A (345 seconds).

### Greater Depth

- 7b. A is true. B is true. C is true.
- 8b. The race was a draw. 737 seconds = 12 minutes 17 seconds.
- 9b. Child D (675 seconds), Child A (704 seconds), Child B (705 seconds), Child C (744 seconds).