

Reasoning and Problem Solving

Step 10: Measuring Time in Seconds

National Curriculum Objectives:

Mathematics Year 3: (3M4d) [Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock/a.m./ p.m., morning, afternoon, noon and midnight](#)

Mathematics Year 3: (3M4e) [Know the number of seconds in a minute and the number of days in each month, year and leap year](#)

Differentiation:

Questions 1, 4 and 7 (Reasoning)

Developing Compare times written in seconds as faster or slower than a time in minutes (3 examples of times using multiples of 60 seconds).

Expected Compare times written in seconds as faster or slower than a time in minutes (5 examples of times using multiples of 5 or 10 seconds).

Greater Depth Compare times written in seconds to a range of times written in minutes (5 examples of times using any number of seconds).

Questions 2, 5 and 8 (Reasoning)

Developing Add a time written in seconds to or from a time written in minutes (using multiples of 60 seconds).

Expected Add a time written in seconds to or from a time written in minutes (using multiples of 5 or 10 seconds).

Greater Depth Add or subtract times written in seconds to or from a time written in minutes (using any number of seconds).

Questions 3, 6 and 9 (Problem Solving)

Developing Convert between minutes and seconds (whole numbers of minutes and multiples of 60 seconds).

Expected Convert between minutes and seconds (multiples of 5 or 10 seconds).

Greater Depth Convert between minutes and seconds (any number of seconds).

[More resources](#) which follow the same small steps as White Rose.

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Reasoning and Problem Solving – Measuring Time in Seconds

1a. Fatima has been looking at the length of her phone conversations to her friend.



Phone Call 1	240 seconds
Phone Call 2	60 seconds
Phone Call 3	120 seconds

Fatima thinks 2 out of the 3 phone calls are less than 2 minutes. Do you agree? Explain how you know.



R

1b. Rampal has been timing how long it takes him to cycle to his friend’s house.



Monday	300 seconds
Thursday	360 seconds
Saturday	240 seconds

Rampal thinks he cycles faster than 5 minutes on 2 out of the 3 days. Do you agree? Explain how you know.



R

2a. Amelie says that in another 60 seconds, the stopwatch will show 2 minutes 90 seconds.



Amelie



Henry

Henry says that in another 60 seconds, the stopwatch will show 3 minutes 30 seconds.

Who is correct? Explain how you know.

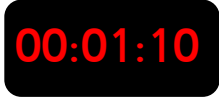


R

2b. Robert says that in another 120 seconds, the stopwatch will show 3 minutes 10 seconds.



Robert



Nancy

Nancy says that in another 120 seconds, the stopwatch will show 2 minutes 30 seconds.

Who is correct? Explain how you know.



R

3a. One of Peter’s answers is incorrect.

3 minutes = 120 seconds
5 minutes = 300 seconds
4 minutes = 240 seconds



Can you spot and correct my mistake?



PS

3b. One of Kiah’s answers is incorrect.

3 minutes = 180 seconds
2 minutes = 240 seconds
6 minutes = 360 seconds



Can you spot and correct my mistake?



PS

Reasoning and Problem Solving – Measuring Time in Seconds

4a. Mrs Walton challenges the children in her class to tidy up in less than 4 minutes.



Monday	195 seconds
Tuesday	250 seconds
Wednesday	210 seconds
Thursday	235 seconds
Friday	320 seconds

Dean thinks 4 out of the 5 days are faster than 4 minutes. Do you agree? Explain how you know.



R

4b. Kelsey times how long her friends can hit the ball back and forth without it going out of play.

Caleb and Bobby	80 seconds
Saffron and Beth	115 seconds
Simon and Hattie	205 seconds
Fia and Hashim	95 seconds
Lottie and Millie	145 seconds



She thinks 3 of the pairs can hit the ball back and forth for more than 2 minutes. Do you agree? Explain how you know.



R

5a. Geeta says that in another 150 seconds, the stopwatch will show 4 minutes 70 seconds.



Dennis



Geeta

Dennis says that in another 150 seconds, the stopwatch will show 5 minutes 50 seconds.

Who is correct? Explain how you know.



R

5b. Elen says that in another 145 seconds, the stopwatch will show 6 minutes 40 seconds.



Joshua



Elen

Joshua says that in another 145 seconds, the stopwatch will show 5 minutes 60 seconds.

Who is correct? Explain how you know.



R

6a. One of Sally's answers is incorrect.

5 minutes 45 seconds = 345 seconds
3 minutes 40 seconds = 340 seconds
2 minutes 55 seconds = 175 seconds



Can you spot and correct my mistake?



PS

6b. One of Ben's answers is incorrect.

4 minutes 25 seconds = 265 seconds
2 minutes 25 seconds = 145 seconds
3 minutes 5 seconds = 305 seconds

Can you spot and correct my mistake?



PS

Reasoning and Problem Solving – Measuring Time in Seconds

7a. To qualify for Swim Team 1, swimmers need times between 2 and 3 minutes. To qualify for Swim Team 2, swimmers need times between 3 and 4 minutes.



Danielle	223 seconds
Alice	147 seconds
Freya	261 seconds
Jaspreet	236 seconds
Ebony	179 seconds

Gina thinks there will be 3 children in Team 1 and 2 children in Team 2. Do you agree? Explain how you know.



R

7b. Bobby records how long the school football teams take to score their first goal at the first match of the season.

Parklands Primary	118 seconds
Mersey Primary	1 minute 18 seconds
Dovecote Primary	1 minute 57 seconds
Crawshaw Primary	79 seconds
Whitewell Primary	1 minute 19 seconds

Bobby thinks Crawshaw Primary have the fastest time by 1 second. Do you agree? Explain how you know.



R

8a. Raj says that in another 213 seconds, the stopwatch will show 5 minutes 52 seconds.



Raj



Joe

Joe says that in another 218 seconds, the stopwatch will show 5 minutes 52 seconds.

Who is correct? Explain how you know.



R

8b. Becky says that 119 seconds ago, the stopwatch showed 1 minute 58 seconds.



Becky



Pamela

Pamela says that 119 seconds ago, the stopwatch showed 1 minute 59 seconds.

Who is correct? Explain how you know.



R

9a. Some of Paul's answers are incorrect.

10 minutes 17 seconds = 617 seconds
336 seconds = 8 minutes and 36 seconds
8 minutes 41 seconds = 581 seconds
277 seconds = 4 minutes and 37 seconds



Can you spot and correct my mistake?



PS

9b. Some of Sue's answers are incorrect.

6 minutes 39 seconds = 389 seconds
424 seconds = 7 minutes and 4 seconds
5 minutes 38 seconds = 338 seconds
376 seconds = 6 minutes and 16 seconds

Can you spot and correct my mistake?



PS

Reasoning and Problem Solving – Measuring Time in Seconds

Developing

- 1a. Fatima is incorrect. Only phone call 2 is less than 2 minutes because $60 \text{ seconds} = 1 \text{ minute}$. The other phone calls are 4 minutes and 2 minutes, and neither of these are less than 2 minutes.
- 1b. Rampal is incorrect. He cycled faster than 5 minutes on Saturday because $240 \text{ seconds} = 4 \text{ minutes}$. On the other days, it took him 5 minutes or 6 minutes, and neither of these are faster than 5 minutes.
- 2a. Henry is correct. $60 \text{ seconds} = 1 \text{ minute}$. The stopwatch reads 2 minutes 30 seconds and 1 minute added to this time would equal 3 minutes and 30 seconds.
- 2b. Robert is correct. $120 \text{ seconds} = 2 \text{ minutes}$. The stopwatch reads 1 minutes 10 seconds and 2 minutes added to this time would equal 3 minutes and 10 seconds.
- 3a. 3 minutes = 180 seconds, not 120 seconds.
- 3b. 2 minutes = 120 seconds, not 240 seconds.

Expected

- 4a. Dean is incorrect. Only 3 out of the 5 says are faster than 4 minutes. It takes the children 4 minutes and 10 seconds on Tuesday, and 5 minutes and 20 seconds on Friday, and neither of these are faster than 4 minutes (240 seconds).
- 4b. Kelsey is incorrect. Only 2 out of the 5 pairs of children could hit the ball back and forth for more than 2 minutes. Simon and Hattie's time was 3 minutes 25 seconds and Lottie and Millie's time was 2 minutes and 25 seconds. The times of the other pairs are not more than 2 minutes (120 seconds).
- 5a. Dennis is correct. $150 \text{ seconds} = 2 \text{ minutes and } 30 \text{ seconds}$. The stopwatch reads 3 minutes 20 seconds, and if 2 minutes and 30 seconds were added to this time, it would equal 5 minutes and 50 seconds.
- 5b. Elen is correct. $145 \text{ seconds} = 2 \text{ minutes and } 25 \text{ seconds}$. The stopwatch reads 4 minutes 15 seconds, and if 2 minutes and 25 seconds were added to this time, it would equal 6 minutes and 40 seconds.
- 6a. 3 minutes and 40 seconds = 220 seconds, not 340 seconds.
- 6b. 3 minutes and 5 seconds = 185 seconds, not 305 seconds.

Greater Depth

- 7a. Gina is partly correct as there are 2 children on Team 2: Danielle and Jaspreet. There are only 2 children on Team 1: Alice and Ebony. Freya's time is 4 minutes 21 seconds so she does not qualify for either team.
- 7b. Bobby is incorrect. Crawshaw Primary take 1 minute 19 seconds to score, which is the same as Whitewell Primary, but Mersey Primary score their first goal 1 second faster.
- 8a. Raj is correct. $213 \text{ seconds} = 3 \text{ minutes and } 33 \text{ seconds}$. The stopwatch reads 2 minutes 19 seconds, and if 3 minutes and 33 seconds were added to this time, it would equal 5 minutes and 52 seconds.
- 8b. Pamela is correct. $119 \text{ seconds} = 1 \text{ minute and } 59 \text{ seconds}$. The stopwatch reads 3 minutes 58 seconds, and if 1 minute and 59 seconds were subtracted from this time, it would equal 1 minute and 59 seconds.
- 9a. Paul has made 2 mistakes. $336 \text{ seconds} = 5 \text{ minutes and } 36 \text{ seconds}$, not 8 minutes and 36 seconds; $8 \text{ minutes and } 41 \text{ seconds} = 521 \text{ seconds}$, not 581 seconds.
- 9b. Sarah has made 1 mistake. $6 \text{ minutes and } 39 \text{ seconds} = 399 \text{ seconds}$, not 389 seconds.