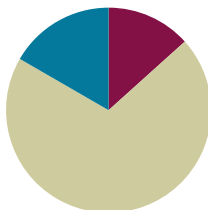


Lesson 3

Objective: Create conversion tables for units of time, and use the tables to solve problems.

Suggested Lesson Structure

■ Fluency Practice	(8 minutes)
■ Concept Development	(42 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (8 minutes)

- Grade 4 Core Fluency Differentiated Practice Sets **4.NBT.4** (4 minutes)
- Convert Capacity Units **4.MD.1** (4 minutes)

Grade 4 Core Fluency Differentiated Practice Sets (4 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 2 Core Fluency Practice Sets)

Note: During Topic A and for the remainder of the year, each day's Fluency Practice may include an opportunity for mastery of the addition and subtraction algorithm by means of the Core Fluency Practice Sets. The process is detailed and materials are provided in Lesson 2.

Convert Capacity Units (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 2 and metric conversions from Module 2.

T: (Write $1 \text{ L} = \underline{\quad} \text{ mL}$.) How many milliliters are in 1 liter?

S: 1,000 milliliters.

Repeat the process for 2 and 3 liters.

T: (Write $5 \text{ L} = \underline{\quad} \text{ mL}$.) Write the number sentence.

S: (Write $5 \text{ L} = 5,000 \text{ mL}$.)

T: (Write $1 \text{ gal} = \underline{\quad} \text{ qt.}$) How many quarts are in 1 gallon?

S: 4 quarts.

Repeat the process for 2 and 3 gallons.

T: (Write $9 \text{ gal} = \underline{\quad} \text{ qt.}$) Write the number sentence.

S: (Write $9 \text{ gal} = 36 \text{ qt.}$)

T: (Write 1 qt = __ pt.) How many pints are in 1 quart?
 S: 2 pints.

Repeat the process for 2 and 3 quarts.

T: (Write 7 qt = __ pt.) Write the number sentence.
 S: (Write 7 qt = 14 pt.)
 T: (Write 1 pt = __ c.) How many cups are in 1 pint?
 S: 2 cups.

Repeat the process for 2 and 3 pints.

T: (Write 6 pt = __ c.) Write the number sentence.
 S: (Write 6 pt = 12 c.)

Concept Development (42 minutes)

Materials: (T) Analog clock with a second hand, stopwatch
 (S) Stopwatch (1 per group), personal white board, Practice Sheet

Problem 1: Convert minutes to seconds.

T: (Hold up an analog clock.) This clock has three hands. What units do the three hands count?
 S: Hours, minutes, and seconds.
 T: How many seconds are in 1 minute?
 S: 60 seconds.
 T: In your groups, one person will need to be in charge of the stopwatch. The rest of the group will close their eyes and, when they think 1 minute has passed, will write M on their personal white boards. The person with the stopwatch tells the group when 1 minute has passed. Let's see who comes closest to 1 minute.
 T: (Allow students to finish the activity.) Did any of you write M on your board at exactly 1 minute?
 T: (Display the two-column table.) What is the rule for converting minutes to seconds?
 S: Multiply by 60.
 T: Complete the conversion table for minutes to seconds.
 S: (Complete the table.)
 T: Solve for how many seconds are in 16 minutes.
 S: 10 minutes is 600 seconds. 6 minutes is 360 seconds. $600 + 360 = 960$. 960 seconds are in 16 minutes. \rightarrow 16 times 60 is 960. 16 minutes equals 960 seconds.



NOTES ON MATERIALS:

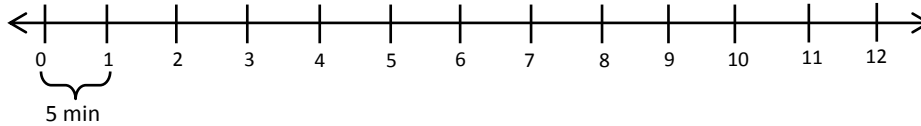
If stopwatches are not abundant enough to easily provide one for each group, consider virtual materials, such as those found at the following links:
[Online Stopwatch: Fireworks](#)
[Online Stopwatch: Egg Timer](#)

Minutes	Seconds
1	60
2	120
3	180
4	240
5	300
6	360
7	420
8	480
9	540
10	600

Repeat the process with 23 minutes.

Problem 2: Convert hours to minutes.

- T: Let’s imagine, as we practiced in Grade 3, that we unwrap the clock and look at the numbers on a number line.
- T: We can use the number line to help us determine the number of minutes in one hour. How many minutes are in an hour?



- S: 60 minutes.
- T: How many groups of 5 minutes?
- S: 12 groups.
- T: (Display the two-column table.) Complete the conversion table for hours to minutes.

Hours	Minutes
1	60
2	120
3	180
4	240
5	300
6	360
7	420
8	480
9	540
10	600

MP.8

- T: How many minutes are in 18 hours?
- S: $600 + 480 = 1,080$. There are 1,080 minutes in 18 hours.
 $\rightarrow 18 \times 60 = 1,080$. 18 hours equals 1,080 minutes.
- T: How many seconds are in 18 minutes? (Pause.)
- S: It’s the same number! 1,080 seconds.
- T: Why?
- S: We multiplied by a factor of 60 for both. \rightarrow The rule is times 60.

Repeat the process with 36 hours.

Problem 3: Convert days to hours.

- T: With your partner, determine the number of hours in 1 day. Use the number line if it helps you.
- S: There are 24 hours in 1 day. The number line represents 12 hours, but I know that we need to double that because 12:00 a.m. to 12:00 p.m. is just half the day. A full day would be another 12 hours back to 12:00 a.m.
- T: If we know that there are 24 hours in 1 day, we can complete the conversion table for days to hours. Complete the table.
- T: How many hours are in 14 days?
- S: $240 \text{ hours} + 96 \text{ hours} = 336 \text{ hours}$. $\rightarrow 14 \times 24 = 336$. 14 days equals 336 hours.

Days	Hours
1	24
2	48
3	72
4	96
5	120
6	144
7	168
8	192
9	216
10	240

Repeat the process for 42 days.

Problem 4: Solve a word problem involving converting days to hours.

T: The Apollo 17 mission was completed in 12 days, 14 hours. How many hours did the mission last?

Solution A

12 days 14 hours

240 hours 48 hours

10 days 2 days 14 hours

12 days = 10 days + 2 days

$$(10 \times 24) + (2 \times 24)$$

$$= 240 + 48$$

$$= 288$$

$$\begin{array}{r} 288 \\ + 14 \\ \hline 302 \text{ hours} \end{array}$$

The mission lasted 302 hours.

Solution B

12 days 14 hours

24 hours 14 hr.

$$12 \times 24 = 288$$

$$288 + 14 = 302$$

The mission took 302 hours.

Solution C

13 days

12 days 14 hours 10 hours

$$13 \times 24 = 312$$

$$312 \text{ hr} - 10 \text{ hr} = 302 \text{ hr}$$

It took 302 hours.

$$\begin{array}{r} 13 \\ \times 24 \\ \hline 52 \\ 260 \\ \hline 312 \end{array}$$

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Differentiate the difficulty of the word problem by offering students working above grade level these extension questions:

- Research the duration of Apollo 16's mission in days and hours. How many hours did it last?
- Compare the duration of Apollo 16 and 17's missions.

Student Debrief (10 minutes)

Lesson Objective: Create conversion tables for units of time, and use the tables to solve problems.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Explain how you could solve Problem 1 without a number line.
- Would it make sense to solve Problem 2 in seconds? Why or why not?
- Explain two strategies for solving problems converting a number of days to hours. Which method is most efficient and why? Which strategy did you use to solve Problem 7?
- Can anyone describe how time is kept in the military or in a foreign country? Is time (seconds, minutes, hours) defined as a metric or customary system?

Exit Ticket (3 minutes)

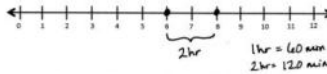
After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 4•7


Name Jack Date _____

Use RDW to solve Problems 1–2.

1. Courtney needs to leave the house by 8:00 a.m. If she wakes up at 6:00 a.m., how many minutes does she have to get ready? Use the number line to show your work.



2. Giuliana's goal was to run a marathon in under 6 hours. What was her goal in minutes?



3. Complete the following conversion tables and write the rule under each table.

Hours	Minutes
1	60
3	180
6	360
10	600
15	900

Days	Hours
1	24
2	48
5	120
7	168
10	240

The rule for converting hours to minutes, and minutes to seconds, is multiply by 60.

The rule for converting days to hours is multiply the days times 24.

COMMON CORE Lesson 3: Create conversion tables for units of time, and use the tables to solve problems. 3/24/14 engage^{ny} 7.A.40

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 4•7

4. Solve.

a. 9 hours 30 minutes = 570 minutes b. 7 minutes 45 seconds = 465 seconds

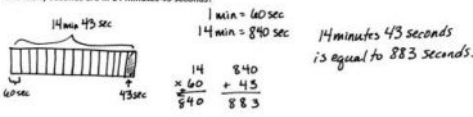
c. 9 days 20 hours = 236 hours d. 22 minutes 27 seconds = 1,347 seconds

e. 13 days 19 hours = 331 hours f. 23 hours 5 minutes = 1,385 minutes

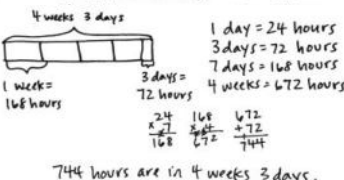
5. Explain how you solved Problem 4f).

Each hour has 60 minutes, so I multiplied 60 minutes times 23 and then added on the last 5 minutes.

6. How many seconds are in 14 minutes 43 seconds?



7. How many hours are there in 4 weeks 3 days?



COMMON CORE Lesson 3: Create conversion tables for units of time, and use the tables to solve problems. 3/24/14 engage^{ny} 7.A.41

Name _____

Date _____

a.

Minutes	Seconds
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

The rule for converting minutes to seconds is

_____.

b.

Hours	Minutes
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

The rule for converting hours to minutes is

_____.

c.

Days	Hours
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

The rule for converting days to hours is

_____.

Name _____

Date _____

Use RDW to solve Problems 1–2.

1. Courtney needs to leave the house by 8:00 a.m. If she wakes up at 6:00 a.m., how many minutes does she have to get ready? Use the number line to show your work.



2. Giuliana’s goal was to run a marathon in under 6 hours. What was her goal in minutes?

3. Complete the following conversion tables and write the rule under each table.

a.

Hours	Minutes
1	
3	
6	
10	
15	

The rule for converting hours to minutes and minutes to seconds is

_____.

b.

Days	Hours
1	
2	
5	
7	
10	

The rule for converting days to hours is

_____.

4. Solve.

a. 9 hours 30 minutes = _____ minutes

b. 7 minutes 45 seconds = _____ seconds

c. 9 days 20 hours = _____ hours

d. 22 minutes 27 seconds = _____ seconds

e. 13 days 19 hours = _____ hours

f. 23 hours 5 minutes = _____ minutes

5. Explain how you solved Problem 4(f).

6. How many seconds are in 14 minutes 43 seconds?

7. How many hours are there in 4 weeks 3 days?

Name _____

Date _____

The astronauts from Apollo 17 completed 3 spacewalks while on the moon for a total duration of 22 hours 4 minutes. How many minutes did the astronauts walk in space?

Name _____

Date _____

Use RDW to solve Problems 1–2.

1. Jeffrey practiced his drums from 4:00 p.m. until 7:00 p.m. How many minutes did he practice? Use the number line to show your work.



2. Isla used her computer for 5 hours over the weekend. How many minutes did she spend on the computer?

3. Complete the following conversion tables and write the rule under each table.

a.

Hours	Minutes
1	
2	
5	
9	
12	

The rule for converting hours to minutes is

_____.

b.

Days	Hours
1	
3	
6	
8	
20	

The rule for converting days to hours is

_____.

4. Solve.

a. 10 hours 30 minutes = _____ minutes

b. 6 minutes 15 seconds = _____ seconds

c. 4 days 20 hours = _____ hours

d. 3 minutes 45 seconds = _____ seconds

e. 23 days 21 hours = _____ hours

f. 17 hours 5 minutes = _____ minutes

5. Explain how you solved Problem 4(f).

6. It took a space shuttle 8 minutes 36 seconds to launch and reach outer space. How many seconds did it take?

7. Apollo 16's mission lasted just over 1 week 4 days. How many hours are there in 1 week 4 days?