Unit 13
Time

Mastery Expert tip! "I found that this unit was a great opportunity to introduce several clocks into the classroom – a 12-hour and a 24-hour digital clock as well as the existing analogue clock on the wall. Seeing the time represented in these different ways throughout the school day helped children to build natural connections between them."

WHY THIS UNIT IS IMPORTANT

This unit will develop children's ability to convert between units of time. Children will apply their knowledge of existing facts (for example, the number of minutes in an hour) when expressing a period of time using a different unit of measurement. Children will also be introduced to the concept of the 24-hour clock, learning to state the time as both a 12- and 24-hour clock time. Children will solve problems using these new concepts and prior learning, including word problems.

WHERE THIS UNIT FITS

→ Unit 12: Money
→ **Unit 13: Time**
→ Unit 14: Statistics

This unit builds on the concepts of time learned in Year 3 Unit 11, particularly when telling time to the minute. Children will link their prior knowledge of facts to bar models that will help them convert between units.

Before they start this unit, it is expected that children:
- can read and write times to the nearest minute
- know the number of seconds in a minute, minutes in an hour and hours in a day
- understand how to express 12-hour times digitally, including using the terms am and pm.

ASSESSING MASTERY

Children who have mastered this unit will be able to convert between seconds and minutes, and between minutes and hours. They will also be able to convert between longer periods of time expressed in days, weeks, months and years. They will confidently use these different units of measurement in their description of times. They will be able to express times in both analogue and digital forms, including 24-hour clock times. Children will apply these elements to confidently solve mathematical problems.

COMMON MISCONCEPTIONS	STRENGTHENING UNDERSTANDING	GOING DEEPER
Children may consider only the numerical value of periods of time without understanding the significance of their units (for example: 1 week and 4 days equals 1 + 4 = 5 days).	Display calendars and year planners in the classroom. Ask questions relating a week on the calendar to the number of days or the year on the year planner to the number of months.	Challenge children to make up problems using the calendar and/or the year planner. Encourage them to use as many different units of time as they can.
Children may confuse the numbers on a digital time with those on an analogue clock face, thinking that 04:11 will have the hands pointing to the numbers 4 and 11.	Label five-minute intervals around a clock face to show the number of minutes in digital form (:00, :05, :10 and so on). Display three different types of clocks (analogue, 12-hour digital and 24-hour digital). Refer to the three clocks over the course of daily routines in order to build connections between these different ways of representing the time.	Challenge children to express times in different ways throughout the day. For example, only one of the three clocks could be shown and children asked to give the time as it would be shown on the other clocks.

WAYS OF WORKING

Use these pages to introduce the unit focus to children. Use the characters to discuss concepts and phrases that children have not heard before.

STRUCTURES AND REPRESENTATIONS

Analogue clock and digital clock: Pictures of clock faces (both analogue and digital) are used regularly to represent times. They are used to demonstrate times as well as forming the basis of problems to solve. Children will be encouraged to use these representations themselves, completing them to represent different times.

Bar model: This model will help children to represent the equivalence between different units of time. The upper bar can be split into one unit and the lower bar used to show the equivalent parts expressed in another unit. Children can then see the calculation that they need to do to convert one unit into another.

1 minute	1 minute	1 minute
60 seconds	60 seconds	60 seconds

KEY LANGUAGE

There is some key language that children will need to know as part of the learning in this unit.

→ seconds, minutes, hours
→ days, weeks, months, years
→ units of time
→ convert, equal to (=), compare
→ 12-hour, 24-hour, am, pm
→ analogue, digital
→ bar model

Unit 13
Time

In this unit we will …
⚡ Convert between units of time
⚡ Write times in different ways
⚡ Compare times by converting units
⚡ Solve problems about units of time
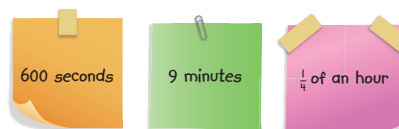
How many minutes are in one hour?

5 minutes

78

PUPIL TEXTBOOK 4C PAGE 78

Here are some maths words we will be using. Are any of these words new?

convert	compare	units of time
seconds	minutes	hours
days	weeks	months
years	12-hour	24-hour
analogue	digital	am/pm

Which time do you think is shortest? Why?

600 seconds

9 minutes

$\frac{1}{4}$ of an hour

79

PUPIL TEXTBOOK 4C PAGE 79

Units of time ❶

Learning focus

In this lesson, children will revise their understanding of the equivalences between different units of time. They will apply their knowledge to convert between units.

Small steps

→ Previous step: Problem solving – money
→ **This step: Units of time (1)**
→ Next step: Units of time (2)

NATIONAL CURRICULUM LINKS

Year 4 Measurement – Time

Convert between different units of measure [for example, kilometre to metre; hour to minute].

ASSESSING MASTERY

Children can express 1 hour in minutes and 1 minute in seconds. Children can confidently convert measurements given in these units and apply this skill in problem-solving contexts.

COMMON MISCONCEPTIONS

Children may add the numbers in measurements without considering the units or converting them. For example, they might write 1 minute 20 seconds as 1 + 20 = 21 seconds. Ask:
• *What is 2 minutes in seconds? What is 2 minutes and 10 seconds in seconds? What did you do to find the answer?*

STRENGTHENING UNDERSTANDING

To strengthen understanding, use stopwatches to time short activities (slightly more than 1 minute). Ask children to observe what happens when the timer goes beyond 59 seconds. With each time, ask children how they could write the time in seconds. Use bar models to support the equivalence of 1 minute = 60 seconds.

GOING DEEPER

Provide children with results tables that show Olympic race times in minutes and seconds (for example, the 800 metre running race) or in hours and minutes (the marathon). Challenge children to convert these into the lesser unit (for example, converting hours and minutes into simply minutes). They can use these new times to devise their own quiz questions to ask each other.

KEY LANGUAGE

In lesson: unit of time, convert, minute, second, hour

Other language to be used by the teacher: measure

STRUCTURES AND REPRESENTATIONS

bar model

RESOURCES

Optional: digital timers/stopwatches

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach ⏸

• Can children recall equivalences of different units of time confidently?
• How could you help them to remember these?

Discover

WAYS OF WORKING Pair work

ASK

- Question **1** a): *What is the difference between the two timers?*
- Question **1** a): *What will the next time shown on each timer be?*
- Question **1** a): *What fact do you know about minutes and seconds that you can use to help compare the times?*

IN FOCUS Ensure that children are given the opportunity to explain their answer to question **1** a). Encourage children to use reasoning to justify their understanding.

PRACTICAL TIPS Provide children with stopwatches to revise the concept of minutes and seconds, particularly observing how their stopwatches behave when 60 seconds is reached. Use timers to illustrate the concept of counting down.

ANSWERS

Question **1** a): 3 minutes 20 seconds = 200 seconds, so both timers show the same time until launch.

Question **1** b): In one minute's time, the controller's timer will show 2 minutes 20 seconds.
The astronaut's timer will show 140 seconds.

Units of time ❶

Discover

Our timer says 200 seconds to go until launch.

3 MINUTES 20 SECONDS UNTIL LAUNCH

❶ **a)** Do the two countdown timers show the same time until launch?

  b) What will both timers say in 1 minute's time?

80

PUPIL TEXTBOOK 4C PAGE 80

Share

WAYS OF WORKING Whole class teacher led

ASK

- Question **1** a): *Why do you think you need to convert times into the same unit to compare them?*
- Question **1** a): *How does the bar model represent the controller's and the astronaut's timers? What would you expect to see if the times are the same?*
- Question **1** a): *Dexter mentions using the 6 times-table to help multiply by 60. How can this help?*
- Question **1** b): *Is there a quicker way to find the answer? How can you use subtraction?*

IN FOCUS Ensure that children are able to explain how the bar models have been used to solve the problem, noting how 1 minute is visually shown to be equivalent to 60 seconds. Ask where the answer is shown on the bar model, and what calculation is needed to find the total.
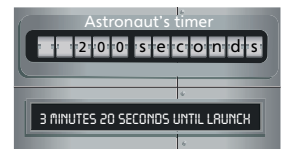
Share

a) The timers show the time in different ways.

Astronaut's timer
1:2:0:0 seconds

3 MINUTES 20 SECONDS UNTIL LAUNCH

To compare the times, convert them into the same **unit of time**.

1 minute = 60 seconds

I am going to draw a bar model to show 3 minutes and 20 seconds.

3 minutes 20 seconds

| 1 minute | 1 minute | 1 minute | 20 seconds |
| 60 seconds | 60 seconds | 60 seconds | 20 seconds |

3 × 60   20

200 seconds

I used the 6 times-table to help me multiply by 60.
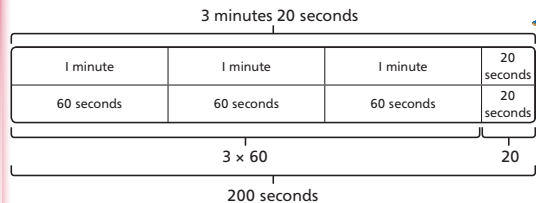
3 × 60 = 180 seconds

180 + 20 = 200 seconds

3 minutes 20 seconds = 200 seconds

Both timers show the same time until launch.

81

PUPIL TEXTBOOK 4C PAGE 81

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question **1**: *Explain the question using your own words. How does the bar model help you to answer the problem?*
- Question **1**: *What is the same and what is different about the bars in the bar model?*
- Question **2**: *How would you complete the bar model?*
- Question **2**: *How do you know how many 60 second bars are equal to 280 seconds? Is there a quick way to find this out?*
- Question **2**: *Why do you think this bar model has seconds on the top and minutes on the bottom?*

IN FOCUS In question **3**, children apply their knowledge of bar models to the new units of time. Ask them to describe what is the same and what is different about the question and about the bar model they could to draw to solve it. Ensure that children are able to explain *why* converting hours into minutes is similar to converting minutes into seconds as well as *how* (because there are 60 minutes in 1 hour as well as 60 seconds in 1 minute).

STRENGTHEN To emphasise the equivalence between 1 minute and 60 seconds, provide children with base 10 equipment and ask them to group them in sixes (with each group of 6 tens representing 1 minute). These can be used in both questions **1** and **2** to support children's understanding of the two units of time.

DEEPEN In question **2**, ask children how they would draw the bar model if the correct timer was the one on the left. Challenge children to solve this type of problem without drawing a bar model.

ASSESSMENT CHECKPOINT Use questions **1**, **2** and **3** to assess whether children can convert between minutes and seconds and between hours and minutes. Look for clear explanations of how they are using the bar models to represent their conversions.

ANSWERS

Question **1**: 2 minutes = 2 × 60 seconds = 120 seconds
120 seconds + 50 seconds = 170 seconds
The two timers do not show the same time.

Question **2**: 280 seconds is the same as 4 minutes + 40 seconds.
The timer on the left should show 4 minutes 40 seconds.

Question **3**: 5 hours and 10 minutes = 310 minutes
This is similar to converting minutes into seconds because there are the same number of minutes in 1 hour as there are seconds in 1 minute (60).

Unit 13: Time, Lesson 1

b) In I minute's time, both timers will show I minute less.

The controller's timer will show 2 minutes 20 seconds.

2 minutes 20 seconds

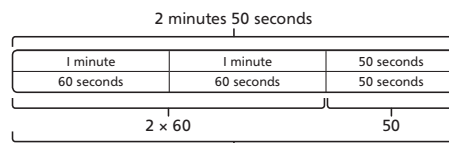| I minute	I minute	20 seconds
60 seconds	60 seconds	20 seconds

2 × 60 | 20
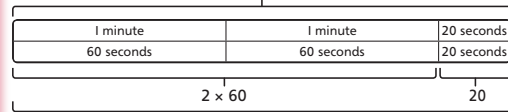
? seconds

2 × 60 = I20 seconds

I20 + 20 = I40 seconds

The astronaut's timer will show I40 seconds.

*I found the same answer by subtracting 60 from 200.*

Think together

2 MINUTES 50 SECONDS UNTIL LAUNCH

I I 60 seconds

1 Do these two timers show the same time?

2 minutes 50 seconds

I minute	I minute	50 seconds
60 seconds	60 seconds	50 seconds

2 × 60 | 50

☐ seconds

The two timers _____ show the same time.

82

PUPIL TEXTBOOK 4C PAGE 82

Unit 13: Time, Lesson 1

2 The countdown timer on the right is correct. The timer on the left is wrong.

What should the timer on the left show?

4 MINUTES 30 SECONDS   **I I 280 seconds**

280 seconds

60 seconds
I minute
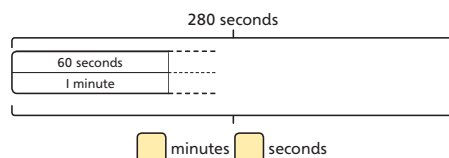
☐ minutes ☐ seconds

280 seconds is the same as ☐ minutes + ☐ seconds.

The timer on the left should show ☐ minutes ☐ seconds.

3 What is 5 hours and I0 minutes written in minutes?

CHALLENGE

Remember, there are 60 minutes in I hour.

5 hours and I0 minutes = ☐ minutes

How is this similar to converting minutes into seconds?

83

→ Practice book 4C p58

PUPIL TEXTBOOK 4C PAGE 83

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question **1** scaffolds children's understanding of the equivalence of hours and minutes through the use of bar modelling. These bar models become progressively less complete, requiring children to draw most of the final model themselves.

STRENGTHEN For children finding it difficult to convert one unit into the other, it may be beneficial to get them to make their own bar models out of pieces of coloured card. They could write 1 minute on the front of each piece and 60 seconds on the reverse (or 1 hour on the front and 60 minutes on the reverse). Having formed a bar model that matches their known information, they could turn all the cards over to find the answer.

DEEPEN In question **5**, children are given a problem where they are required to calculate the number of seconds in 1 hour. Give children similar problems, for example, to find the number of hours in a week. Ask them to explain whether they could find the number of hours in a month from the number of weeks in a month.

THINK DIFFERENTLY Question **3** asks children to use a different method to apply their knowledge of converting between minutes and hours. Encourage children to use subtraction to work out each film length in terms of hours and minutes. Challenge them to investigate the duration of their own favourite films as these are usually shown in minutes.

ASSESSMENT CHECKPOINT Use questions **1** and **3** to assess whether children can convert between units of time. Check whether they are confident using different methods; they should be able to apply both times-tables facts (6 times-tables to help identify multiples of 60) and subtraction methods (repeatedly subtracting 60).

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.

Reflect

WAYS OF WORKING Independent thinking

IN FOCUS Use this question to check children's methodology. Pay attention to the way that children approach the conversion. Some may look for the nearest multiple of 60 to find the number of hours, others may repeatedly subtract 60. Ask children to share their working and ask whether it matters which method they used. Ask how they would have converted if they had been given the number of hours and minutes and asked to give the time in minutes.

ASSESSMENT CHECKPOINT Check that children are able convert the given time accurately and explain their method.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.
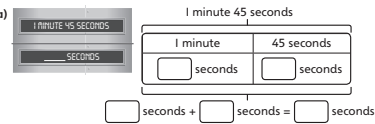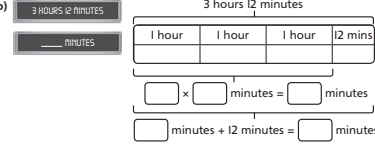
After the lesson ⏸

- Were children confident explaining their reasoning in this lesson?
- In the next lesson, children will continue to convert between units of time (days, weeks, months and years). Do they have the confidence to apply what they have learnt in this lesson to convert between different units of time?
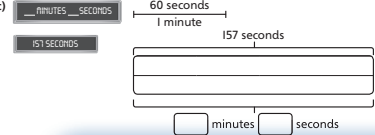
115

Units of time ❶

1 A space shuttle is counting down to take off.

These timers show the time left in different ways.

Complete each bar model to work out the missing time.

a) **1 MINUTE 45 SECONDS** / **___ SECONDS**

1 minute 45 seconds

| 1 minute | 45 seconds |
| [ ] seconds | [ ] seconds |

[ ] seconds + [ ] seconds = [ ] seconds

b) **3 HOURS 12 MINUTES** / **___ MINUTES**

3 hours 12 minutes

| 1 hour | 1 hour | 1 hour | 12 mins |

[ ] × [ ] minutes = [ ] minutes

[ ] minutes + 12 minutes = [ ] minutes

c) **___ MINUTES ___ SECONDS** / **157 SECONDS**

60 seconds / 1 minute

157 seconds

[ ]

[ ] minutes [ ] seconds

58

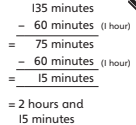**PUPIL PRACTICE BOOK 4C PAGE 58**

---

2 Show how you can use 6 times-table facts to help convert times.

1 × 6 = [ ]	1 × 60 = [ ]	1 hour = [ ] minutes
2 × 6 = [ ]	2 × 60 = [ ]	[ ] hours = [ ] minutes
3 × 6 = [ ]	3 × 60 = [ ]	[ ] hours = [ ] minutes
4 × 6 = [ ]	4 × 60 = [ ]	[ ] hours = [ ] minutes
10 × 6 = [ ]	10 × 60 = [ ]	[ ] hours = [ ] minutes

3 Use subtraction to find the length of each film in hours and minutes.

Film	Length (minutes)
Lift Off!	135
Escape from Saturn	95
Star Voyager	145

The first film has been done for you.

a) Lift Off!   **b)** Escape from Saturn   **c)** Star Voyager

```
    135 minutes
 −   60 minutes  (1 hour)
 =   75 minutes
 −   60 minutes  (1 hour)
 =   15 minutes
 = 2 hours and
   15 minutes
```

59

PUPIL PRACTICE BOOK 4C PAGE 59

---

4 The winner of the London Marathon finished in 2 hours and 5 minutes.

Ella's dad completed the race in 4 hours and 15 minutes.

How many minutes after the winner did Ella's dad finish the race?

Ella's dad finished the marathon [ ] minutes after the winner.

5 Tom's kitchen tap drips once every second.

He puts a bowl underneath it to catch the water.

How many drops will be in the bowl after 1 hour?

Show your working.

CHALLENGE

Reflect

Explain how to work out the number of hours and minutes in 152 minutes.

60

PUPIL PRACTICE BOOK 4C PAGE 60

Units of time **2**

Learning focus

In this lesson, children will revise their understanding of the equivalences between days, weeks, months and years, applying their knowledge to convert between units of time.

Small steps

→ Previous step: Units of time (1)
→ **This step: Units of time (2)**
→ Next step: Converting times (1)

NATIONAL CURRICULUM LINKS

Year 4 Measurement – Time

Convert between different units of measure [for example, kilometre to metre; hour to minute].

ASSESSING MASTERY

Children can express 1 week in days and 1 year in months. Children can confidently convert measurements given in these units and apply this skill in problem-solving contexts.

COMMON MISCONCEPTIONS

Children may add the numbers in measurements without considering the units or converting them. For example, 1 week 4 days might be written as 1 + 4 = 5 days. Ask:
• *What is 2 weeks in days? What is 2 weeks and 3 days in days? What did you do to find the answer?*

Children may think of the larger unit of measurement as being worth 10, so they may consider 4 years and 3 months as being equivalent to 43 months. Ask:
• *How many months are in 1 year? How many months are in 2 years? How many months are in 2 years and 1 month?*

STRENGTHENING UNDERSTANDING

Reinforce children's knowledge of multiples of 7 and 12 (useful when converting between days and weeks, and between months and years respectively). Display an unmarked number line split into 50. Choose one group of children to count along the line from 1 to 50. A second group should call out '1', '2' and so on for each group of 7 that is counted. Use the same method to practise identifying multiples of 12.

GOING DEEPER

Give children problems where they need to use their knowledge of months of the year to convert to days. For example, ask: *Kate has a book out of the library for the whole of January and February. How many days is this? How many weeks and days is this?*

KEY LANGUAGE

In lesson: unit of time, convert, day, week, month, year

Other language to be used by the teacher: measure

STRUCTURES AND REPRESENTATIONS

bar model

RESOURCES

Optional: pieces of string

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach ⏸

• How could you use concrete representations (clocks, calendars) to support children?
• Can children recall equivalences of different units of time confidently?

Discover

WAYS OF WORKING   Pair work

ASK

- Question ❶: *What sorts of things do we measure in weeks/ months/years?*
- Question ❶: *We use clocks and timers to measure hours, minutes and seconds. What do we use to measure days, weeks, months and years?*
- Question ❶: *What facts do you know about days, weeks, months and years that you can use to convert between these units?*

IN FOCUS   Discuss the different units of time that are
shown in the picture. Children sometimes do not see weeks, months and years as units of time like hours, minutes and seconds because they are not used in telling the time from a clock. Ensure that they understand that these are still units of time, but used for longer periods of time. Ask them how they might measure these units (for example, using dates on a computer screen, calendars, wall planners and so on).

PRACTICAL TIPS   One way to model additions between times
is to use a timeline. Give children a piece of string and ask them to use sticky labels to create a timeline that labels the information they know of the two dogs' ages. At the left-hand end should be 3 years and 8 months (Lexi's dog's age), then a jump of 1 year and 7 months, followed by 'Max's dog's age' at the other end of the timeline.

ANSWERS

Question ❶ a): The new play area will open in 28 days.

Question ❶ b): Max's dog is 5 years and 3 months old.

Share

WAYS OF WORKING   Whole class teacher led

ASK

- Question ❶ a): *What fact do you need to use to convert a period of weeks into days?*
- Question ❶ a): *Would you rather work out 4 × 7 or 7 + 7 + 7 + 7 to find the answer?*
- Question ❶ b): *Is this an addition or subtraction question?*
- Question ❶ b): *The bar model is used for part of the working out. How does it help you?*

IN FOCUS   Ensure that children can explain how the bar
models have been used to solve each problem. In question ❶ a) they should note how 1 week is visually equivalent to 7 days. Children should understand that bar models provide a useful way of modelling equivalences. In question ❶ b), check that children understand that the bar model is being used for *part* of the question (to split up 15 months into years and months), not the whole question.

PUPIL TEXTBOOK 4C PAGE 84

Units of time ❷

Discover

My dog is 3 years and 8 months old.

My dog is 1 year and 7 months older than your dog.

Lexi   Max

❶ a) In how many days will the new play area open?

b) How old is Max's dog?

84

PUPIL TEXTBOOK 4C PAGE 85

Share

a) The new play area will be open in 4 weeks. Convert this into days.

I am going to draw a bar model to work out the number of days in 4 weeks.

4 weeks			
1 week	1 week	1 week	1 week
7 days	7 days	7 days	7 days

28 days

1 week = 7 days

4 × 7 = 28 days

The new play area will open in 28 days.

b) Max's dog is 1 year 7 months older than 3 years 8 months.

I think I will add the number of whole years first. Then I will add the number of months.

3 years + 1 year = 4 years

8 months + 7 months = 15 months

15 months	
12 months	3 months

1 year   3 months

15 months is the same as 1 year and 3 months.

4 years + 1 year and 3 months = 5 years and 3 months

Max's dog is 5 years and 3 months old.

85

117

Think together

WAYS OF WORKING   Whole class teacher led (I do, We do, You do)

ASK

- Question **1** a): *How is this question similar to question **1** b) in Discover?*
- Question **1** a): *How does the bar model help you to answer the problem?*
- Question **1** a): *Why could the answer not just be '8 years 14 months'?*
- Question **2**: *How do you know how many 7-day bars are equal to 35 days? Is there a quick way to find this out?*
- Question **2**: *Why do you divide by 7 to find the answer, not any other number?*

IN FOCUS   In question **1** a), make sure that children understand why the bar model is used to convert 14 months into years and months. Ask them to explain why the bar model shows 14 months split into 12 months and 2 months, not 7 and 7 or 13 and 1, for example.

STRENGTHEN   In question **2**, encourage children to use strips of paper to build up various bar models, exploring the different numbers of days that are formed by blocks of 7 days (1 week). Ask how many weeks are the same as 7 days, 14 days, 21 days … Link this to times-tables facts and guide children towards a quicker way to find the answer – dividing 35 by 7.

DEEPEN   Deepen children's conceptual understanding of question **3** by challenging them to teach the correct way of converting years and months into months to someone who has never converted units of time before. Ask how they could help them to avoid making the kind of mistake Amelia made and what resources or pictures they could use.

ASSESSMENT CHECKPOINT   Use questions **1**, **2** and **3** to assess whether children can convert between months and years and between weeks and days, supporting their reasoning with pictorial representations (bar models). Look for children who use the bar model to recognise the different operations they can use when converting between units of time: division for smaller units into larger ones and multiplication for larger units into smaller ones.

ANSWERS

Question **1** a): Andy is 9 years and 2 months old.

Question **1** b): Mo is 10 years and 9 months old.

Question **2**: 35 ÷ 7 = 5
    5 weeks are the same as 35 days.

Question **3**: Amelia is wrong because she thinks that the number of years and months are the same as tens and ones. 4 years are worth 4 × 12, not 4 × 10. 4 years and 3 months = 51 months
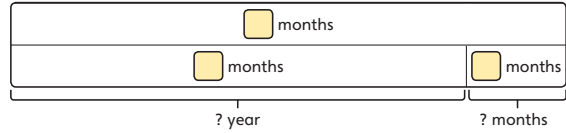

Think together

1

"I am 8 years and 10 months old." — Reena

"I am 4 months older than you." — Andy

a) How old is Andy?

8 years 10 months + 4 months = 8 years ☐ months

☐ months	
☐ months	☐ months

? year   ? months

☐ months is the same as ☐ year ☐ months.

8 years + ☐ year ☐ months = ☐ years ☐ months

Andy is ☐ years and ☐ months old.

b) Mo is 1 year and 11 months older than Reena.

How old is Mo?

Mo is ☐ years and ☐ months old.

86

PUPIL TEXTBOOK 4C PAGE 86

---

2 How many weeks are the same as 35 days?

35 days	
7 days	- - - - -

☐ × 7 days = ☐ weeks
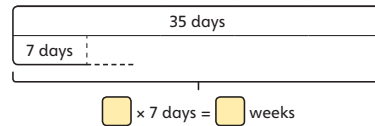
35 ÷ 7 = ☐

☐ weeks are the same as 35 days.

3 What is 4 years and 3 months converted into months?   **CHALLENGE**

"I think that 4 years and 3 months is the same as 43 months." — Amelia

"I will think about how many months are in a year."

Explain Amelia's mistake.

Work out the correct answer.

87

→ Practice book 4C p61

PUPIL TEXTBOOK 4C PAGE 87

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question **1** scaffolds children's understanding of the equivalence of days, weeks, months and years through the use of bar modelling. These bar models become progressively less complete, requiring children to draw most of the final model themselves.

STRENGTHEN In question **2**, children may need reminding that there are 365 days in a year.

If children are finding it difficult to calculate abstractly in question **4**, point out the part of the question that may need converting (in both cases, the second period of time). Then encourage them to use pictorial representations (bar models) to convert the units of time. Ask children to explain how they used their bar models to help work out the calculations.

DEEPEN In question **6**, ask children whether all years have 365 days. Discuss how their calculation needs to change to take account of leap years. Challenge children to devise their own investigations similar to question **6**, for example working out the number of weeks they have been attending school. This requires converting from the number of years and months, so prompting a discussion about how many weeks are in a year and a month and whether this is a precise number.

ASSESSMENT CHECKPOINT Use questions **1** and **2** to assess whether children are confident in converting between days and weeks, and between months and years. Look for children using pictorial representations (bar models) to support their reasoning. Use question **5** to check whether they are able to explain which operation to use when converting between different units.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.

Reflect

WAYS OF WORKING Independent thinking

IN FOCUS Explain to children that this sort of conversion is one that people need to do regularly in real life, as babies' ages are often given in months only, even after a year. Ask them to explain how they will use unit conversion to find the answer.

ASSESSMENT CHECKPOINT Children should explain clearly how to convert 20 months into 1 year and 8 months by finding the number of groups of 12 (1 year) in 20 months. This may involve using a pictorial representation, choosing to use subtraction or division.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.
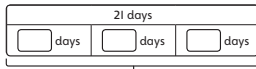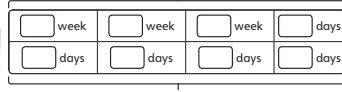
After the lesson ⏸

- Are children confident converting between days, weeks, months and years?
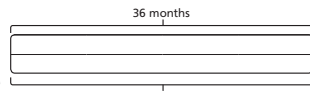- What opportunities can you give for children to continue to practise these skills in meaningful, real-life contexts?

PUPIL PRACTICE BOOK 4C PAGE 61

PUPIL PRACTICE BOOK 4C PAGE 62

PUPIL PRACTICE BOOK 4C PAGE 63

Converting times ①

Learning focus

In this lesson, children will convert between analogue and digital times.

Small steps

→ Previous step: Units of time (2)
→ **This step: Converting times (1)**
→ Next step: Converting times (2)

NATIONAL CURRICULUM LINKS

Year 4 Measurement – Time

Convert between different units of measure [for example, kilometre to metre; hour to minute].

ASSESSING MASTERY

Children can confidently convert between analogue and digital 12-hour times to the nearest minute. They apply this skill when problem solving.

COMMON MISCONCEPTIONS

Children may misunderstand the relationship between the numbers on a digital clock face and the numbers on an analogue clock face. For example, they may represent the digital time 6:10 as one hand pointing to the number 6 and the other hand pointing to the number 10. Similarly, children may represent the analogue time ten past 7 as 7:02 because these are the two numbers the hands are pointing to. Ask:

• *What do the numbers on each side of the colon in a digital time represent? How would you show this time on an analogue clock face?*

STRENGTHENING UNDERSTANDING

To help children build connections between analogue and digital times, consider times to the nearest five minutes. Provide children with large analogue clock faces and ask them to place number cards next to each number to show the digital equivalent minutes. For example, the number 1 on the clock face represents 5 past and so is represented by :05 in a digital time. Turn this into a quick-fire question and answer game where children point to the correct part of the clock for minutes given in a digital time (such as :45).

GOING DEEPER

Show children different 'minutes to' analogue times. Challenge them to write the time in three different ways. For example, three minutes to four might be written as '3:57', 'fifty-seven minutes past 3' or 'three minutes to 4'. This will further consolidate children's understanding of the links between digital and analogue times.

KEY LANGUAGE

In lesson: unit of time, convert, **analogue**, **digital**, **am**, **pm**, hour, minute, 12-hour

STRUCTURES AND REPRESENTATIONS

analogue clock, digital clock

RESOURCES

Optional: analogue clocks, digital clocks, number cards

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach ⏸

• How confident are children when reading analogue times to the nearest minute?
• What opportunities are there for you to refer to both analogue and digital times throughout the school day to embed the concepts learnt in this lesson?
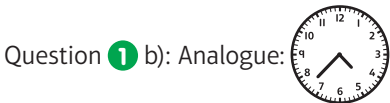
Discover

WAYS OF WORKING Pair work

ASK

- Question **1** a): *Look at the two types of clock face shown. What is the same? What is different?*
- Question **1** a): *How does Sofia know that her watch is wrong? Is it too fast or too slow?*
- Question **1** a): *What time does the park clock say it is?*
- Question **1** b): *How far will the minute hand move in an hour and a half? How far will the hour hand move?*

IN FOCUS When considering question **1** b), encourage children to discuss how both methods of showing the time will change over the course of an hour (for example, the minute hand on the analogue clock moving once around the clock face, or the hours digit on the digital watch increasing by 1). Extend the question to consider how the clocks will change over the course of one and a half hours.

PRACTICAL TIPS Provide children with practice clock faces with movable hands and with number cards for modelling digital watches. Call out different times and challenge them to set their clocks to the correct time as quickly as possible. Move from times to the nearest five minutes to times to the nearest minute.

ANSWERS

Question **1** a): The time on the watch should say 3:07 pm.

Question **1** b): Analogue:

Digital: 4:37 pm.

Converting times ①

Discover

I will meet you back here in an hour and a half.

Wait! My watch is wrong! Let me change it!

① **a)** What should the time on the watch say now?

b) What will the clock and the watch look like when the spies meet back at the bench?

88

PUPIL TEXTBOOK 4C PAGE 88

Share

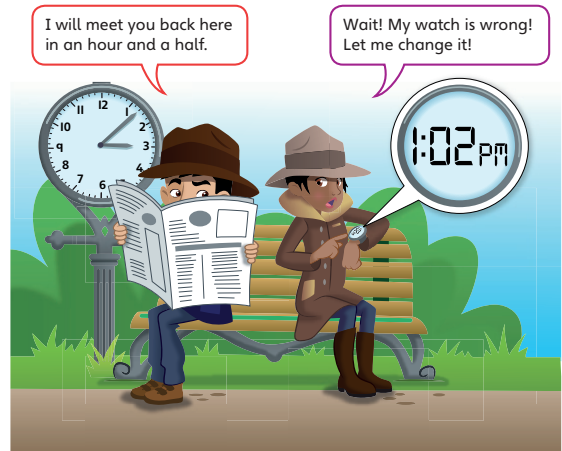**WAYS OF WORKING** Whole class teacher led

ASK

- Question **1** a): *What do the letters am and pm mean? The digital watch shows that it is a pm time – how else can you tell this fact?*
- Question **1** b): *What happens to both types of clock when the time crosses into a new hour?*
- Question **1** b): *How would you show the time 1:56 on an analogue clock? Or the time sixteen minutes to 4 on a digital watch?*
- Question **1** b): *If Sofia presses the SET button on her watch once for every minute it needs to change, how many times will she need to press it to alter it by one and a half hours?*

IN FOCUS When answering question **1** b), ensure that children recognise that the number of minutes past the hour increases by 30 as half an hour equals 30 minutes. Give examples that cross the hour boundary. For example: *What time will the spies need to meet if the time now is 3:50 pm?* In these cases, children will need to partition 30 and complete two additions – one to get to 4 o'clock (+ 10) and one to add the remainder of the 30 minutes (+ 20).

Share

a) **Analogue** and **digital** are two ways of showing times. You can convert from one to the other.
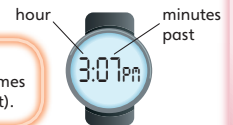
The park clock shows an analogue time.

It shows the time is seven minutes past 3.

The time on the watch should say 3:07 pm.

'**am**' times are before midday (starting from midnight); '**pm**' times are after midday (up to midnight).

b) An hour and a half is the same as 1 hour 30 minutes.

3:07 pm   4:07 pm   4:37 pm

+ 1 hour   + 30 minutes

Because 1 hour is 60 minutes, I know that half an hour is 30 minutes.

When the spies meet back at the bench, the clock and the watch will look like this:

analogue   digital

89

PUPIL TEXTBOOK 4C PAGE 89

Think together

Whole class teacher led (I do, We do, You do)

ASK

- Question **1**: *How could you say twenty to 9 in a different way? Why is this important?*
- Question **1**: *Why doesn't the digital version of twenty to 9 have the number 20 or 9 in it?*
- Question **2**: *There are two ways to say the time on the first clock. What are they? Which one is the most helpful when finding the correct digital clock that goes with it?*
- Question **2**: *Do the am or pm letters make a difference to how you answer the question?*

IN FOCUS The times in question **2** test children's understanding of the two numbers in a digital time. For example, the analogue clock showing twenty-one minutes past 5 might be matched incorrectly to the digital time 4:05 am because children believe that the numbers on the clock face towards which the hands are pointing should be the same as the ones in the digital time.

STRENGTHEN In questions **1** and **2**, provide children with digit cards and analogue clock faces with movable hands. These will enable children to physically model the times as both analogue and digital.

DEEPEN Question **3** requires children to convert a digital time to analogue and use reasoning to explain incorrect answers that are based on common misconceptions. The key error here is that children may not be able to recognise the meaning of each number either side of the colon in a digital time. Challenge children to think of other common misconceptions. They could make up similar problems to question **3**, with one correct match and two mismatches, and swap with a partner to explain the mistakes.

ASSESSMENT CHECKPOINT Use question **2** to assess whether children can convert digital times to analogue and vice versa. They should be able to express digital times in different ways, particularly being able to describe times that are both minutes past and minutes to the hour (for example, 4:50 as 'fifty minutes past 4' and 'ten to 5').

ANSWERS

Question **1**: Twenty to 9 is the same as forty minutes past 8.
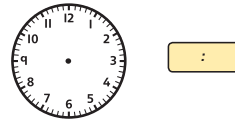
analogue   digital

8:40 am

Question **2**: a) 7:51 pm, b) 5:21 pm, c) 8:10 am, d) 4:05 am

Question **3**: Alex's clock face matches the digital time. Jamilla thinks 6:10 am means six minutes past 10 and has drawn this time instead. Bella has mixed up the minute and the hour hands.
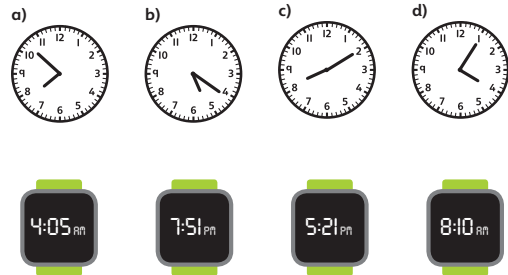

PUPIL TEXTBOOK 4C PAGE 90

PUPIL TEXTBOOK 4C PAGE 91

Practice

WAYS OF WORKING Independent thinking

IN FOCUS In question **2**, the analogue clock shows two minutes to 11 and so the first misconception is that the numbers being pointed to on the clock face are the same as the numbers in a digital time. The second mistake is that, as the hour hand looks closest to the 11, the time is 11:58. Ask children how they would help Emma and Max so that they do not make the same mistakes again.

STRENGTHEN To support children as they attempt to convert each written time in question **3** into analogue and digital, suggest that they underline the important words in the message. Provide analogue clock faces for them to model each time before copying onto the blank clock face provided. If necessary, ask questions to guide them to the relevant information on the clock face needed to make each part of the digital time.

DEEPEN Use question **5** to deepen children's understanding and reasoning skills. Ask children whether there are any incorrect digital times that they can make using the given digits. These may be those that are formatted incorrectly (63:5) or those that refer to impossible times (3:65). Give children different sets of number cards to make possible times, including sets of four cards where two are 0, 1 or 2.

THINK DIFFERENTLY In question **4**, children revise what the digits in a digital time represent by considering a time where the same number has different meanings in the analogue and digital representations. Ask children whether they can think of any other examples where one of the hands on a clock face points to a digit in the digital time, but they both represent different things.

ASSESSMENT CHECKPOINT Use questions **1** and **3** to assess whether children can convert between analogue and 12-hour digital times. They should recognise what both sets of digits either side of the colon in a digital time represent and be able to express 'minutes to' digital times in different ways (for example, 6:42 as 'eighteen minutes to 7').

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.

Reflect

WAYS OF WORKING Independent thinking

IN FOCUS Children need to explain what the numbers in a digital time represent. Children should be able to describe how to look for the hour of the clock that the time is (which will give the first number in the digital time) and then the number of minutes *past* the hour (which will give the second number). Ask them to give an example.

ASSESSMENT CHECKPOINT Look for children who are able to describe accurately how to convert an analogue time into a digital time.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.

After the lesson ⏸

- In the next lesson children will convert between 24-hour digital times and analogue times. Do children have the confidence to apply what they have learnt in this lesson in a new context?

PUPIL PRACTICE BOOK 4C PAGE 64

PUPIL PRACTICE BOOK 4C PAGE 65

PUPIL PRACTICE BOOK 4C PAGE 66

Converting times **2**

Learning focus

In this lesson, children will convert between 12-hour and 24-hour times expressed on analogue and digital clocks.

Small steps

→ Previous step: Converting times (1)
→ **This step: Converting times (2)**
→ Next step: Problem solving – units of time

NATIONAL CURRICULUM LINKS

Year 4 Measurement – Time

Convert between different units of measure [for example, kilometre to metre; hour to minute].

ASSESSING MASTERY

Children can confidently convert between analogue and digital 24-hour times to the nearest minute. They apply this skill when problem solving.

COMMON MISCONCEPTIONS

Children may think, because 17:00 can be said as 17 hundred hours, there are 100 minutes in an hour. Ask:
• *How many hours go by between 13:00 and 14:00? How many minutes is this?*

Children may interchange minutes and hours from digital times. For example, they may read 16:05 as sixteen minutes past 5 – this error is often because analogue times are said in this order (minutes past hour). Ask:
• *If a clock shows 13:07, what time is it? Can you make this time on an analogue clock?*

STRENGTHENING UNDERSTANDING

To support children's understanding of 24-hour clock times in different contexts, present times in different ways (clock on computer, times in different parts of the world, times shown on timetables). Discuss the way that these 24-hour times are formatted. Choose individual times and ask children to say these times and to represent them on an analogue clock.

GOING DEEPER

Explore possible misconceptions and encourage children to consider the advice they would give to someone making that particular error. For example, show children an analogue clock displaying twenty-five past 3. Explain that this is an afternoon time. Ask children to think what wrong answers someone might give if asked to write this time as a 24-hour digital time and how they would correct the mistakes.

KEY LANGUAGE

In lesson: convert, analogue, digital, 12-hour time, **24-hour time**, hour, minute, am, pm

STRUCTURES AND REPRESENTATIONS

analogue clock, digital clock

RESOURCES

Optional: analogue clocks, digital clocks, number cards, examples of 24-hour clock times from everyday life (computer clock, timetables etc.)

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach ⏸

• Are children confident when relating 12-hour digital times to analogue times?
• Can children recall what is meant by a 24-hour time and why they are used?

Discover

WAYS OF WORKING Pair work

ASK

- Question **1** a): *Compare these digital times with the ones in the last lesson. What is the same? What is different?*
- Question **1** a): *How can a digital time show more than 12 hours when there are only 12 hours on a clock face?*
- Question **1** b): *How could you say each time a different way?*

IN FOCUS Ensure that the picture provides an opportunity for children to revise the characteristics of 24-hour times and to explore the differences between 24-hour digital times and the 12-hour digital times they used in the previous lesson. Check that children understand what is meant by a '24-hour time'.

PRACTICAL TIPS Provide digital clocks (or use online digital clocks) for children to practise exploring 24-hour clock times. Ask children to make the different times in the picture. As they move from one time to the other, children should notice how the 24-hour clock behaves (for example, the hours go to 00 when moving on from 23).

ANSWERS

Question **1** a): The first two digits show the hour (from 00 up to 23). The last two digits show the number of minutes past (from 00 up to 59).

Question **1** b): The correct watch shows 15:52.

Converting times ❷

Discover

Richard

Luis

All of these digital times have four digits.

Some of the times look unusual.

1 a) Why do the watches show four digits?
   b) The clock is correct. Which watch shows the right time?

92

PUPIL TEXTBOOK 4C PAGE 92

Share

WAYS OF WORKING Whole class teacher led

ASK

- Question **1** a): *Look at the table. What do you notice about the way that the digital times are written?*
- Question **1** a): *How would you write each time as a 12-hour time?*
- Question **1** b): *What advice would you give someone looking at an analogue clock to convert it into a 24-hour digital time?*
- Question **1** b): *What would each digital time look like on a clock face? Which one is the same as the clock in the picture?*

IN FOCUS Use both analogue and digital clocks (or number cards) for children to model both sets of times. The physical acts of moving the hands of the clock and altering the digits in a digital time will ensure that children build connections between the two formats. It is particularly important to spend time considering times after 12 pm (where the hour digits will be more than 12) and where the number of minutes are after half past (where the digital time uses the number of minutes *past* even though the time would normally be read as a number of minutes *to*).

Share

a) All the digital watches show **24-hour times**.

24-hour digital times are always written using four digits.

The first two digits show the hour (from 00 up to 23).

The last two digits show the number of minutes past (from 00 up to 59).

hours	:	minutes past
06	:	30
09	:	17
13	:	45
15	:	52
19	:	00

24-hour times do not include 'am' or 'pm'. We know by looking at the numbers. Times from 00:00 to 11:59 are am times. Times from 12:00 to 23:59 are pm times.
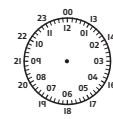
b) The time on the clock is eight minutes to 4. This is the same as fifty-two minutes past 3.

The shop is open, so this is a pm time.

I can convert a 12-hour pm time into a 24-hour time by adding 12 to the number of hours.

3 + 12 = 15

3:52 pm = 15:52

The correct watch looks like this: 15:52

93

PUPIL TEXTBOOK 4C PAGE 93

Think together

Whole class teacher led (I do, We do, You do)

ASK

- Question **1**: *What do you need to find out from an analogue time to convert it into a digital time?*
- Question **1**: *Explain how to convert a 12-hour am or pm time into a 24-hour digital time.*
- Question **2**: *Why do you think this question gets you to focus on the number of minutes past the hour, rather than the number of minutes to?*

IN FOCUS In question **2**, ask children what they notice about the answer boxes given for the 24-hour time. Children should identify that there is no space for am/pm and also that there are spaces for four digits (both of which are features of 24-hour times). Ask how their answer would differ if this time was in the afternoon.

STRENGTHEN Provide analogue clocks with movable hands and number cards for children to model their answers. Emphasise the 'minutes to' elements of a clock face and also how 'to' times can also be said as 'minutes past' times. If helpful, use flash cards to reinforce children's understanding of these two ways of expressing times (for example, showing 'twenty to 5' and expecting children to respond with 'forty minutes past 4').

DEEPEN After children have identified the mistake in question **4**, ask them to give further mistakes that could be made when converting between different formats of times in real life. Ask: *What mistakes might you make if you were looking at the time on your 24-hour digital watch and wanting to adjust the time on your analogue clock in the kitchen to match it? What if you wanted to set your digital watch by looking at the analogue clock in your classroom?*

ASSESSMENT CHECKPOINT Use questions **1** and **2** to assess whether children can convert between analogue and 24-hour digital times.

ANSWERS

Question **1** a): The clock shows twelve minutes past 8.
As a 12-hour time, this is written as 8:12 am.
As a 24-hour time, this is written as 08:12.

Question **1** b): The clock shows thirteen minutes to 12.
As a 12-hour time, this is written as 11:47 pm.
As a 24-hour time, this is written as 23:47.

Question **2**: Quarter to 5 is the same as forty-five minutes past 4.
Analogue: [clock] 24-hour digital: 04:45

Question **3** a): Mo's watch would show 06:35.

Question **3** b): Mo's watch would show 18:35.

Question **4**: Isla has treated it as a pm time. It is the morning, so she does not need to add 12 to the number of hours. To convert 7:28 am into a 24-hour time, Isla needs to write a 0 at the start of the time so it has four digits and to remove the letters 'am' as these are not needed. The 24-hour time is 07:28.

Think together

1 What will these times look like as 24-hour times?

a) The clock shows ☐ minutes past ☐ .
As a 12-hour time, this is written as ☐ : ☐ am.
As a 24-hour time, this is written as ☐ : ☐ .

in the morning

b) The clock shows ☐ minutes to ☐ .
As a 12-hour time, this is written as ☐ : ☐ pm.
☐ + 12 = ☐
As a 24-hour time, this is written as ☐ : ☐ .

at night

2 Quarter to 5 is the same as ☐ minutes past ☐ .
How would you complete the analogue and 24-hour digital clock if this time was in the morning?

☐ : ☐

94

PUPIL TEXTBOOK 4C PAGE 94

---
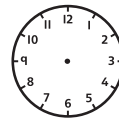
3 Mo is altering his digital watch to show 24-hour times.
It is twenty-five to 7.
a) What would Mo's watch now show if this was an am time?
b) What would it show if it was a pm time?

4 I know how to convert this to a 24-hour time! I add 12 to the number of hours to get 19:28.

7:28am

Isla

Explain Isla's mistake.
How would you convert 7:28 am into a 24-hour time?

I know how many digits a 24-hour time has.

CHALLENGE

→ Practice book 4C p67

95

PUPIL TEXTBOOK 4C PAGE 95

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question **1** challenges children to convert a variety of times – expressed in both words and as 12-hour digital times – into both analogue and 24-hour digital formats. Ask children how each time shows what part of the day it is describing. Ask them to explain why this is important when writing the time on an analogue or 24-hour digital clock.

STRENGTHEN As question **4** is more abstract in nature, ask children what they might do to help visualise the current time and then the time $1\frac{1}{2}$ hours later. Ask them what they could use to count on one and a half hours from 2:17. Provide access to analogue and digital clocks for children to model the question.

DEEPEN Use the open-ended task in question **5** to deepen children's understanding of converting between 24-hour and 12-hour times. Ask questions about the times they make: whether it is before or after midday, and how this affects how they will work out the 12-hour time. Challenge children to come up with examples of times that are not correct and then explain why not (for example, 24:11 because 24-hour clock times go to 00 after 23, or 4:40 because all 24-hour times need four digits).

ASSESSMENT CHECKPOINT Use questions **1** and **2** to assess whether children can convert between analogue and 24-hour digital times as well as between 12-hour and 24-hour digital times. They should be able to use their understanding of the digital format to identify what each set of numbers means, applying this knowledge when moving between analogue and digital times. Children should be confident when representing am and pm times using 24-hour notation.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.

Reflect

WAYS OF WORKING Independent thinking

IN FOCUS Give children the opportunity to consider the different representations of time they have worked with. Ask them to describe the features of 12-hour times and 24-hour times, and how they would convert between them. Children may find it useful to refer back to previous pages in the Textbook to help explain their ideas.

ASSESSMENT CHECKPOINT Look for children who are able to explain that they need to identify whether the 12-hour time is an am or pm time and how to convert each of these into 24-hour times. Children's reasoning should make mention of the concepts they have covered so far, for example the 24-hour clock times always contain four digits.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.

After the lesson ⏸

- Have children made connections between the past two lessons when converting using digital times?
- How will you reinforce these connections during the next lesson when problem solving?

Converting times 2

1 What would each time look like on an analogue and 24-hour digital clock?

a) 1:05 am

b) seven o'clock in the evening

c) 11:41 pm

d) 8:28 am

e) two minutes past midnight

PUPIL PRACTICE BOOK 4C PAGE 67

2 Convert these 24-hour digital times into analogue times.

a) 00:00 b) 13:42 c) 20:16 d) 09:51

3 These 24-hour times have all been written incorrectly.

Write each time correctly. Explain the mistakes.

a) 3:42 [:]

b) 15:42 pm [:]

4 Max is going shopping. His watch shows 24-hour times.

His mum says, 'It is now 2:17 pm. I will meet you outside the sports shop in an hour and a half.'

What time will Max's watch show when he has to meet his mum?

Max's watch will show [:].

PUPIL PRACTICE BOOK 4C PAGE 68

5 Write down ten 24-hour times where the four digits add up to 8 each time. **CHALLENGE**

Convert your times into 12-hour times.

For example, 05:21 → 5:21 am

	24-hour time	12-hour time		24-hour time	12-hour time
1			6		
2			7		
3			8		
4			9		
5			10		

Reflect

Explain how to change between 12-hour and 24-hour clock times.

PUPIL PRACTICE BOOK 4C PAGE 69

Problem solving – units of time

Learning focus

In this lesson, children will apply their knowledge of units of time to problem-solving contexts. They will use mathematical reasoning, choosing when and how to convert between units of time or between analogue and digital times in order to solve problems.

Small steps

→ Previous step: Converting times (2)
→ **This step: Problem solving – units of time**
→ Next step: Charts and tables (1)

NATIONAL CURRICULUM LINKS

Year 4 Measurement – Time

Convert between different units of measure [for example, kilometre to metre; hour to minute].

ASSESSING MASTERY

Children can solve time-based problems confidently, where they are required to convert between units of time and/or between times shown on analogue and digital clocks.

COMMON MISCONCEPTIONS

Children may think that 24-hour times in a problem are not correct because there are only 12 numbers on a clock face. Ask:
• *Why might the time 16:10 look unusual to some people? Is it written correctly? What does it mean?*

Children may think that – because two pieces of information in a problem are given using different units of time – they are unconnected. Ask:
• *Can you highlight the units of time mentioned in this problem? How can you make them easier to compare?*

STRENGTHENING UNDERSTANDING

To strengthen understanding, ensure that children use the structures and representations that they have been using throughout the unit. Suggest that they underline the parts of the problem that are most important. Ask whether they can say the problem in a different way. Provide blank bar models and analogue/digital clocks to help children model each problem.

GOING DEEPER

Provide children with data that shows the number of hours/days/weeks/months that it has taken various explorers to complete their journeys. Challenge children to devise their own problems based on these. The simplest form of question may be a straightforward conversion from one unit into another. Encourage children, however, to come up with more complicated multi-step questions including information of their own.

KEY LANGUAGE

In lesson: convert, seconds, minutes, hours, days, weeks, months, years, analogue, digital, 12-hour, 24-hour, compare

Other language to be used by the teacher: unit of time, measure, slower, quicker

STRUCTURES AND REPRESENTATIONS

bar model, analogue clock, digital clock

RESOURCES

Optional: calendars/year planners, flash cards, analogue clocks, digital clocks, number cards

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach ⏸

• Are children confident converting between units of time?
• Are children confident problem solving and reasoning?

Discover

WAYS OF WORKING Pair work

ASK

- Question ❶: *Why is it important for the explorers to be able to convert times accurately? Can you think of another example when it might be important?*
- Question ❶: *What different units of time can you see in the picture?*
- Question ❶: *What facts do you know about these units of time? How many days are in 1 week? How many days/weeks are in 1 month? (How does it depend on the month?) How many days/weeks/months are in 1 year?*

IN FOCUS Explore the different units of time mentioned in the picture. Ask children to list them and then revise the equivalence of each unit. Use the opportunity to discuss the different lengths of months and how this affects the answer. Encourage children to suggest when different units of time might be important when going on an expedition. Can they think of one example for each unit of time?

PRACTICAL TIPS Provide pairs with calendars/year planners and encourage them to role-play the parts of the explorers. For example, they can use the calendars to mark the current date and then when they might expect to run out of woolly socks! It does not matter which month they use as the questions do not specify this information. Using calendars in this way should help children visualise the equivalence between 7 days and 1 week (or 1 row down on the calendar) and between 12 months and 1 year (or 1 whole calendar!).

ANSWERS

Question ❶ a): The explorers have been training for $2\frac{1}{2}$ years.

Question ❶ b): Toshi does have enough socks to make it to the North Pole, because three weeks (or 21 days) of socks is greater than the 20 days left of travelling.

Share

WAYS OF WORKING Whole class teacher led

ASK

- Question ❶: *Describe what each question is asking you to do in as few words as possible.*
- Question ❶: *It is easier to compare two periods of time if they are converted so that they are the same unit. Does it matter which unit you choose to convert?*
- Question ❶ b): *Dexter and Flo give two different methods. Explain how they reach the same answer.*

IN FOCUS Both questions employ bar models in order to represent the problem visually. Ask children to explain how the bar models have been used to help solve the problem. Ask them whether they could work out the answer without using a bar model.

Problem solving – units of time

Discover

We have been training for this expedition for 30 months. We are so close!

I have only enough woolly socks to last me another three weeks!

Jen

Toshi

NORTH POLE 20 days' walk away

❶ a) How many years have the explorers been training for this expedition?

b) Does Toshi have enough socks to make it to the North Pole?

96

PUPIL TEXTBOOK 4C PAGE 96

Share

I am going to use a bar model to help convert 30 months into years.

a) The explorers have been training for 30 months.

30 months		
12 months	12 months	6 months

1 year   1 year $\frac{1}{2}$ year
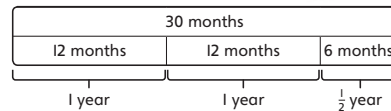
12 months = 1 year

6 months = $\frac{1}{2}$ a year

30 months = 12 months + 12 months + 6 months

The explorers have been training for $2\frac{1}{2}$ years.

b) I converted the weeks into days to help compare them.

3 weeks

1 week	1 week	1 week
7 days	7 days	7 days
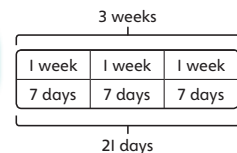
21 days

$3 \times 7 = 21$

Toshi has enough socks for 21 days.

It takes 20 days to get to the North Pole. 21 days > 20 days.

Toshi does have enough socks to make it to the North Pole!

I found the same answer by converting the days into weeks instead. 3 weeks > 2 weeks 6 days.

97

PUPIL TEXTBOOK 4C PAGE 97

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question **1**: *Why is the bar model useful?*
- Question **1**: *Is the quicker time the one with the larger or smaller number of seconds?*
- Question **1**: *Flo mentions a different way to convert the times. What do you think it is?*
- Question **2**: *What is the difference between the two methods of finding the answer?*
- Question **2**: *Is the tin that needs to be used first the one with the longer or shorter 'Use by' date?*

IN FOCUS Question **2** takes children through two methods of finding the answer (by converting either the tin A or tin B label so that the chosen label is expressed in the same units of measurement as the other). Show children the problem initially without revealing the structured responses and ask how they would work out the answer. This may reveal themselves in children's initial responses and can then be used for discussion.

STRENGTHEN To strengthen children's understanding of the connections between units of time, use flash cards with equivalent times on each side (for example, 1 minute on the front and 60 seconds on the back). Children could then use these flash cards to form their own bar models.

DEEPEN The problems in this section all allude to two ways of finding the answer (i.e. converting either of the two times so that it is the same as the other and can then be compared more easily). Ask whether it matters which unit they decide to convert. Some children may find it easier to go from large units to small units as the operation used is multiplication rather than division. Give children several pairs of times to investigate.

ASSESSMENT CHECKPOINT Use questions **1**, **2** and **3** to assess whether children are confident in solving problems that involve conversion and comparison. Ensure children are able to explain clearly why and how they are using bar models to help solve each problem.

ANSWERS

Question **1**: $(3 \times 60) + 14 = 180 + 14 = 194$ seconds
194 seconds < 203 seconds
3 minutes 14 seconds is a quicker time than 203 seconds.
Jen is quicker than Toshi.

Question **2** a): Tin A = Use by 4 weeks 2 days
Tin B = Use by 4 weeks
Tin B needs to be used first.

Question **2** b): Tin A = Use by 30 days, B = Use by 28 days
Tin B needs to be used first.

Question **3**: Answers will vary but should involve converting one of the given measurements so that the unit of time is the same.

Question **3** a): 3 hours and 45 minutes is 225 minutes, so it is longer than 200 minutes.

Question **3** b): $4\frac{1}{2}$ years is 54 months, so it is longer than 50 months.

Think together

1 Who is quicker at putting their socks on in the cold?

It takes me 3 minutes and 14 seconds to put my socks on in the cold. — Jen

It takes me 203 seconds. — Toshi

3 minutes 14 seconds

1 minute	1 minute	1 minute	14 seconds
☐ seconds	☐ seconds	☐ seconds	14 seconds

☐ seconds

3 minutes 14 seconds
= $(3 \times 60) + 14$
= ☐ + 14
= ☐ seconds

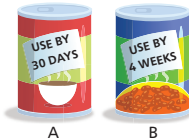Use >, < or = to compare the times.

☐ seconds ◯ 203 seconds

I can think of a different way to convert these times to find the answer!

_____ is quicker than _____ .

98

PUPIL TEXTBOOK 4C PAGE 98

---

2 Which tin of food needs to be used first?
Find the answer in two ways.

USE BY 30 DAYS — A
USE BY 4 WEEKS — B

a) Convert tin A into weeks and compare the weeks.

Tin A
30 days

7 days	7 days	7 days	7 days	2 days
☐ week	☐ week	☐ week	☐ week	2 days

☐ weeks ☐ days

Tin ____ needs to be used first.

b) Convert tin B into days and compare the days.
Tin ____ needs to be used first.

3 How could you compare:
a) 3 hours and 45 minutes to 200 minutes?
b) $4\frac{1}{2}$ years to 50 months?
What operations did you use in each part?

CHALLENGE

To compare measurements, convert one of the measurements so that the units are the same in both.

→ Practice book 4C p70

99

PUPIL TEXTBOOK 4C PAGE 99

Practice

WAYS OF WORKING Independent thinking

IN FOCUS In question **1**, children explore the relationship between weeks and days in the context of a mountain climb. The climb consists of four stages, the times for which are given in tabular form. Spend time asking children questions about the data in the table – time taken to complete a stage, time taken to complete two or three consecutive stages, etc. – so that they become familiar with what is being represented.

STRENGTHEN With children who need further support for question **2**, begin by asking them to look at the third column of the table – what unit of time does it ask for the answer to be given in? Children should then work backwards and look at the second column. If children are unsure how to convert between seconds, minutes and hours, encourage them to look back at the bar models they used in the **Textbook**.

DEEPEN Ask children to make up similar questions to question **5**. They could use the times of the school buses to ask questions about when they need to collect from different places for children to get to school in time for lessons. Encourage them to solve problems using both 12-hour and 24-hour times.

THINK DIFFERENTLY In question **4**, children are presented with four ages of babies. The ages are given for the first two babies (using different units of time) and related clues are given for the remaining two. Children are expected to both convert one of the first two babies' ages and then solve the clues so that each age is now given in the same unit of time.

ASSESSMENT CHECKPOINT Use questions **1**, **2** and **3** to assess whether children are confident when approaching and solving time-based problems where they are required to convert between units of time and/or between times shown on analogue and digital clocks. They should display reasoning skills, explaining appropriate methods and thinking with confidence.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.

Reflect

WAYS OF WORKING Pair work

IN FOCUS This activity provides an opportunity to check children's methodology. They should begin by thinking individually and deciding on a method they would use. Then they should explain this method to their partner. In their explanation, children should include the equivalence of 1 year and 12 months and describe how they would use this information to help. Ask children whether they used the same method as their partner, and whether their answers were the same.

ASSESSMENT CHECKPOINT Look for children who describe clearly and accurately how to convert 108 months into years.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.

After the lesson ⏸

- How did children respond mathematically to the problems and how did the mathematical processes flow and develop during the lesson?
- Do you feel that children are ready to move on?

Problem solving – units of time

1 Two teams of explorers raced each other to be the first to climb to the top of a mountain.

They completed four different stages until they reached the top.

This is a record of their climbs.

Team	Stage 1	Stage 2	Stage 3	Stage 4
Team A	1 week 2 days	2 weeks	1 week 4 days	2 weeks 1 day
Team B	10 days	13 days	11 days	17 days

a) Who completed Stage 1 first?

Team _____ was the first to complete Stage 1. It took [ ] days.

b) How long did it take Team B to complete Stages 1 and 2 altogether?

It took [ ] weeks and [ ] days altogether for Team B to complete Stages 1 and 2.

c) Which team reached the summit first? By how many days? Show your working.

Team _____ reached the summit [ ] days before Team _____ .

70

PUPIL PRACTICE BOOK 4C PAGE 70

---

2 The table shows some athletics world records. Convert the times into a different unit of measurement.

Event	World record	Convert to	
Men's 800 m	100 seconds	[ ] minutes	[ ] seconds
Women's 1,500 m	230 seconds	[ ] minutes	[ ] seconds
Men's 3,000 m	440 seconds	[ ] minutes	[ ] seconds
Women's 20 km walk	75 minutes	[ ] hours	[ ] minutes
Men's 50 km walk	212 minutes	[ ] hours	[ ] minutes

Use this space to show your working.

3 The classroom clock is analogue. Zac's digital watch shows 24-hour times.

It is twenty to 3 in the afternoon. What do the clock and the watch look like?

[:]

71

PUPIL PRACTICE BOOK 4C PAGE 71

---

4 Here is information about the ages of four babies.

Abdul	Ben	Cerys	Dan
24 months	1 year 10 months	3 months older than Ben	4 months younger than Cerys

Write the babies' names in order from youngest to oldest.

5 A bus takes 95 minutes to travel from the bus station to the retail park. It arrives at the retail park at 14:02. What time did it leave the bus station? **CHALLENGE**

The bus left the bus station at [:].

Reflect

Write how you would convert 108 months into years. Explain it to a partner.

72

PUPIL PRACTICE BOOK 4C PAGE 72

End of unit check

Don't forget the *Power Maths* unit assessment grid on p26.

End of unit check

1 It takes Alex 180 seconds to run around the school field.
What is another way of writing this time?
- **A** 30 minutes
- **B** 7,200 minutes
- **C** 3 seconds
- **D** 3 minutes

2 How could you find out the number of days in 21 weeks?
- **A** Multiply 21 by 7.
- **B** Divide 21 by 7.
- **C** Change the units to days.
- **D** Subtract 7 from 21.

FILM RELEASE IN 21 WEEKS!

3 Which time is not the same as the others?

A 3:52 PM   **B**   **C** 04:52   **D** 8 minutes to 4

100

PUPIL TEXTBOOK 4C PAGE 100

WAYS OF WORKING   Group work adult led

IN FOCUS

- Questions **1** and **2** assess children's ability to convert measurements of time: seconds into minutes and weeks into days.
- Questions **3** and **4** assess children's ability to convert and compare times represented in different ways (including analogue clocks and 12-hour and 24-hour digital clocks).
- Question **5** assesses children's ability to convert between units of time in a problem-solving context.
- Question **6** is a SATs-style question where conversion between units of time (minutes and seconds) is necessary to solve the problem.

ANSWERS AND COMMENTARY

Children who have mastered the concepts in this unit will be able to convert between seconds, minutes and hours, and between days, weeks, months and years. They will confidently use these units of measurement in their description of times. They will be able to express times in both analogue and digital forms, including 24-hour clock times. Children will apply these elements to confidently solve mathematical problems.

4 Which of these 12-hour times is written correctly as a 24-hour time?
- **A** 2:34 am = 24:34
- **B** 4:19 am = 04:19
- **C** 7:30 am = 19:30
- **D** 3:29 am = 3:29

5 Which of these lengths of time is the longest?
A 1 week   **B** 75 days   **C** 150 minutes   **D** 240 hours

6 Amelia, Bella and Ebo run a race.
Amelia's time is 85 seconds.
Bella finishes 8 seconds before Amelia.

I finished two seconds after Bella.

Ebo

What is Ebo's time in minutes and seconds?

→ Practice book 4C p73   101

PUPIL TEXTBOOK 4C PAGE 101

Q	A	WRONG ANSWERS AND MISCONCEPTIONS	STRENGTHENING UNDERSTANDING
1	D	A suggests the child has divided by 6 instead of 60. B suggests the child has multiplied instead of divided. C suggests the child has correctly calculated the answer, but confused the units of time.	Play matching pairs games using flashcards, where children are required to match times expressed in different units.
2	A	B or D suggest the child has used the incorrect operation. C suggests the child does not understand that a calculation is needed to convert between units of time.	Provide three different types of clocks in the classroom (analogue, 12-hour digital and 24-hour digital). Use the following activities to build connections between the three ways of showing the time:
3	C	A, B or D suggests the child has incorrectly identified the common time.	• At various times during the school day, ask children to express the time in these three different ways.
4	B	A suggests the child does not realise that 24-hour clock times revert to 00:00 after reaching 23:59. C suggests the child has added 12. D suggests the child is not aware that 24-hour times must have four digits.	• Cover up one or two of the clocks and encourage children to predict what they show.
5	B	A or C suggests the child has incorrectly converted the units of time before comparing them. D suggests the child has chosen the largest number.	• Alter one of the clocks so that it shows the wrong time. Ask children to identify which clock is wrong and what it should show.
6	1 minute 19 seconds	Some may get the right answer in seconds, but then not manage to convert it correctly.	

My journal

WAYS OF WORKING Independent thinking

ANSWERS AND COMMENTARY

Children's answers will vary depending on their age (which may be more, equal to or less than 100 months). Their responses should show one of the following methods:

- Children should convert 100 months into years and months and then compare this with their own age. For example: *I know I have been alive less than 100 months because 100 months is the same as 8 years and 4 months (100 divided by 12 is 8 remainder 4). I am 8 years and 2 months old, so I have been alive less than 100 months.*
- Children should convert their own age into months and then compare this with 100 months. For example: *I know that I have been alive less than 100 months because I am 8 years and 2 months old. This is the same as 98 months (8 multiplied by 12 is 96 plus another 2 months equals 98).*

To help children work out how to answer the question, ask:

- *Write your age down. Is it written in the same units as the number you want to compare it to? How can you convert either your age or the number in the question so that they are written in the same units?*

Power check

WAYS OF WORKING Independent thinking

ASK

- *What did you know about converting between different units of time before you began this unit?*
- *Do you think you would be able to convert between an analogue time and a 12-hour or 24-hour digital time on your own?*

Power puzzle

WAYS OF WORKING Independent thinking or pair work

IN FOCUS   The purpose of this puzzle is for children to move seamlessly between different units of time, finding equivalent pairs until there is one square left. Children should colour each pair using a different colour. When they reach the final square, a final challenge might be to invent a match that could go with it.

ANSWERS AND COMMENTARY

The pairs are as follows:

> 06:56 matched with 6:56 am
> 3 hours 46 minutes matched with 226 minutes
> 60 months matched with 5 years
> Analogue clock showing four minutes to 6 matched with 17:56
> 8 weeks 4 days matched with 60 days
> 4 years 11 months matched with 59 months
> Analogue clock showing ten past 1 matched with 13:10

The remaining, unmatched square is: 01:02

After the unit ⏸

- How did children respond to the materials and approaches used during the unit?
- How do you feel that the unit assessment went?

Unit 13: Time

End of unit check

My journal

How long have you been alive? Is this more, equal to or less than 100 months?

Use this space to show your working.

I know I have been alive more / the same as / less than 100 months

because _____

_____

_____

Keywords:

convert, months, years, units

Power check

How do you feel about your work in this unit?   ☺? ☺ ☺

73

PUPIL PRACTICE BOOK 4C PAGE 73

Unit 13: Time

Power puzzle

Inside this grid there is one time that does not have an equal pair.

Which one is it?

Try colouring each pair in a different colour to help you spot the odd time out.

If you are working with a partner, take it in turns to colour a pair until you are left with the odd one out.

06:56	3 hours 46 minutes	60 months	(clock)	8 weeks 4 days
01:02	226 minutes	5 years	17:56	4 years 11 months
(clock)	60 days	6:56 am	59 months	13:10

Try making your own puzzle for a partner to solve. Remember that each time must be part of a pair – apart from one!

74

PUPIL PRACTICE BOOK 4C PAGE 74

Strengthen and **Deepen** activities for this unit can be found in the *Power Maths* online subscription.