N3.8 Problems involving time

objectives

- Use a timetable and find intervals for 24-hour times.

- Solve word problems involving time.

starter

Vocabulary

minutes
hours
am
pm

Resources

mini-whiteboards

Ask pupils for complements of numbers in 60. For example:

Q What should be added to 45 to make 60?

Check by counting up from 45 to 50, then 50 to 60. Repeat with 23 and 9. If necessary, use an empty number line to demonstrate.

Remind the class that there are 60 minutes in every hour. If the time is 10 minutes to 9 in the morning, it can be written as 8:50 am. Write this on the board. Stress that 50 minutes past the hour is the same as 10 minutes to the next hour, and that 50 + 10 = 60. Point out that a colon is used to separate the hours from the minutes.

Ask pupils to write these times on their whiteboards:

- 5 minutes to 3 in the afternoon;

- 20 minutes past 8 in the morning;

- 18 minutes to 5 in the afternoon.

Say that, with time, there are three common types of calculation:

- you know a start time and the length of an event, and you want to know the end time (for example, when a TV programme will end if it starts at 7:45 pm and lasts 50 minutes);

- you know the length of an event and an end time, and want to know the start time (for example, when to start cooking a casserole that takes 90 minutes to cook, so that it is ready for lunch at 1:15 pm);

- you know the start time and end time, and want to know the length of an event (for example, how long a train journey will take if it starts at 4:35 and ends at 6:15).

Show pupils how to do each type of calculation. First, work out an end time.

A television programme starts at ten minutes to eight. It lasts twenty-five minutes. At what time does it finish?

Explain how to add on the 25 minutes in two steps: the 10 minutes needed to reach the hour of 8 o'clock, then the remaining 15 minutes to reach 8:15. Use a time line to demonstrate bridging through the hour.
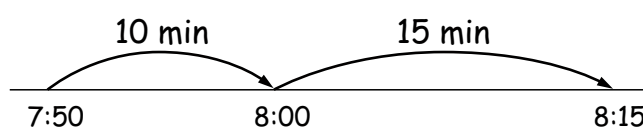
Ask one or two similar questions for pupils to answer on their whiteboards.

Next, work out a start time.

> *A forty-five minute lesson ended at ten twenty. What time did it start?*

Explain how to subtract the 45 minutes in two steps: the 20 minutes needed to go back to the hour of 10 o'clock, and then the remaining 25 minutes to reach 25 minutes to 10, or 9:35.

Ask a couple of similar questions for pupils to answer on their whiteboards.

Now show pupils how to calculate a time interval.

> *A bus leaves Hampton at 9:35 am and arrives at Croxton at 10:15 am. How long does the bus journey take?*

Start with the earlier time. Count up to the hour from 35 minutes to 60 minutes. Jot down 25 minutes as a reminder. Then count from the hour to 15 minutes past the hour. Jot down 15 minutes. Add the two together mentally, then state the answer: 40 minutes.

Repeat by working out the difference between 3:10 pm and 6:08 pm. Stress to the class that first they should count on 50 minutes to 4:00 pm, then two hours to 6:00 pm, then the last 8 minutes to 6:08 pm.

| 50 min | 2 hours | 8 min |

3:10   4:00   6:00   6:08

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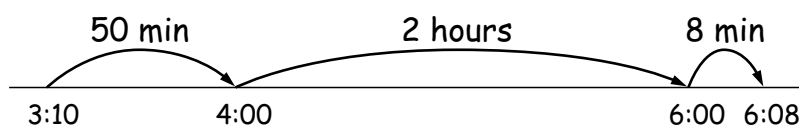
main activity

Vocabulary
24-hour clock
digit

Resources
OHTs N3.8a, N3.8b
mini-whiteboards
ITP *Tell time* (optional)

Remind the class that on a digital clock or watch there are spaces for four digits: two for the number of hours past midnight and two for the number of minutes past the hour. Some clocks or watches may have spaces for two more digits for the number of seconds.

Write 7:35 am on the board. Say that on a 24-hour clock, it is conventional to fill all four of the spaces for digits for hours and minutes. 7:35 am is written as 07:35 hours. Ask pupils to write on their whiteboards in 24-hour clock time:

- 6:30 am (06:30);

- five past three in the morning (03:05).

Write 1:00 pm on the board. Explain that on a 24-hour clock this would be displayed as 13:00, or 13 hundred hours, because it is a total of 13 hours and no minutes past midnight. Repeat with 5:27 pm. Say that this would be written as 17:27 hours, and would usually be said as 'seventeen twenty-seven hours', not 'seventeen hundred and twenty-seven hours'.

Say that, with a 24-hour clock, it is possible to tell whether it is am (before midday or noon) or pm (after midday, or afternoon) by looking at the number of hours. If the number of hours is less than 12, it is am, before midday.

After midday, to convert a 12-hour clock time to a 24-hour clock time, we just add 12 to the number of hours. Ask pupils to convert these 12-hour clock times to 24-hour clock times, and to write them on their whiteboards:

- 4:15 pm;

- 10:45 pm;

- three minutes past six in the afternoon.

Ask:

Q The time is sixteen thirty-five. How many minutes is this before five o'clock in the afternoon?

You could, if you wish, support this section of the lesson by using the ITP *Tell time*, downloaded from www.standards.dfes.gove.uk/numeracy. Select options and ask questions to consolidate pupils' understanding.

Work through some questions with the whole class, using **OHTs N3.8a** and **N3.8b**. Use a timeline to demonstrate if any pupils have difficulty.

other tasks	**Unit 11 section 4: Time**	
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Springboard 7	2 The 24-hour clock	page 381
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	Star challenge 10: Bus timetable	page 382
	Star challenge 11: Car park charges	page 383

plenary	Check that pupils know the relationships between units of time by asking:

Resources
Resource N3.8c

Q How many days in a week? Hours in a day? Minutes in an hour? Seconds in a minute?

Q Which operation do we use to convert weeks to days? (multiply by 7)

Q How do we convert a number of days to week? (divide by 7)

Q How do we change hours to minutes? (multiply by 60)
So how many minutes is 3 hours?

Q Which operation do we use to change minutes to hours? (divide by 60)
So how many hours is 300 minutes? 90 minutes? 105 minutes?

Finish the lesson by reminding the class that some of the ways that we talk about time are not very logical. For example, 2:00 am is described as 'two in the morning' although it is in the middle of the night!

Finish with a selection of mental arithmetic questions taken from National Curriculum tests, using **Resource N3.8c**.

> **Remember**
>
> - A time line can help with time calculations.
>
> - 00:00 is midnight and 12:00 is midday, or noon.
>
> - 08:15 is before noon and is 8:15 am. 18:40 is after noon and is 6:40 pm.
>
> - Some 24-hour clock timetables don't use a colon to separate the hours from the minutes.

These are the start and finish times on a video cassette recorder.
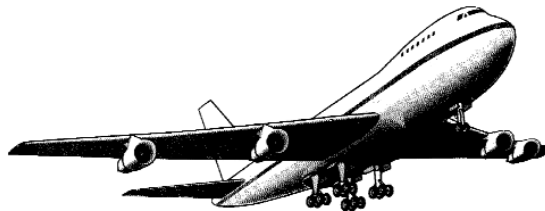
START   14:45
FINISH 17:25

For how long was the video recording?

hours	minutes

An aeroplane takes off on Tuesday at   22:47
It lands on Wednesday at   07:05

How long in hours and minutes is the flight?

hours	minutes

Bus timetable Croxton to Braytown					
Croxton *depart*	11:30	11:45	12:20	12:45	13:30
Braytown *arrive*	12:15	12:30	13:05	13:30	14:15

Derek caught the 11:45 bus from Croxton.
What time did he arrive in Braytown?
How long did the bus journey take?

Derek took 15 minutes to get from his house
to the bus stop.
He waited 5 minutes for the bus to come.
What time did Derek leave his house?

Ruth must get to Braytown by 13:20.
Which buses could she catch?

Ruth is 15 minutes too late for the 12:20 from Croxton.
She catches the next bus instead.
How long does Ruth wait for the next bus?

1 How many centimetres are in one metre?

2 Write a number that is bigger than twenty-eight and a half
   but less than twenty-nine.

3 Gary collects ten-pence coins. Altogether he has twelve.
   How much money is that?

4 What is nine multiplied by seven?

5 What number is one hundred less than eight thousand?
   Write your answer in figures.

6 A television programme starts at ten minutes to seven.
   It lasts twenty-five minutes.
   At what time does the programme finish?

7 How many hours is three hundred minutes?

8 Subtract twenty from eight.

9 The perimeter of an equilateral triangle is thirty centimetres.
   What is the length of each side?

10 What is twenty-one multiplied by nine?

11 What is the next prime number after twenty-three?

12 The time is sixteen thirty-five.
    How many minutes is this before five o'clock in the afternoon?

13 What is one quarter of two hundred thousand?
    Write your answer in figures.

14 Add together two point two and one point nine.

15 What is two thirds of sixty minutes?