Study Guide: 5.10 Elapsed Time

Standard: 5.10– The student will determine an amount of elapsed time in hours and minutes within a 24-hour period.

What you need to know:

- How to determine the elapsed time between a start and end time

- How to find the end time when given the start time and elapsed time

- How to find the start time when given the end time and elapsed time

Essential Question: What are two strategies for determining elapsed time?

Key Vocabulary:

Analog clock– A clock or watch with moving hands and the numbers 1-12 to show you time

Digital clock– A clock that displays the time with numbers

Elapsed time– the amount of time that has passed between two given times

Second– 1/60 of a minute, 1/3600 of an hour

Minute– 60 seconds, 1/60 of a minute

Hour– 60 minutes, 1/24 of a day

Day– 24 hours

There are **3 essential parts** to an elapsed time problem, one of which will be the thing you are solving for:

- **Start time– Key words: begin, start (when being asked to find start time, question asks "At what time?")**

- **End time– Key words: finish, end (when being asked to find end time, question asks "At what time?")**

- **Elapsed time– Key words: hours, minutes (when being asked to find the elapsed time, question asks "How long?")**

These three things will be in each elapsed time problem you encounter. Two out of the three will be given to you; you must solve for the one that is missing.

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In order to solve a word problem we have to analyze it f first to see what we are looking for.

To do this, color code the start time, end time, and elapsed time in the word problem and draw a diagram to go with the problem. See the diagram to the left borrowed from Deb Hanson.

These are the three main types of problems you will see. As you just learned on the previous page, you are going to be given two of the three essential parts of an elapsed time problem and must solve for the third.

How much time passed in between?

Starting Time — Ending Time

The concert started at 7:05 P.M. It ended at 8:20 P.M. How long did the concert last?

The event lasted this long.

Starting Time — ?

The hockey game started at 6:15 P.M. It lasted 1 hour, 55 minutes. At what time did the game end?

The event lasted this long.

? — Ending Time

Beth has been baking cupcakes for the past 3 hours and 25 minutes. She just finished them 4:10 P.M. At what time did she begin baking?

- In the first problem, the start and end time are given and students are asked to find the elapsed time.

- In the second problem, the start time and elapsed time are given and students are asked to find the end time.

- In the third problem, the end time and elapsed time are given, and students are asked to find the start time.

How do we calculate elapsed time?

Elapsed time can be found by **counting on** from the beginning time to the finishing time.

- Count the number of whole hours between the beginning time and the finishing time.

- Count the remaining minutes.

- Add the hours and minutes.

    - For example, to find the elapsed time between 10:15 a.m. and 1:25 p.m., count on as follows: from 10:15 a.m. to 1:15 p.m., count 3 hours; from 1:15 p.m. to 1:25 p.m., count 10 minutes; and then add 3 hours to 10 minutes to find the total elapsed time of 3 hours and 10 minutes.

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Elapsed time can also be found by **counting backward** from the finishing time to the beginning time.

- Count the number of whole hours between the finishing time and the beginning time.

- Count the remaining minutes.

- Add the hours and minutes.

    - For example, to find the elapsed time between 10:43 a.m. and 1:50 p.m., count backward as follows: from 1:50 p.m. to 10:50 a.m., count backward 3 hours (1:50pm-12:50pm (1 hour), 12:50pm-11:50am (1 hour), 11:50am-10:50am (1 hour) for a total of 3 hours). Then, count the minutes from 10:50 to 10:43 am; 7 minutes. Then add the 3 hours to the 7 minutes for a total elapsed time of 3 hours and 7 minutes.

Mountains and Hills Strategy

You will create a timeline with mountains, hills, and rocks. Fill in the times used as you go. You can do this for counting on or backward.
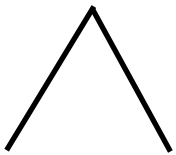
Mountains = 1 hour   Hills = 1, 5, 10, 15, 20, or 30 minute increments

Sample Problem: Nick was dropped off at the movies at 4:40pm and his mom picked him up at the theater at 7:37pm. How long was Greg at the theater?

1. After analyzing the problem, we find that we are given the start and end time and are asked to find the elapsed time. Draw a timeline listing your start time at the left-hand side and your end-time at the right-hand side.

4:40   7:37

2. Draw mountains, hills, or rocks to show the time elapsed. Write the time moved inside the drawing. Put the new time where the drawing ends. Here is the thought process I go through:

If it is 4:40 and we move 1 hour, what time will it be? 5:40. If we move another hour, what time will it be? 6:40. If we move another hour, what time will it be? 7:40. We are only trying to get to 7:37, so 7:40 is too far. I can go the full 3 hours and then subtract 3 minutes to go from 7:40 back to 7:37. That would mean 3 hours—3 minutes = 2 hours 57 minutes.
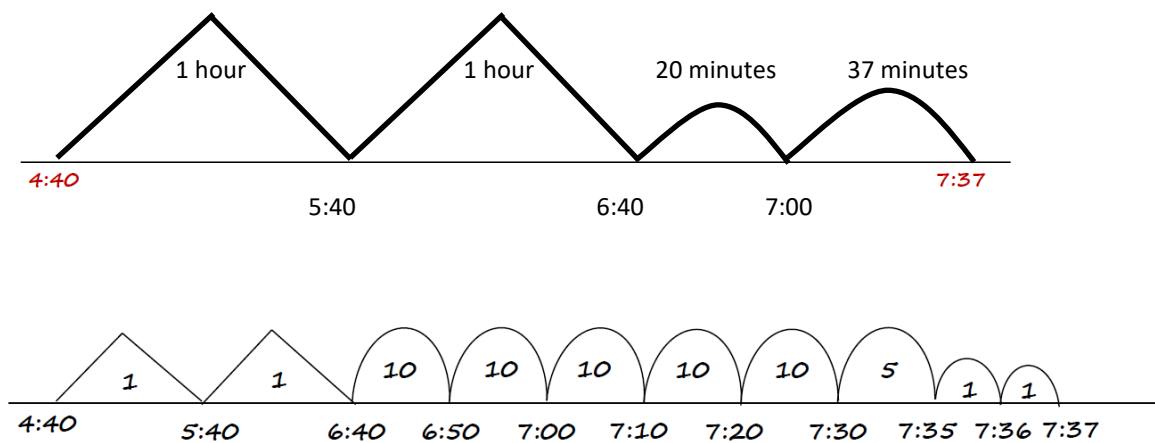
1 hour   1 hour   1 hour

4:40   7:37
                                                 - 3 minutes
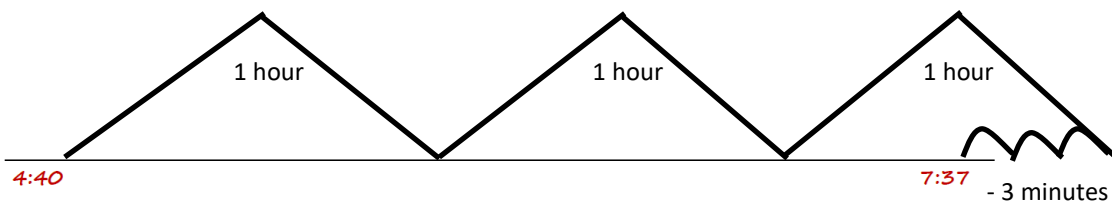
Mountains, Hills, and Rocks Strategy, continued:

We could also solve it this way:

If it is 4:40 and we move 1 hour, what time will it be? 5:40. If we move another hour, what time will it be? 6:40. If we move another hour, what time will it be? 7:40. We are only trying to get to 7:37, so 7:40 is too far. We can move two hours, but then will need to change our increments. I am going to add 20 minutes to get to the start of the next hour, 7:00pm. Then I can add on 37 more minutes to get to 7:37.

Then we add up the times: 1 hour + 1 hour + 20 minutes + 37 minutes= 2 hours 57 minutes.

1 hour + 1 hour = 2 hours

10 min. + 10 min. + 10 min. + 10 min. + 10 min. + 5 min. + 1 min. + 1 min. = 57 minutes

2 hours 57 minutes

T-Chart Strategy

Create a T-Chart with the information you know. Then work in increments, listing the amount of elapsed time on the side. In the problem below, we are given the start time and elapsed time and have to find the end time.

Sample Problem: Jane boards a bus at 8:43am from her hometown in Maryland to New York. After several stops, Jane arrives in New York 6 hours and 34 minutes later. What time did she arrive?

I start at 8:45am and add on 6 hours, putting the time (2:45pm) that it would be after 6 hours in the table. Then, to get to the start of the next hour (3pm) I add on 15 minutes. I've now gone forward 6 hours and 15 minutes of the 6 hours and 34 minutes I have to calculate. In order to find my final end time, I subtract 34-15 and find that I still need to go forward 19 more minutes since I've only done 15 of the 34. I find that my end time is 3:19pm.

Start: 8:45am	
2:45pm	6 hours
3:00pm	15 minutes
3:19pm	19 minutes
	6 hours 34 minutes