



Name: _____

Date: _____

Student Exploration: Elapsed Time

Vocabulary: 24-hour clock, analog clock, elapsed time



Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
It's 1:25 PM and Freddy is bored. He stares at the classroom clock, wishing for the bell to ring.

1. If school gets out at 2:30 PM, how long does Freddy have to wait before the bell rings? _____
2. After a spelling quiz, Freddy looks at the clock again. It reads 1:52 PM. How long does Freddy have to wait now?

Gizmo Warm-up

While Freddy tries to figure out how long before the bell rings, he is calculating **elapsed time**, or the time that passes between two events. Finding elapsed time can be tricky because time is measured in a variety of ways: 60 seconds in a minute, 60 minutes in an hour, and 24 hours in a day.

You can practice finding elapsed time with the *Elapsed Time Gizmo*. Notice that the clocks on the Gizmo are **analog clocks**, or clocks with hour and minute hands.



1. To begin, drag the red (hour) hand of **Clock 1** to the 1 and the blue (minute) hand to the 5.
Check that **PM** is selected, and select **Lock**. What time is shown on **Clock 1**? _____
2. On **Clock 2**, set the hour hand to 2 and the minute hand to 6. Select **PM**.
 - A. What time is shown on **Clock 2**? _____
 - B. What is the elapsed time between 1:25 PM and 2:30 PM? _____
3. Lock **Clock 2** and set **Clock 1** to 1:52 PM.
What is the elapsed time between 1:52 PM and 2:30 PM? _____



Activity A: Hours	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Set Clock 1 to 7:00 AM and lock Clock 1. • Set Clock 2 to 8:00 AM. 	
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1. Lucia gets up at 7:00 AM every morning. Her school starts at 8:00 AM.
 How long does Lucia have to get to school each morning? _____

2. Lucia has art at 11:00 AM. How much time elapses between when she wakes up and the start of art class? _____ Check your answer with the Gizmo.

3. In general, how do you find the elapsed time between a time in the morning (such as 7:00 AM) and another time later that morning? _____

4. Lucia's school starts at 8:00 AM and ends at 3:00 PM. To model these times, set **Clock 1** to 8:00 AM, lock **Clock 1**, and then set **Clock 2** to 3:00 PM.

A. How long does the school day last? _____

B. How did you determine this? _____

C. Turn on **Show calculation**. How is the elapsed time calculation shown? _____

5. When finding elapsed time from morning to afternoon, it is helpful to use the **24-hour clock**, also known as "military time." To do this, add 12 to all times starting at 1:00 PM. For example, 3:00 PM is converted to 15:00 in the 24-hour clock.

Find the following elapsed times by first converting the second time to the 24-hour clock. Show your work. Check each answer using the Gizmo.

- A. 11:00 AM → 2:00 PM _____
- B. 9:00 AM → 10:00 PM _____
- C. 1:00 AM → 7:00 PM _____
- D. 7:00 AM → 5:00 PM _____

(Activity A continued on next page)

Activity A (continued from previous page)

6. Turn off **Show calculation**. Lucia goes to bed at 9:00 PM and wakes up at 7:00 AM. To model this, set **Clock 1** to 9:00 PM and **Clock 2** to 7:00 AM.

A. How much time does Lucia sleep? _____

B. Turn on **Show calculation**. How is the elapsed time calculation shown? _____

Just as you add 12 hours to the PM time when finding AM → PM elapsed times, you can add 12 hours to the AM time when finding PM → AM elapsed times. For example, 7:00 AM is converted to 19:00 so that 9:00 PM can be subtracted.

7. Turn off **Show calculation**. Lying in bed at 9:30 PM, Lucia can't stop thinking about her friend's party, which starts in 16 hours. Model this situation in the Gizmo using the **h** slider. (Hint: Set **Clock 1** to 9:30 PM, lock **Clock 1**, and then set the **Elapsed time**.)

A. At what time does the party start? _____

B. How can you determine this? _____

C. Turn on **Show calculation**. How is the elapsed time calculation shown? _____

D. Why was 24 hours added to the time shown on **Clock 2**? _____

8. One day, Lucia goes to art camp. Lucia was at the camp for 7 hours and got out 3:30 PM.

At what time did the camp start? _____ Check your answer with the Gizmo.

9. Find the following elapsed times. For each problem, the second time is on the following day. Show your work. Check each answer using the Gizmo.

A. 8:00 PM → 3:00 AM _____

C. 8:45 AM → 4:45 AM _____

B. 11:00 PM → 10:00 PM _____

D. 3:00 PM → 10:30 AM _____



Activity B: Minutes	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Turn off Show calculation. 	
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1. Alice loves to run. On Monday, she started her run at 1:32 PM and finished at 1:58 PM. To model this, set **Clock 1** to 1:32 PM, lock **Clock 1**, and set **Clock 2** to 1:58 PM.
 - A. What is the elapsed time between 1:32 PM and 1:58 PM? _____
 - B. How can you calculate this result? _____
 - C. Turn on **Show calculation**. How is this calculated in the Gizmo? _____

2. Turn off **Show calculation**. Alice's next run lasts from 8:31 AM to 9:17 AM.
 - A. What is the elapsed time between 8:31 AM and 9:17 AM? _____
Check your answer by modeling the situation in the Gizmo.
 - B. Can you find the elapsed time by subtracting 8:31 from 9:17? _____
 - C. How can you calculate the elapsed time when the minute value of **Clock 2** is less than the minute values of **Clock 1**? _____

 - D. Turn on **Show calculation**. How is this done in the Gizmo? _____

When the “minutes” of the ending time are less than the “minutes” of the first, you need to “borrow” to subtract. One hour equals 60 minutes, so you can reduce the “hours” of the **Clock 2** by one, and increase the “minutes” by 60. For example, 9:17 becomes 8:77.

3. Alice wants to run for 2 hours and 35 minutes. If she has to be home by 6:15 PM, when is the latest she can start? _____ Check your answer with the Gizmo.
4. Use what you have learned to find the following elapsed times. Show your work, and check each answer with the Gizmo.
 - A. 11:45 AM → 4:23 PM _____
 - B. 3:42 PM → 10:07 PM _____

