

Time, Liquid Volume, and Mass: math lesson, Grade 3

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How long is a lesson? How much juice fits in a pitcher? How heavy is a backpack? In this chapter you will learn to measure **time**, **liquid volume**, and **mass**, and to solve measurement word problems with confidence.

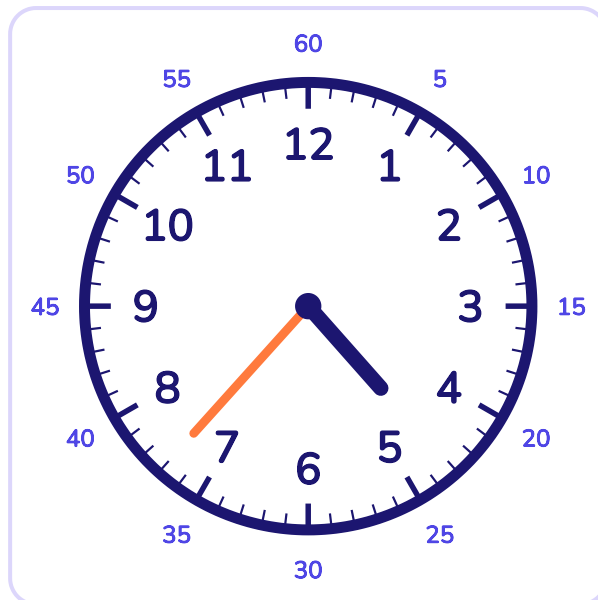
1. Telling time to the minute

A clock has two hands. The **short hand** is the hour hand. The **long hand** is the minute hand. Around the clock face there are 60 tiny marks, one for each minute. The minute hand moves from one mark to the next in one minute, and it takes 60 minutes to go all the way around.

M

How to read an analog clock

1. Look at the hour hand. Find the hour it has *just passed*.
2. Look at the minute hand. Count by fives for each number: 5, 10, 15, 20, and so on.
3. Count the small marks after the last number to get the exact minute.
4. Write the time as hours, a colon, then minutes: 4:37.



E

Example 1

On the clock above, the hour hand is between 4 and 5, so the hour is 4. The minute hand points two marks past the 7. The 7 stands for 35 minutes, and two more marks make 37 minutes. The time is **4:37**. It is 23 minutes until 5:00, because $60 - 37 = 23$.

2. A.M. and P.M.

A day has 24 hours, but the clock shows only 12 numbers, so the hour hand goes around twice each day. We use **a.m.** for the time from midnight until just before noon and **p.m.** for the time from noon until just before midnight. Breakfast at 7:15 a.m. is in the morning. Dinner at 6:30 p.m. is in the evening.



Careful with 12

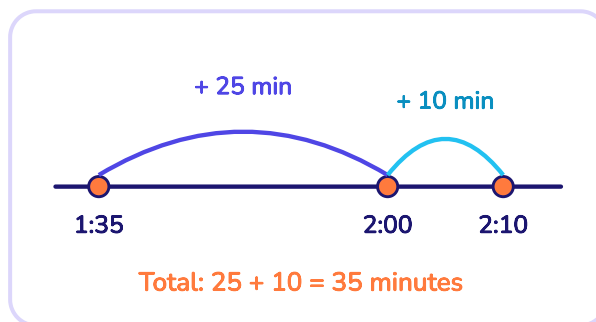
Noon is 12:00 p.m. and midnight is 12:00 a.m. The time 12:45 p.m. is just after lunch, not in the middle of the night.

3. Elapsed time

D Elapsed time

Elapsed time is the amount of time that passes from a start time to an end time.

The easiest way to find elapsed time is to jump along a number line. First jump to the next full hour, then jump the rest of the way.



E Example 2

A craft class starts at 1:35 p.m. and ends at 2:10 p.m. From 1:35 to 2:00 is 25 minutes. From 2:00 to 2:10 is 10 more minutes. The class lasts $25 + 10 = 35$ minutes.

M Finding an end time or a start time

- To find the **end time**, start at the start time and jump forward by the amount of time given.
- To find the **start time**, start at the end time and jump backward.

4. Time word problems

To solve a time word problem, ask yourself what you know and what you must find. Do you know the start time and the end time? Then you want the elapsed time. Do you know the start time and the elapsed time? Then you want the end time. Drawing a quick number line helps a lot.

E Example 3

Omar starts reading at 5:40 p.m. He reads for 25 minutes. When does he stop? From 5:40, jump 20 minutes to 6:00. Then jump 5 more minutes to 6:05. Omar stops at 6:05 p.m.

! Zyro's trick

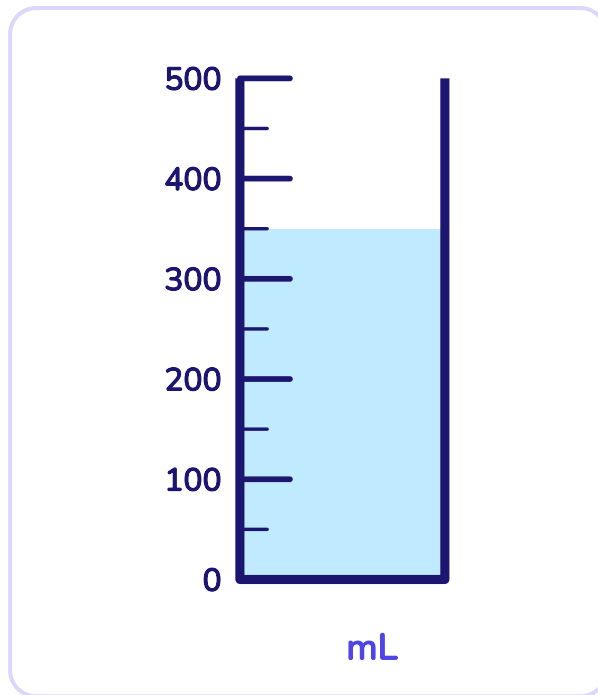
Zyro the explorer says: "On my planet we always stop at a landmark. Make the next full hour your landmark, and the jumps become easy!"

5. Liquid volume: liters and milliliters

Liquid volume tells us how much liquid a container can hold. In the metric system we measure it in **liters (L)** and **milliliters (mL)**. A milliliter is tiny: about one drop from a medicine dropper is a fraction of one. A liter is much bigger: a large water bottle holds about one liter.

P Liters and milliliters

$1 \text{ L} = 1,000 \text{ mL}$. So $2 \text{ L} = 2,000 \text{ mL}$ and $3,000 \text{ mL} = 3 \text{ L}$.



The beaker above has marks every 50 mL. The liquid reaches the mark halfway between 300 and 400, so it holds **350 mL**. To fill it to 500 mL, you need 150 more milliliters.

E Example 4

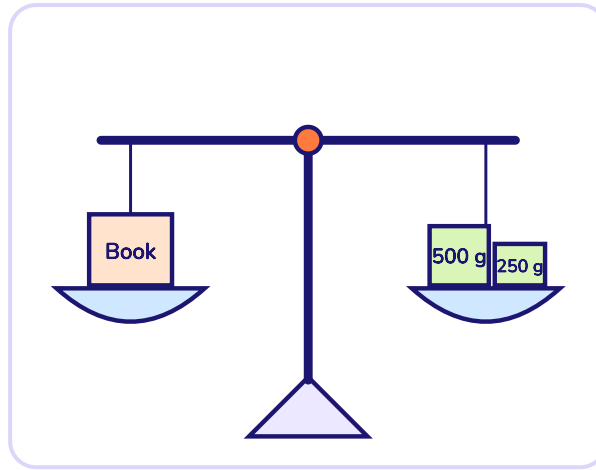
A pitcher holds 2 L of lemonade. Sam pours 4 glasses of 250 mL each. That is $4 \times 250 = 1,000$ mL, or 1 L. The pitcher still holds $2 - 1 = 1$ L.

6. Grams and kilograms

Mass tells us how much matter is in an object. We measure it in **grams (g)** and **kilograms (kg)**. A paper clip has a mass of about 1 gram. A small bag of flour has a mass of about 1 kilogram.

P Grams and kilograms

$1 \text{ kg} = 1,000 \text{ g}$. So $5 \text{ kg} = 5,000 \text{ g}$, and $2 \text{ kg } 300 \text{ g} = 2,300 \text{ g}$.



On the balance above, the book exactly balances the two weights, so the book has a mass of $500 + 250 = 750$ grams.

Unit	Symbol	Good for measuring	Example
milliliter	mL	tiny amounts of liquid	a spoonful of syrup
liter	L	larger amounts of liquid	a fish tank, a juice carton
gram	g	light objects	a pencil, a coin
kilogram	kg	heavier objects	a watermelon, a backpack

7. Estimating measures

You do not always have a tool, so you can **estimate**. Compare the object to something you know. A glass of water is about 250 mL, a small pot is about 1 L, and a bucket is about 10 L. An apple is about 200 g, a loaf of bread is about 500 g, and a house cat is about 4 kg. Your estimate does not have to be exact, but it must be reasonable.



Pick the right unit

A pencil does not have a mass of 10 kg, and a bathtub does not hold 10 mL. If your answer sounds silly, check the unit!

You may also meet U.S. units. A liter is a little more than a quart, and a kilogram is a little more than 2 pounds. The metric units in this chapter are the ones used in science around the world.

8. Measurement word problems

For problems with liquid volume or mass, first make sure all the measures are in the *same unit*. Change kilograms to grams, or liters to milliliters, then add, subtract, multiply, or divide. Finally, write your answer with its unit.



Example 5

A box holds a 1 kg bag of rice and a 600 g bag of beans. What is the total mass?

Change to grams: $1,000 + 600 = 1,600$. The box has a mass of **1,600 g**, or 1 kg 600 g.

Key takeaways

- The minute hand counts by fives around the clock; 60 minutes make 1 hour.
- Use a.m. before noon and p.m. after noon.
- Elapsed time: jump to the next full hour, then jump the rest.
- **1 L = 1,000 mL** and **1 kg = 1,000 g**.
- Estimate with objects you know, and always choose a sensible unit.
- In a word problem, convert to one unit first, then compute, then write the unit.



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Speed drill for Grade 3: how many in 60 seconds?



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