GRADE 7 · UNIT 3 · LESSON 8

Real-World Problems

Putting It Together

MA.7.NSO.2.3

I can solve a real-world problem that needs all four operations, forwards or backwards.

Last lesson of the unit.

Every operation from Lessons 1 to 7 turns up today.

And for the first time, some questions run backwards.

Warm-Up

On your own. Number your paper 1 to 4.

A gym charges $12.00 to join, then $3.50 for each visit.

1. What do you pay for 6 visits?
2. You have paid $47.00 so far. How many visits is that?
3. Which question multiplied, and which divided?
4. In question 2, why can you not just divide $47.00 by $3.50?

Notes

I. One-Time Fees and Repeated Charges

A. A one-time fee is charged once, however big the job gets.

1. A booking fee, a joining fee, the price of a first lesson.

B. A repeated charge is multiplied by how many times it happens.

C. **total = one-time fees + (repeated charge × how many)**

1. Every problem today is some version of that one line.

Notes

II. “The First X, Then Y for Each Additional Z”

A. Take off the first stretch **before** you count anything.

B. Divide what is left by the size of one additional step.

1. That tells you how many EXTRA charges there are.

C. The first stretch is paid for by its own price, not by the extra charges.

$0.86 for the first 1.5 miles, then $0.34 for each extra 0.3 mile. A 31.5-mile trip:

31.5 − 1.5 = 30 miles left, 30 ÷ 0.3 = 100 extra charges

Not 31.5 ÷ 0.3 = 105. The first 1.5 miles are already paid for.

Notes

III. Working Backwards from a Total

A. You are given the total and asked for one of the pieces.

B. Peel the known pieces off the total first, one at a time.

   1. Subtract the fees you already know. Then divide by the per-unit charge.

C. Every step undoes a step from the forwards version.

Notes

IV. When the Answer Has to Be a Whole Number

A. You cannot build 6.12 birdhouses or make 7.01 bows.

B. Counting how many you can MAKE? Round down.

1. 7.9 boards' worth of wood makes 7 pieces. But if you must BUY boards, you buy 8.

C. Ask what the number COUNTS before you round it.

1. Money rounds to the nearest cent. Things you can only have whole round down.

Example 1

A rideshare charges $5.50 to book, $0.86 for the first 1.5 miles, then $0.34 for each additional 0.3 mile. What does a 31.5-mile trip cost?

How many miles are the extra charges for?

Not 31.5. Read the sentence again.

Example 1

A rideshare charges $5.50 to book, $0.86 for the first 1.5 miles, then $0.34 for each additional 0.3 mile. What does a 31.5-mile trip cost?

Step 1	Take off the first stretch.	**$31.5 - 1.5 = 30$ miles**

Thirty miles of extra charges, and each one covers 0.3 of a mile.

Example 1

A rideshare charges $5.50 to book, $0.86 for the first 1.5 miles, then $0.34 for each additional 0.3 mile. What does a 31.5-mile trip cost?

Step 1	Take off the first stretch.	**$31.5 - 1.5 = 30$ miles**
Step 2	How many additional steps fit into what is left?	**$30 \div 0.3 = 100$**

One hundred charges of 34 cents each. Now add the fees.

Example 1

A rideshare charges $5.50 to book, $0.86 for the first 1.5 miles, then $0.34 for each additional 0.3 mile. What does a 31.5-mile trip cost?

Step 1	Take off the first stretch.	$31.5 - 1.5 = 30$ miles
Step 2	How many additional steps fit into what is left?	$30 \div 0.3 = 100$
Step 3	One-time fees, then the repeated charge.	$5.50 + 0.86 + 100(0.34) = \$40.36$

Dividing 31.5 by 0.3 gives 105, and a bill $1.70 too high. Close enough that nobody notices.

Example 2

Same trip, same fare. The driver also waited, at $1.05 a minute, and the total bill was $46.66. How long did the driver wait?

Forwards

fare

\+ waiting charge

= total bill

Backwards

You cannot start this one until you have the answer to Example 1.

The fare was $40.36. What is the rest of the bill for?

Example 2

Same trip, same fare. The driver also waited, at $1.05 a minute, and the total bill was $46.66. How long did the driver wait?

Forwards

fare
\+ waiting charge
= total bill

Backwards

46.66 − 40.36 = 6.30

Peel off what you already know.

What does the $6.30 represent? Say it before you divide it.

Example 2

Same trip, same fare. The driver also waited, at $1.05 a minute, and the total bill was $46.66. How long did the driver wait?

Forwards

fare

\+ waiting charge

= total bill

Backwards

46.66 − 40.36 = 6.30

6.30 ÷ 1.05 = 6 minutes

Whiteboards · Question 1 of 9

Boards up on three.

$0.40 for the first 2 miles,
then $0.25 for each extra half mile.
A 12-mile trip. How many EXTRA charges?

Subtract the first stretch, then divide. Do not cost it out.

Whiteboards · Question 1 of 9

Answer.

Take off the first stretch: $12 - 2 = 10$ miles.

Each extra charge covers half a mile: $10 \div 0.5$

20 extra charges

Whiteboards · Question 2 of 9

Boards up on three.

$9.00 for the first hour,

then $2.50 for each extra 15 minutes.

A 2.5-hour job. How many EXTRA charges?

There is a conversion hiding in this one.

Whiteboards · Question 2 of 9

Answer.

Take off the first hour: $2.5 - 1 = 1.5$ hours.

1.5 hours is 90 minutes. $90 \div 15$

6 extra charges

Whiteboards · Question 3 of 9

Boards up on three.

A gym charges $12 to join,
then $3.50 a visit.
Fifteen visits. What is the total?

One-time fee, plus the repeated charge times how many.

Whiteboards · Question 3 of 9

Answer.

$$\text{total} = \text{one-time fee} + (\text{charge} \times \text{how many})$$

$$12 + 15(3.50)$$

$64.50

Whiteboards · Question 4 of 9

Boards up on three.

The same gym. A different member has paid $47.00 in total. How many visits?

Backwards. Subtract before you divide.

Whiteboards · Question 4 of 9

Answer.

Peel off the joining fee: $47 - 12 = 35$.

$35 \div 3.50$

10 visits

Whiteboards · Question 5 of 9

Boards up on three.

A rideshare charges $4.00 to book,
then $0.60 a mile.
The bill was $19.00. How many miles?

Same shape, different situation.

Whiteboards · Question 5 of 9

Answer.

Peel off the booking fee: $19 - 4 = 15$.

$$15 \div 0.60$$

25 miles

Whiteboards · Question 6 of 9

Boards up on three.

At that gym, Kaya divided $47.00 by $3.50 and got 13.4 visits.

Two things should have told her this was wrong. What are they?

One is about the fee. The other is about the number itself.

Answer.

She never subtracted the $12 joining fee.

And 13.4 is not a possible number of visits.

$(47 - 12) \div 3.50 = 10$, which is.

10 visits

Whiteboards · Question 7 of 9

Boards up on three.

Bailey has 53.17 feet of ribbon. Each bow uses 3.125 feet. She has already made 10 bows. How many more bows can she make from what is left?

A 7 bows B 7.01 bows C 8 bows D 17 bows

Subtract first, then divide. Then look hard at the leftover.

Whiteboards · Question 7 of 9

Answer.

Used: $10 \times 3.125 = 31.25$ ft

Left: $53.17 - 31.25 = 21.92$ ft

$21.92 \div 3.125 \approx 7.01$, and part of a bow is none.

A. 7 more bows

Whiteboards · Question 8 of 9

Boards up on three.

A shop starts the week with no cashews. Bags of 20 5/6 lb arrive 18 at a time, twice a week. At the end of the week 177.75 lb are left. It sold the same amount every day of the week. How much a day?

A. 28.18 lb B. 81.75 lb C. 107.14 lb D. 572.25 lb

Work out what came in before you work out what went out.

Whiteboards · Question 8 of 9

Answer.

In: $20\ 5/6 \times 18 \times 2 = 750$ lb

Sold: $750 - 177.75 = 572.25$ lb

Per day: $572.25 \div 7$

B. 81.75 pounds

Whiteboards · Question 9 of 9

Boards up on three.

A birdhouse needs four 0.75-ft pieces, one 0.25-ft piece and two 0.5-ft pieces. A board is 8.5 ft and costs $10.28. Devon has $35. How many can he build?

Four steps: wood per house, boards he can buy, total feet, houses.

Whiteboards · Question 9 of 9

Answer.

Per house: $4(0.75) + 0.25 + 2(0.5) = 4.25$ ft

Boards: 3 cost \$30.84, 4 cost \$41.12, so 3

Wood: $3 \times 8.5 = 25.5$ ft, and $25.5 \div 4.25 = 6$

6 birdhouses

IXL

Last five minutes.

Open IXL and start today's skills.

Work on paper where the question needs work. The answer box does not show it.

Whatever you do not finish is tonight's practice.

The skills for today are posted in Google Classroom.