Switch It! Two-Step Conversions

Teacher		**Class**	Grade 5
Subject	Math	**Topic**	Converting units
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Students learn to convert units within one system. They use conversions to solve two-step real-world problems.

Curriculum links

- Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m)
- Use these conversions in solving multi-step, real world problems

Learning objectives

- Students will convert metric length, mass and capacity units within the system.
- Students will convert customary length and weight units within the system.
- Students will solve multi-step real-world problems that require converting units first.

Success criteria

- I can switch metric units by multiplying or dividing by 10, 100, 1000.
- I can switch customary units using 12, 3, 1760 and 16.
- I can convert to one unit first, then solve two-step problems.

What students already know

Ask students to name units for length, weight and capacity and the tool with inches on one edge and centimeters on the other.

Key words

convert	change an amount so it is shown in a different unit
conversion factor	an equal pair like 100 cm = 1 m that lets you switch [4]
kilogram	a mass equal to 1,000 grams [8]
inch	a small customary length; 12 make 1 foot [12]
centimeter	a metric length; 100 make 1 meter [4]

Materials

- printed Worksheet Task B sheets
- pencils
- Slides 1-12 on screen
- Video clip 5 ready to play
- meter stick, ruler and tape measure
- mini whiteboards and markers

Before the lesson

- Print one Worksheet Task B sheet per pair and spare copies
- Test Slides 1-12 and Video clip 5 (0:00-5:00) with sound
- Set meter stick, ruler and tape measure where all can see
- Put 1 kilometer = 1000 meters [5] reference cards on tables

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Lesson outline

0–8 min **Starter** 8 min · Whole class

Activate prior unit knowledge and set up the need to convert before solving.

YOU DO

1. Show Slide 1 and read the title, then give the hook: A builder has a plan in one unit but a ruler in another — what should they do?
2. Show Slide 4 mindmap and ask pairs to name metric and US units they already know.
3. Show Slide 3 and teach the rule: bigger unit means fewer; smaller unit means more.
4. Show the ruler and tape measure that has inches on one edge and centimeters on the other.

STUDENTS DO

1. Call out units for length, weight and capacity with a partner.
2. Repeat the rule: bigger unit means fewer, smaller unit means more.
3. Look at the two-sided ruler and name both systems.

Say: Today we are problem solvers. A builder has a plan in one unit but a ruler in another. We will learn when to multiply and when to divide, then convert to one unit before we add or solve.

Ask: What metric units measure length? (Millimeters, centimeters, meters, or kilometers [4].) · What tool shows inches on one edge and centimeters on the other? (A ruler or tape measure with two systems side by side.) · If we change the same desk into tiny millimeters, what happens to the number? (It gets bigger because we need more small units.)

Check understanding: Thumbs up if you can say the rule in your own words; reteach Slide 3 with desk example if many are unsure.

Support: Point to the meter stick and ruler while naming mm, cm, m and in, ft. **Stretch:** Ask students to predict which number will be bigger: meters or millimeters for the same desk.

Use: Slides 1-4

8–20 min **Teaching** 12 min · Whole class

Model how to convert metric units by multiplying or dividing by 10, 100 and 1000.

YOU DO

1. Play Video clip 5 (0:00-5:00) on Slide 6 and tell students to spot when to multiply and when division gives decimals.
2. Show Slide 7 and model large to small means multiply for more units and small to large means divide for fewer units [6].
3. Model 2 m = 200 cm by multiplying by 100 because 100 cm = 1 m [4].
4. Model converting kilograms to grams by multiplying by 1,000 [8] because a kilogram is 1,000 grams [8].

STUDENTS DO

1. Watch the video and signal multiply or divide with hand signs.
2. Copy the two models and say if the answer should get bigger or smaller.
3. Choral respond with kilo- means 1000 [5], centi- means 0.01 [5], milli- means 0.001 [5].

Say: Metric units are based on tens. Large to small, we multiply so the number gets bigger. Small to large, we divide so the number gets smaller. Our conversion factor is an equal pair, like 100 cm = 1 m.

Worked example: 5 cm = ? m: 100 cm = 1 m [4], so go small to large and divide [6]. 5 divided by 100 = 0.05, so 5 cm = 0.05 m. Check: meters are larger, so fewer of them makes sense.

Ask: How do you change 5 kilometers to meters? (Multiply by 1000 to get 5000 meters [5] because 1 kilometer = 1000 meters [5].) · How do you change centimeters to meters? (Divide, because you go from smaller to larger so the number gets smaller [6].)

Check understanding: Mini whiteboards: show 3 m = ? cm; if many miss 300, remodel with place-value shift.

Support: Give place-value chart and focus on centimeters to millimeters where 10 mm = 1 cm [4]. **Stretch:** Ask students to explain what happens to the digits when the answer is less than one, like 0.05 m.

Use: Slides 6-7, Video clip 5 (0:00–5:00)

20–30 min **We do** 10 min · Pairs

Practice choosing multiply or divide for customary length and weight conversions.

YOU DO

1. Show Slide 10 and remind pairs that large to small means multiply and the number gets bigger, like 2 m = 200 cm [4].
2. Model 36 feet equals 12 yards [12] by dividing 36 by 3 because 1 yd = 3 ft [12].
3. Model converting 7 feet to inches by multiplying 7 by 12, giving 84 inches [8] because 1 ft = 12 in [12].
4. Have pairs solve 80 ounces to pounds on whiteboards.

STUDENTS DO

1. Hold up multiply or divide cards before solving each pair.
2. Solve 36 ft to yd, 7 ft to in, and 80 oz to lb with a partner.
3. Explain to partner why the number got bigger or smaller.

Say: Think: do I need more pieces or fewer? Large to small, multiply and the number gets bigger. Small to large, divide and the number gets smaller. Use 12 in = 1 ft and 1 yd = 3 ft.

Worked example: 80 oz = ? lb: 16 ounces in a pound [8]. Small to large, so divide [6]. 80 divided by 16 = 5, so 80 oz = 5 lb.

Ask: Miles to yards: multiply or divide when there are 1760 yards in every mile [6]? (Multiply, because yards are smaller so you need a bigger number [6].) · Inches to feet: multiply or divide? (Divide, because feet are larger so you need a smaller number [6].)

Check understanding: Check whiteboards for 5 lb; pull small group to reteach dividing by 16 [8] if needed.

Support: Provide sentence frames and a worked example showing 80 ounces converts to pounds by dividing by 16 [8]. **Stretch:** Ask pairs to do a two-step: yards all the way to inches using 1 yd = 3 ft [12] and 1 ft = 12 in [12].

Use: Slides 4, 10

30–50 min **Main activity** 20 min · Pairs

Solve multi-step real-world problems by converting to one unit first, then adding.

YOU DO

1. Hand out Worksheet Task B and show Slide 9 with the drink and rope totals.
2. Model the rope without devices: 4 ft = 4 x 12 = 48 in [12], then 48 + 18 = 66 in, circling in.
3. Set pairs to work: convert first, then add, showing multiply or divide each time.
4. Remind students that 1.2 meters is 120 centimeters [8] and operations with decimals to hundredths help write answers like 1.05 m [2].

STUDENTS DO

1. Work in pairs on Slide 9 totals and then Worksheet Task B warm-ups and real-life problems.
2. Write both steps and circle the final unit, checking against 5 kilometers equals 5000 meters [5].
3. Compare answers and defend the choice of multiply or divide.

Say: Real problems need two steps. First convert so both amounts use the same unit. Then add. Show your multiply or divide every time and circle your final unit.

Worked example: Drink: 1.5 L + 750 mL = ? mL. Milli- means 0.001 [5], so 1 L = 1000 mL. 1.5 x 1000 = 1500 mL. 1500 + 750 = 2250 mL. Rope: 4 ft + 18 in = ? in. 4 x 12 = 48 in [12]. 48 + 18 = 66 in.

Ask: Why can we not add 1.5 L and 750 mL right away? (They are different-sized units; convert to one unit first, then add.) · Drink problem: did you multiply or divide, and why? (Multiply 1.5 by 1000 to get more milliliters because milliliters are smaller [6].)

Check understanding: Collect one problem per pair on boards; if conversions are flipped, replay the more-or-fewer pieces check.

Support: Highlight the units in each problem and provide the fact that 1 kilometer = 1000 meters [5] for reference. **Stretch:** Have students create an extra step that asks for the difference between two converted amounts.

Use: Slide 9, Worksheet Task B

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50–60 min **Plenary** 10 min · Whole class

Check accuracy of conversions and lock in when to multiply or divide.

YOU DO

1. Show Slide 12 true-or-false cards and have teams vote true or false with paddles.
2. Fix the trick: 1.2 m = 120 cm, not 12 cm, because 1.2 meters is 120 centimeters [8].
3. Show Slide 11 and have each student pick the trick they will use first: more pieces or fewer, decimal move, or estimate then check.

STUDENTS DO

1. Vote true or false and write the multiplication or division to defend the call.
2. Correct the false one and state the right conversion.
3. Tell a partner which trick helps most before the exit ticket.

Say: Catch the fakes. Prove each with math. Kilo means 1,000, so 1 kg = 1,000 g. For 36 in, we divide by 12 to get 3 ft. Think every time: more pieces or fewer?

Ask: Is 80 oz = 5 lb true? How do you know? (True, divide by 16 [8] because 16 ounces in a pound [8].) · Is 1.2 m = 12 cm true? (False, 1.2 m = 120 cm [8] because 100 cm = 1 m [4].)

Check understanding: Exit ticket on paper; reteach small group tomorrow if divide-versus-multiply is still flipped.

Support: Give a reference strip showing every gallon has four quarts [6] and 16 ounces in a pound [8]. **Stretch:** Have students write two tricky false statements of their own for another team to fix.

Use: Slides 11-12

Common mistakes

Mistake	How to spot it	How to fix it
Multiplying when converting to a larger unit, getting a bigger number.	Answer has more units after switching to a larger unit, like 5 cm = 500 m.	Use bigger unit means fewer; small to large means divide for a smaller number [6].
Writing 1.2 m = 12 cm.	Student multiplies by 10 instead of 100.	Show 100 cm = 1 m [4], so 1.2 m is 120 centimeters [8].
Multiplying ounces to get pounds, like 80 oz = 1280 lb.	Number gets huge when it should shrink.	Recall 16 ounces in a pound [8], so divide 80 by 16 to get 5 lb [8].

Support

- Highlight the units in each problem and provide the fact that 1 kilometer = 1000 meters [5] for reference
- Give a place-value chart and centimeters to millimeters table where 10 mm = 1 cm [4]
- Let students line up centimeter strips to build 120 cm using 100 cm = 1 m [4]

Stretch

- Have students create an extra step that asks for the difference between two converted amounts
- Have pairs find a third length between 120 cm and 121 cm and write it in both units
- Have students write two tricky false statements for another team to fix

For the LSE or teaching assistant

Sit with target pairs in main activity; read Task B aloud, help highlight units, prompt more pieces or fewer, and check decimal placement for 0.05 m types.

Check for understanding

Question	Answer
Convert 5 cm to meters.	0.05 m (divide by 100)
Is 36 in = 3 ft true? Show the math.	True, 36 divided by 12 = 3 because 12 in = 1 ft
Solve: 1.5 L + 750 mL = ? mL. Show both steps.	1500 mL + 750 mL = 2250 mL

Homework

Measure 2 home objects in cm, convert each to mm and m, and show multiply or divide.

Sources

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