Multiplying Fractions by Whole Numbers

Grade 5 · Fractions unit, lesson 3 of 8 · Free lesson

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Common Core Standard: 5.NF.B.4

Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a x q / b.

OVERVIEW

This lesson is the hinge of the whole unit. Pupils who meet fraction multiplication first as a rule (multiply the tops, multiply the bottoms), will apply it blindly for years. Pupils who meet it as copies and jumps build a mental picture that survives: the whole number counts how many, the numerator counts pieces, and the denominator just names the piece size, so it cannot change. Insist on the picture now and next lesson's area models will feel like a natural next step instead of a new trick. Watch for the pupil who multiplies the denominator: that error, caught today, is cheap. Caught in June, it is expensive.

MATERIALS

- Printed task cards (page 2 of this worksheet) and scissors for each pair
- A long number line on the board for demonstrating jumps. Masking tape on the floor works brilliantly
- The practice page (page 3) and pencils. Leave room in margins for pupils to sketch their own jumps

DIRECTIONS

1. Teach the lesson slides, counting the landings out loud together on both number-line problems.
2. Pairs cut out the task cards and draw the jumps for each card on its back before writing the product.
3. Set the practice page. Pupils must show the counting (for example 4 x 2 = 8 thirds) beside every Part B answer.
4. Mark together from page 4, asking each time: what did the whole number multiply, and what stayed the same?

EVIDENCE OF LEARNING

Success looks like this: the pupil multiplies the numerator only, explains that the piece size cannot change, and converts the product to a mixed number without being asked.

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Task Cards: Cut Apart and Solve

Cut along the dashed lines. For each card, draw the jumps on the number line, count the pieces you land on, then write the product.

Card 1



Draw the jumps on the line, then multiply: 3 x 1/4 = ?

_____ **Answer:** _____

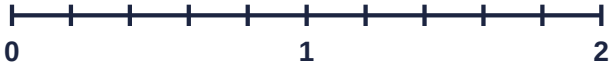
Card 2



Draw the jumps on the line, then multiply: 4 x 2/3 = ?

_____ **Answer:** _____

Card 3



Draw the jumps on the line, then multiply: 2 x 3/5 = ?

_____ **Answer:** _____

Card 4



Draw the jumps on the line, then multiply: 5 x 1/6 = ?

_____ **Answer:** _____

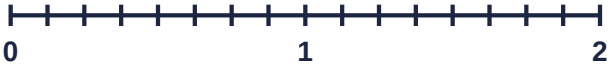
Card 5



Draw the jumps on the line, then multiply: 3 x 2/7 = ?

_____ **Answer:** _____

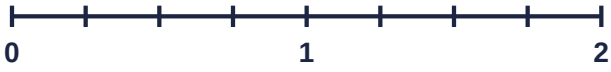
Card 6



Draw the jumps on the line, then multiply: 4 x 3/8 = ?

_____ **Answer:** _____

Card 7



Draw the jumps on the line, then multiply: 6 x 1/4 = ?

_____ **Answer:** _____

Card 8



Draw the jumps on the line, then multiply: 2 x 5/6 = ?

_____ **Answer:** _____

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Multiplying Fractions by Whole Numbers

Name: _____ Date: _____ Class: _____

Part A - Jumps on the Line

Draw the jumps on each line, then write the product.

1. 3 x 2/5 = _____



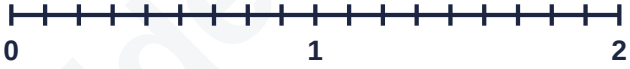
2. 4 x 1/3 = _____



3. 2 x 5/8 = _____



4. 5 x 2/9 = _____



Part B - Multiply

Multiply the numerator only. Write products as mixed numbers when they pass 1.

1. 4 x 3/10 = _____
2. 7 x 1/8 = _____
3. 3 x 4/9 = _____
4. 6 x 5/12 = _____

Part C - Word Problems

Draw a quick number line in the margin if it helps.

1. Each ribbon spool holds 2/3 of a metre of ribbon.
Ivy buys 5 spools. How much ribbon does she buy in total?

_____

Answer: _____ metres

2. A measuring jug holds 4/5 of a litre of water.
How much water is there in 3 full jugs?

_____

Answer: _____ litres

Say it like a mathematician:
___ x __/__ is ___ jumps of __/__ on the number line, landing on ___.

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Answer Key - Fractions by Whole Numbers

Task Cards

1. 3/4 (3 jumps of 1/4).
2. 2 2/3 (4 x 2 = 8 thirds = 8/3).
3. 1 1/5 (2 x 3 = 6 fifths = 6/5).
4. 5/6 (5 jumps of 1/6).
5. 6/7 (3 x 2 = 6 sevenths).
6. 1 1/2 (4 x 3 = 12 eighths = 12/8).
7. 1 1/2 (6 x 1 = 6 quarters = 6/4).
8. 1 2/3 (2 x 5 = 10 sixths = 10/6).

Part A - Jumps on the Line

1. 1 1/5 (6/5).
2. 1 1/3 (4/3).
3. 1 1/4 (10/8).
4. 1 1/9 (10/9).

Part B - Multiply

1. 1 1/5 (12/10).
2. 7/8.
3. 1 1/3 (12/9).
4. 2 1/2 (30/12).

Part C - Word Problems

1. 3 1/3 metres (5 x 2 = 10 thirds = 10/3).
2. 2 2/5 litres (3 x 4 = 12 fifths = 12/5).

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