

Grade 5 - Multiplication as Scaling - Answer Key

Common Core 5.NF.B.5a, 5.NF.B.5b · maths-pdf.fr/en/

This answer key explains each of the 20 problems. Prediction problems state how the scale factor compares with 1. Calculation problems show the multiplication steps and then compare the product with the original factor. Final answers are in bold.

Grade 5 · Common Core State Standards: **5.NF.B.5a, 5.NF.B.5b**

Exercise 1 - Predict the size

The factor $\frac{3}{4}$ is less than 1.

Multiplying by a number less than 1 makes the product smaller than the other factor.

Less than 8.

Exercise 2 - Factor greater than 1

The factor $\frac{5}{4}$ is greater than 1.

Multiplying by a number greater than 1 makes the product larger than the other factor.

Greater than 6.

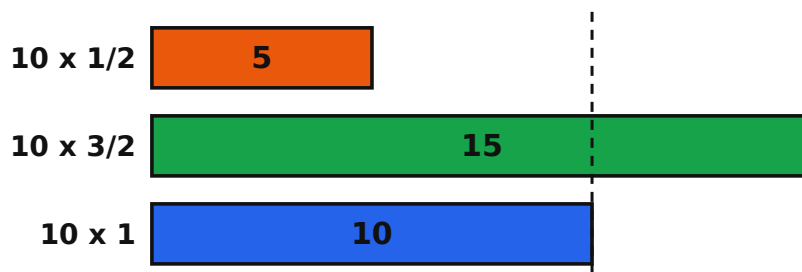
Exercise 3 - Factor equal to 1

The fraction $\frac{4}{4}$ equals 1.

Multiplying by 1 does not change the other factor.

Equal to 7.

Exercise 4 - Order the products



The bars show 5, 15, and 10.

$$10 \times \frac{1}{2} = 5, 10 \times \frac{3}{2} = 15, \text{ and } 10 \times 1 = 10.$$

Least to greatest: $10 \times \frac{1}{2}$, 10×1 , $10 \times \frac{3}{2}$.

Exercise 5 - Fill in the symbols

(a) $\frac{7}{8} < 1$, so the product is smaller: $9 \times \frac{7}{8} < 9$.

(b) $\frac{9}{8} > 1$, so the product is larger: $9 \times \frac{9}{8} > 9$.

(c) $\frac{8}{8} = 1$, so the product is the same: $9 \times \frac{8}{8} = 9$.

Exercise 6 - Compare to one factor

The factor $\frac{1}{2}$ is less than 1.

Multiplying by a number less than 1 makes the product smaller than the other factor.

Multiply the numerators and multiply the denominators: $\frac{5}{6} \times \frac{1}{2} = \frac{5 \times 1}{6 \times 2} = \frac{5}{12}$.

$$\frac{5}{12}$$

The product $\frac{5}{12}$ is less than $\frac{5}{6}$.

Exercise 7 - Compute and compare

Write the whole number 12 as $\frac{12}{1}$.

Multiply the numerators and multiply the denominators: $\frac{12}{1} \times \frac{3}{4} = \frac{12 \times 3}{1 \times 4} = \frac{36}{4}$.

Simplify: $\frac{36}{4} = 9$.

$$9$$

$9 < 12$, which matches the prediction because $\frac{3}{4} < 1$.

Exercise 8 - Scaling up

Write the whole number 6 as $\frac{6}{1}$.

Multiply the numerators and multiply the denominators: $\frac{6}{1} \times \frac{5}{3} = \frac{6 \times 5}{1 \times 3} = \frac{30}{3}$.

Simplify: $\frac{30}{3} = 10$.

10

$10 > 6$, which matches the prediction because $\frac{5}{3} > 1$.

Exercise 9 - Smaller than both factors

Multiply the numerators and multiply the denominators: $\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12}$.

Simplify: $\frac{6}{12} = \frac{1}{2}$.

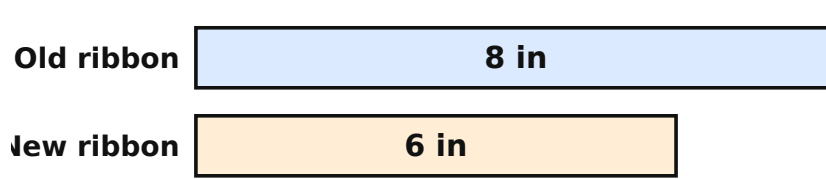
$\frac{1}{2}$

Compare with $\frac{2}{3}$: $\frac{1}{2} = \frac{3}{6}$ and $\frac{2}{3} = \frac{4}{6}$, so $\frac{1}{2} < \frac{2}{3}$.

Compare with $\frac{3}{4}$: $\frac{1}{2} = \frac{2}{4}$, so $\frac{1}{2} < \frac{3}{4}$.

The product is less than both factors.

Exercise 10 - Resize a ribbon



Three fourths of 8 inches is 6 inches.

The factor $\frac{3}{4}$ is less than 1.

Multiplying by a number less than 1 makes the product smaller than the other factor.

Write the whole number 8 as $\frac{8}{1}$.

Multiply the numerators and multiply the denominators: $\frac{8}{1} \times \frac{3}{4} = \frac{8 \times 3}{1 \times 4} = \frac{24}{4}$.

Simplify: $\frac{24}{4} = 6$.

6

The new ribbon is 6 inches long.

Exercise 11 - Which products are larger?

The factors $\frac{7}{6}$ and $\frac{5}{4}$ are greater than 1. The factor $\frac{2}{3}$ is less than 1, and 1 equals 1.

Check: $14 \times \frac{2}{3} = 9\frac{1}{3}$, $14 \times \frac{7}{6} = 16\frac{1}{3}$, $14 \times 1 = 14$, $14 \times \frac{5}{4} = 17\frac{1}{2}$.

$14 \times \frac{7}{6}$ and $14 \times \frac{5}{4}$ are greater than 14.

Exercise 12 - Mixed number scaled down

Write the mixed number as improper fraction: $2\frac{1}{2} = \frac{5}{2}$.

Multiply the numerators and multiply the denominators: $\frac{5}{2} \times \frac{4}{5} = \frac{5 \times 4}{2 \times 5} = \frac{20}{10}$.

Simplify: $\frac{20}{10} = 2$.

2

$2 < 2\frac{1}{2}$, which matches the prediction because $\frac{4}{5} < 1$.

Exercise 13 - Mixed number scaled up

Write the mixed numbers as improper fractions: $3\frac{1}{3} = \frac{10}{3}$ and $1\frac{1}{5} = \frac{6}{5}$.

Multiply the numerators and multiply the denominators: $\frac{10}{3} \times \frac{6}{5} = \frac{10 \times 6}{3 \times 5} = \frac{60}{15}$.

Simplify: $\frac{60}{15} = 4$.

4

$4 > 3\frac{1}{3}$, which matches the prediction because $1\frac{1}{5} > 1$.

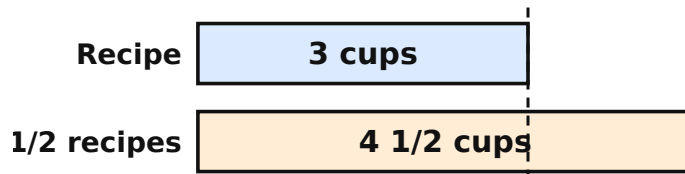
Exercise 14 - Explain two products

$\frac{1}{4} \times 8 = \frac{8}{4} = 2$.

$$\frac{5}{4} \times 8 = \frac{40}{4} = 10.$$

$\frac{1}{4}$ is less than 1, so the product 2 is less than 8. $\frac{5}{4}$ is greater than 1, so the product 10 is greater than 8.

Exercise 15 - Bigger batch of pancakes



One and a half times 3 is 4 1/2.

The factor $1\frac{1}{2}$ is greater than 1, so he needs more than 3 cups.

Write the mixed number as improper fraction: $1\frac{1}{2} = \frac{3}{2}$.

Write the whole number 3 as $\frac{3}{1}$.

Multiply the numerators and multiply the denominators: $\frac{3}{2} \times \frac{3}{1} = \frac{3 \times 3}{2 \times 1} = \frac{9}{2}$.

Write as a mixed number: $\frac{9}{2} = 4\frac{1}{2}$.

$$4\frac{1}{2}$$

Jamal needs $4\frac{1}{2}$ cups of flour, which is more than 3 cups.

Exercise 16 - Puppy and kitten



The kitten weighs 6 pounds.

The factor $\frac{3}{4}$ is less than 1.

Multiplying by a number less than 1 makes the product smaller than the other factor.

Write the whole number 8 as $\frac{8}{1}$.

Multiply the numerators and multiply the denominators: $\frac{3}{4} \times \frac{8}{1} = \frac{3 \times 8}{4 \times 1} = \frac{24}{4}$.

Simplify: $\frac{24}{4} = 6$.

6

The kitten weighs less than the puppy. It weighs 6 pounds.

Exercise 17 - Enlarged photo

Write the whole number 6 as $\frac{6}{1}$.

Multiply the numerators and multiply the denominators: $\frac{6}{1} \times \frac{5}{2} = \frac{6 \times 5}{1 \times 2} = \frac{30}{2}$.

Simplify: $\frac{30}{2} = 15$.

15

The new width is 15 inches. Compare: $15 > 12$.

The new photo is 15 inches wide, so it will not fit in the 12-inch frame.

Exercise 18 - Plant growth

The factor $\frac{4}{3}$ is greater than 1, so the plant is taller now.

Write the mixed number as improper fraction: $2\frac{1}{4} = \frac{9}{4}$.

Multiply the numerators and multiply the denominators: $\frac{9}{4} \times \frac{4}{3} = \frac{9 \times 4}{4 \times 3} = \frac{36}{12}$.

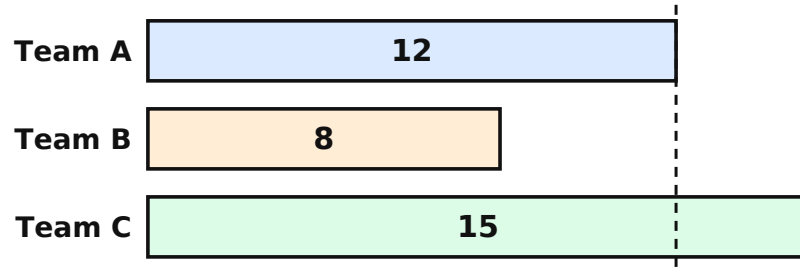
Simplify: $\frac{36}{12} = 3$.

3

Growth: $3 - 2\frac{1}{4} = \frac{3}{4}$ foot.

The plant is 3 feet tall now, and it grew $\frac{3}{4}$ foot.

Exercise 19 - Little League runs



Team B scored 8 runs and Team C scored 15 runs.

Team B: $\frac{2}{3} \times 12 = 8$. The factor is less than 1, so B scored fewer than 12.

Team C: $\frac{5}{4} \times 12 = 15$. The factor is greater than 1, so C scored more than 12.

Team B scored 8 runs and Team C scored 15 runs. Team C scored the most.

Exercise 20 - School store prices

Eraser: $0.80 \times \frac{3}{4} = 0.60$, since one fourth of \$0.80 is \$0.20 and three fourths is \$0.60.

Notebook: $0.80 \times 2\frac{1}{2} = 0.80 \times 2.5 = 2.00$.

Total: $0.80 + 0.60 + 2.00 = 3.40$.

The eraser costs \$0.60, the notebook costs \$2.00, and the total is \$3.40.