

Equivalent Fractions

Two fractions are *equivalent* when they name the same amount, even if the numbers look different. $\frac{1}{2}$ and $\frac{2}{4}$ both mean half of a whole.

Equivalence Rule

Multiply (or divide) both the numerator AND the denominator by the same number.

The fraction changes form but not value: $\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$.

Key Concepts

- Two fractions are **equivalent** when they represent the same amount of the whole, even though they use different numbers.
- To make an equivalent fraction, multiply the top and the bottom by the same number. Whatever you do to the top, you must do to the bottom.
- You can also *divide* both top and bottom by the same number to find a simpler equivalent fraction.
- A fraction is *unchanged* when you multiply numerator and denominator by the same nonzero number, because that's just multiplying by 1 in disguise: $\frac{2}{2} = 1$.

Worked Examples

① Find a fraction equivalent to $\frac{1}{3}$ with denominator 6.

👉 The denominator needs to grow from 3 to 6, so multiply by 2. Whatever you do to the bottom, you must do to the top: $1 \times 2 = 2$. So $\frac{1}{3} = \frac{2}{6}$.

💡 **Answer:** $\frac{2}{6}$

② Are $\frac{2}{4}$ and $\frac{3}{6}$ equivalent?

👉 Try to make them match. $\frac{2}{4}$ simplifies: divide top and bottom by 2 to get $\frac{1}{2}$. $\frac{3}{6}$ also simplifies: divide top and bottom by 3 to get $\frac{1}{2}$. Both reduce to $\frac{1}{2}$, so yes, they are equivalent.

💡 **Answer:** Yes

③ Write two fractions equivalent to $\frac{3}{4}$.

👉 Multiply top and bottom by the same number. Times 2: $\frac{6}{8}$. Times 3: $\frac{9}{12}$. So $\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$. You could keep going: times 4 gives $\frac{12}{16}$, and so on.

💡 **Answer:** $\frac{6}{8}, \frac{9}{12}$ (others possible)

Practice Problems

Fill in the missing number to make equivalent fractions.

1. $\frac{1}{2} = \frac{?}{4}$ _____

2. $\frac{1}{3} = \frac{?}{6}$ _____

3. $\frac{2}{3} = \frac{?}{6}$ _____

4. $\frac{1}{4} = \frac{?}{8}$ _____

5. $\frac{3}{4} = \frac{?}{8}$ _____

6. $\frac{2}{4} = \frac{?}{2}$ _____

7. $\frac{4}{6} = \frac{?}{3}$ _____

8. $\frac{1}{2} = \frac{?}{8}$ _____

9. $\frac{2}{8} = \frac{?}{4}$ _____

10. $\frac{3}{6} = \frac{?}{2}$ _____

11. $\frac{1}{4} = \frac{2}{?}$ _____

12. $\frac{2}{3} = \frac{4}{?}$ _____

Study Tips

-  “Whatever you do to the top, do to the bottom.” That is the one rule of equivalence.
-  To go to a bigger denominator, multiply. To go to a smaller one, divide. Both work as long as the same number is used on top and bottom.
-  Always sanity-check on a fraction strip or number line: equivalent fractions land at the same spot, even if their tick marks differ.

 Word Problems

1. Tom ate $\frac{2}{4}$ of a pizza and Sara ate $\frac{1}{2}$ of an identical pizza. Did they eat the same amount? Explain.

Answer: _____

2. A recipe calls for $\frac{3}{4}$ cup of flour. Jenny only has a $\frac{1}{8}$ -cup scoop. How many scoops does she need?

Answer: _____

Answer Key — with Friendly Explanations**Practice Problems**

1. Multiply top and bottom by 2: $\frac{1 \times 2}{2 \times 2} = \frac{2}{4}$.

 **Answer:** 2

2. Multiply by 2: $\frac{2}{6}$.

 **Answer:** 2

3. Multiply by 2: $\frac{4}{6}$.

 **Answer:** 4

4. Multiply by 2: $\frac{2}{8}$.

 **Answer:** 2

5. Multiply by 2: $\frac{6}{8}$.

 **Answer:** 6

6. Divide top and bottom by 2: $\frac{1}{2}$.

 **Answer:** 1

7. Divide by 2: $\frac{2}{3}$.

 **Answer:** 2

8. Multiply by 4: $\frac{4}{8}$.

 **Answer:** 4

9. Divide by 2: $\frac{1}{4}$.

 **Answer:** 1

10. Divide by 3: $\frac{1}{2}$.

 **Answer:** 1

11. To make 1 into 2, multiply by 2; do the same on the bottom: $4 \times 2 = 8$.

 **Answer:** 8

12. To make 2 into 4, multiply by 2; do the same to 3: 6.

 **Answer:** 6

Word Problems

1. $\frac{2}{4} = \frac{1}{2}$. They ate the same amount.

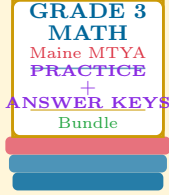
 **Answer:** *Yes*

2. $\frac{3}{4} = \frac{6}{8}$, so 6 of the $\frac{1}{8}$ -cup scoops.

 **Answer:** 6 scoops

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