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: $\frac{1}{2} = \frac{1\times2}{2\times2} = \frac{2}{4}$.

Key Concepts

1. Two fractions are **equivalent** when they represent the same amount of the whole, even though they use different numbers.

2. 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.

3. You can also *divide* both top and bottom by the same number to find a simpler equivalent fraction.

4. 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: $\frac{1\times2}{2\times2} = \frac{2}{4}$.

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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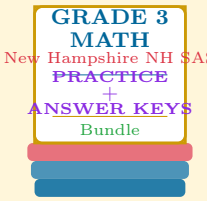

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