FRACTIONS
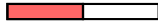
A DEFINITIONS

Discover: Hugo is very hungry after playing soccer. His dad baked two identical cakes. Hugo eats one whole cake:

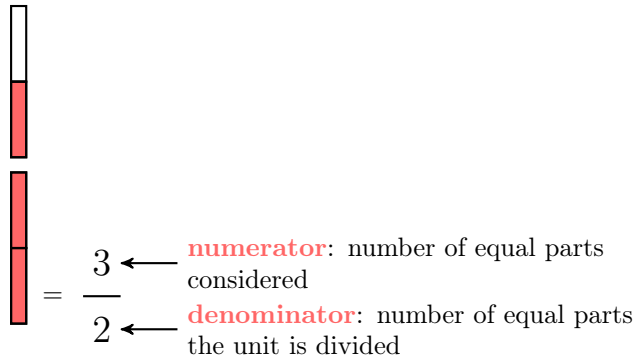How much cake does Hugo eat in total? Write your answer as a fraction.

Answer:

- Hugo eats one whole cake and half of another cake.

- The numerator (top number) shows how many parts Hugo eats: 3.

- The denominator (bottom number) shows how many equal parts make one cake: 2.

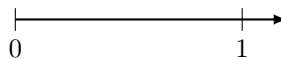- So Hugo eats $\dfrac{3}{2}$ cakes in total.

Definition **Fraction**

A **fraction** includes two numbers: the **numerator** and the **denominator**, separated by a bar.

$$= \frac{3}{2}$$

numerator: number of equal parts considered

denominator: number of equal parts the unit is divided
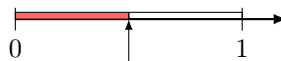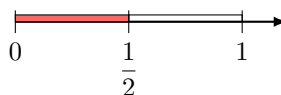

B ON THE NUMBER LINE

Discover:

- Hugo is walking along a path.

- He stops and asks himself, "Where am I?"

- His father says, "You are at half of the way that is $\dfrac{1}{2}$."

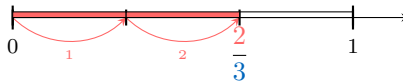To represent the fraction $\dfrac{2}{3}$ on a number line.

1. Draw a straight line and mark the points 0 and 1.
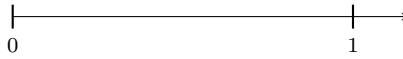
2. Divide the line between 0 and 1 into 3 equal parts.
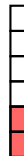

3. Count 2 parts from 0 and mark the point.

C EQUIVALENT FRACTIONS

Discover: Mr. Tariel has a cake that he cuts into **3 equal parts**. He plans to give **1 part** to his son, Louis.


Louis says, "I want **2 pieces**!"
His dad replies, "Alright," and cuts each of the **3 parts** in half, making **6 smaller equal parts**. He then gives Louis **2 of these smaller pieces**.

Louis looks at his plate and feels disappointed.
Why is Louis still not happy?

Answer: Even though Louis got **2 pieces** instead of 1, the total amount of cake he received is the same as before. His dad just cut the cake into smaller pieces.
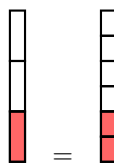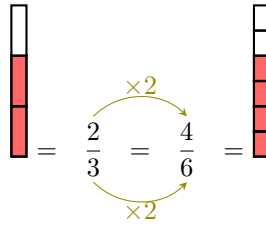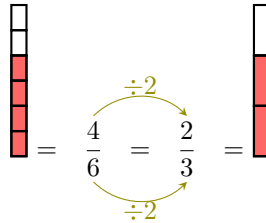

In fractions:

$$\frac{1}{3} = \frac{2}{6}$$

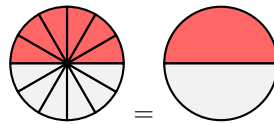- When you multiply the numerator and the denominator by the same number, the fractions are equals.

$$= \quad \frac{2}{3} \quad \overset{\times 2}{\underset{\times 2}{=}} \quad \frac{4}{6} \quad =$$

- When you divide the numerator and the denominator by the same number, the fractions are equals.

$$= \quad \frac{4}{6} \quad \overset{\div 2}{\underset{\div 2}{=}} \quad \frac{2}{3} \quad =$$

D SIMPLIFICATION

Discover: Pizza Time! Louis eats $\frac{6}{12}$ of a pizza. Hugo says, "Hey, $\frac{6}{12}$ is the same as $\frac{1}{2}$. It's easier to understand if you simplify the fraction!".
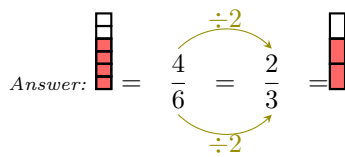
$$=$$

- **Louis:** "How is $\frac{1}{2}$ easier?"

- **Hugo:** "Because $\frac{1}{2}$ is the simplified form of $\frac{6}{12}$. It means you ate 1 out of 2 slices instead of 6 out of 12 slices. It's the same amount of pizza, but it's simpler to understand!"

Method **Simplifying a fraction**

To simplify a fraction, we find an equivalent fraction with the smallest possible numerator and denominator.

Ex: Simplify $\frac{4}{6}$

$Answer:$ $\quad = \quad \frac{4}{6} \quad \overset{\div 2}{\underset{\div 2}{=}} \quad \frac{2}{3} \quad =$

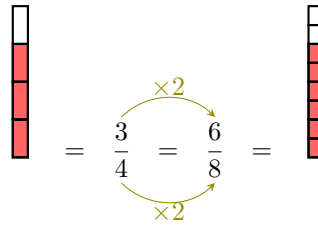## E ORDERING FRACTIONS

Discover:

- Hugo eats $\frac{3}{4}$ of a cake.

- Louis eats $\frac{5}{8}$ of the same cake.

Who eats more cake?

Answer:

- We need to compare the fractions $\frac{3}{4}$ and $\frac{5}{8}$.

- To compare fractions, the pieces must be the same size. We do this by finding a common denominator.

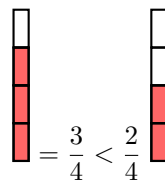- Convert $\frac{3}{4}$ to an equivalent fraction with denominator 8:

$$= \quad \frac{3}{4} \quad \overset{\times 2}{\underset{\times 2}{=}} \quad \frac{6}{8} \quad =$$

- Now, Hugo eats $\frac{6}{8}$ of the cake and Louis eats $\frac{5}{8}$.

- Since $\frac{6}{8} > \frac{5}{8}$, Hugo eats more cake.

Definition Ordering Fractions with the Same Denominator

For two fractions with the same denominator, the fraction with the larger numerator is larger.

Ex: Compare $\frac{3}{4}$ and $\frac{2}{4}$.

Answer:

$$= \frac{3}{4} < \frac{2}{4}$$

**Method Comparing Fractions with Different Denominators**

To compare two fractions with different denominators:

- Find a **common denominator**.

- Convert each fraction to an equivalent fraction with that denominator.

- Compare the numerators.

Ex: Compare $\frac{1}{2}$ and $\frac{3}{4}$.

Answer:

- Since $\frac{1}{2}$ and $\frac{3}{4}$ have different denominators, we change $\frac{1}{2}$ into an equivalent fraction with denominator 4:
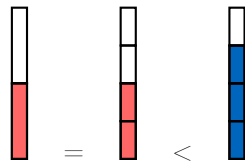
$$= \quad \frac{1}{2} \quad \overset{\times 2}{\underset{\times 2}{=}} \quad \frac{2}{4} \quad =$$
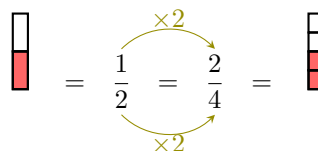
- Compare the numerators:

$$\frac{2}{4} < \frac{3}{4}$$

- Therefore,

$$\frac{1}{2} < \frac{3}{4}$$

- In pictures:

$$=\qquad<$$

Discover: Hugo eats $\frac{2}{4}$ of a cake: and Louis eats $\frac{1}{4}$ of the same cake:
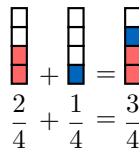Which fraction of the cake have Hugo and Louis eaten together?

Answer:

$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$
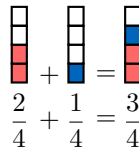
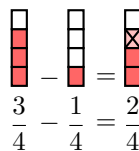So Hugo and Louis eat $\frac{3}{4}$ of the cake together:

Definition **Addition of Fractions with Common Denominators**

When we **add** fractions with common denominators, we keep the denominator the same and add the numerators:

$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

Definition **Subtraction of Fractions with Common Denominators**

When we **subtract** fractions with common denominators, we keep the denominator the same and subtract the numerators:
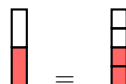

$$\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$$

Discover: Hugo eats $\frac{1}{2}$ of a cake: and Louis eats $\frac{1}{4}$ of the same cake: .
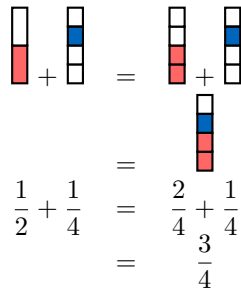What fraction of the cake have Hugo and Louis eaten together?

Answer:

- **Step 1: Find a common denominator**: To add the fractions, we need equal-sized parts. Divide each of Hugo's parts into two smaller parts:

So, Hugo eats $\frac{1}{2} = \frac{2}{4}$ of the cake.

- **Step 2: Add the fractions using the common denominator**: Now, we can add the two fractions:

$$\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$$
$$= \frac{3}{4}$$

- **Step 3: Final Answer**: Hugo and Louis eat $\frac{3}{4}$ of the cake together:

Method **Addition or Subtraction of Fractions with Different Denominators**

To add or subtract fractions with different denominators:

- **Find a common denominator**: Choose a common multiple of the denominators.

- **Convert each fraction**: Rewrite each fraction so it has the common denominator.

- **Add or subtract the numerators**: Add or subtract the numerators and keep the denominator the same.