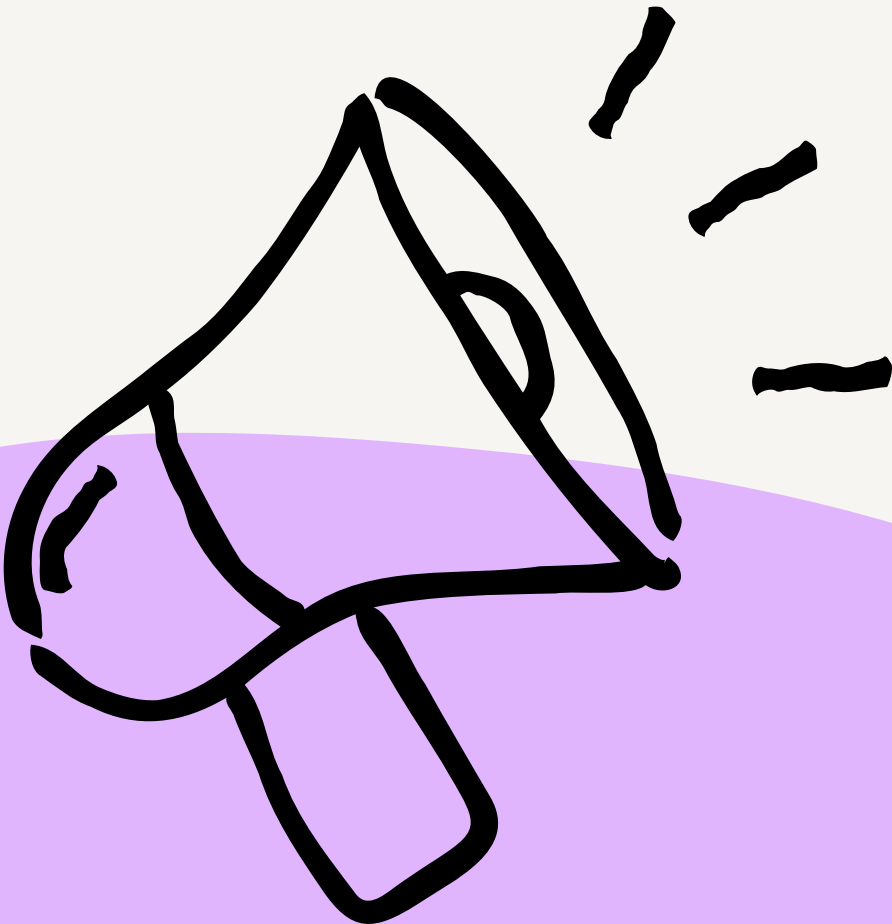
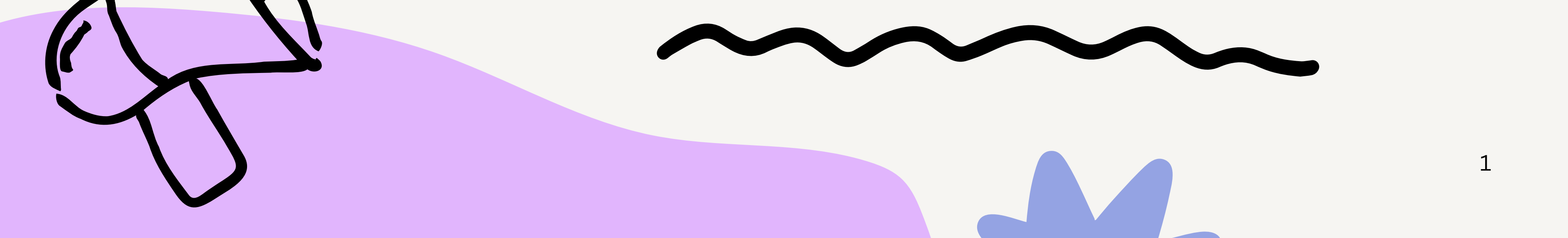




ARITHMETIC AND



Fractions II

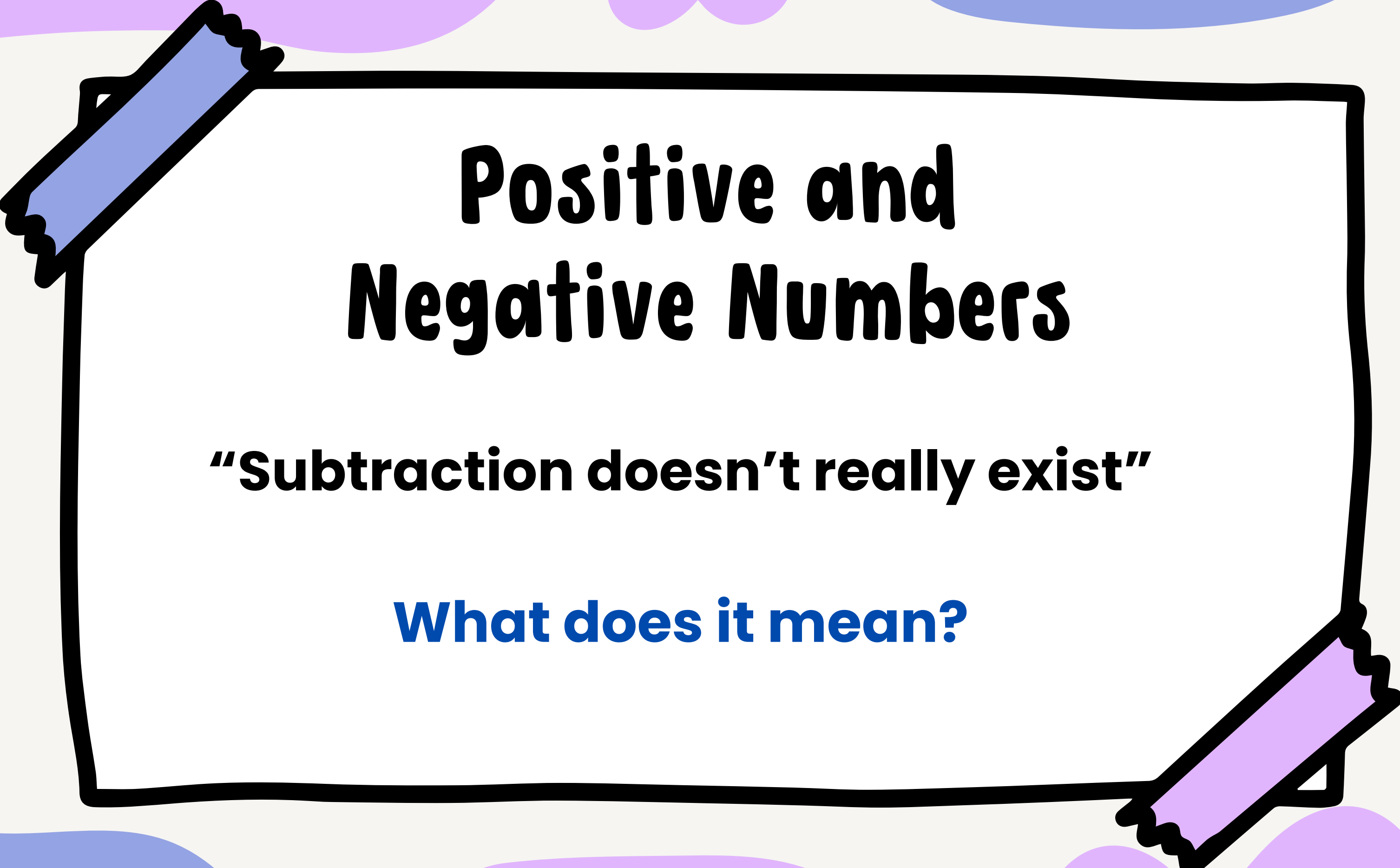
Contents

- **Positive and Negative Numbers**
- **Mental Math, Addition and Subtraction**
- **Dicimals**

- **Rounding**
- **Fractions**
- **Word Problems with fractions**

Contents

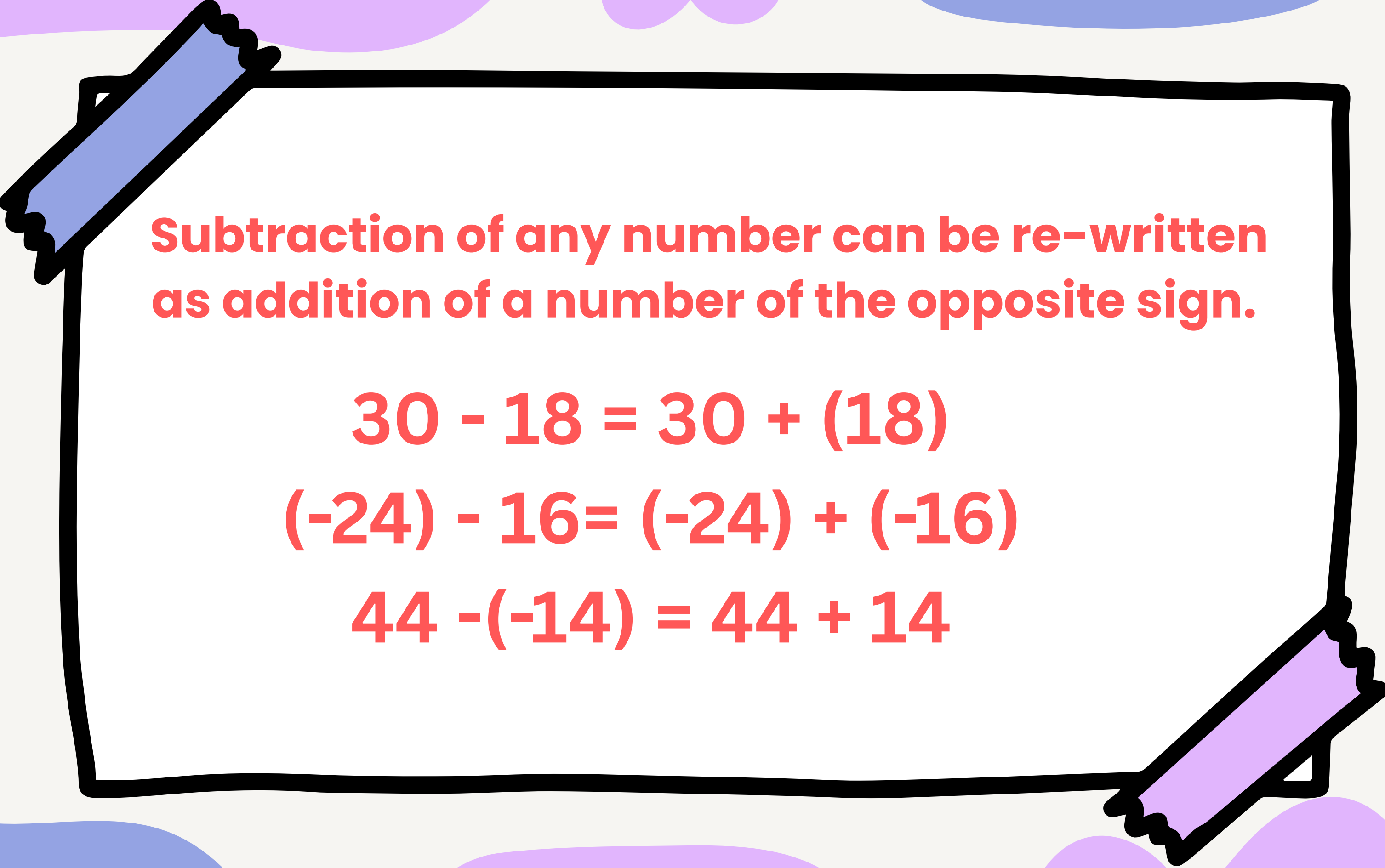
- **Positive Numbers are greater than zero.**
- **Negative numbers are less than zero.**
- **Zero is neither positive nor negative.**
- **A number line helps us see order and direction.**
- **Which is greater: -3 or -8 ? Explain using the number line.**



Positive and Negative Numbers

“Subtraction doesn’t really exist”

What does it mean?



**Subtraction of any number can be re-written
as addition of a number of the opposite sign.**

$$30 - 18 = 30 + (18)$$

$$(-24) - 16 = (-24) + (-16)$$

$$44 - (-14) = 44 + 14$$

The Sign Rules for Multiplication :

$$(\text{positive}) * (\text{positive}) = \text{positive}$$

$$(\text{negative}) * (\text{negative}) = \text{positive}$$

$$(\text{positive}) * (\text{negative}) = \text{negative}$$

Same signs  positive product

Different signs  negative product

The Sign Rules for Division :

$$(\text{positive}) / (\text{positive}) = \text{positive}$$

$$(\text{negative}) / (\text{negative}) = \text{positive}$$

$$(\text{positive}) / (\text{negative}) = \text{negative}$$

Same signs  positive quotient

Different signs  negative quotient

Absolute Value

“Absolute value means distance from zero.”

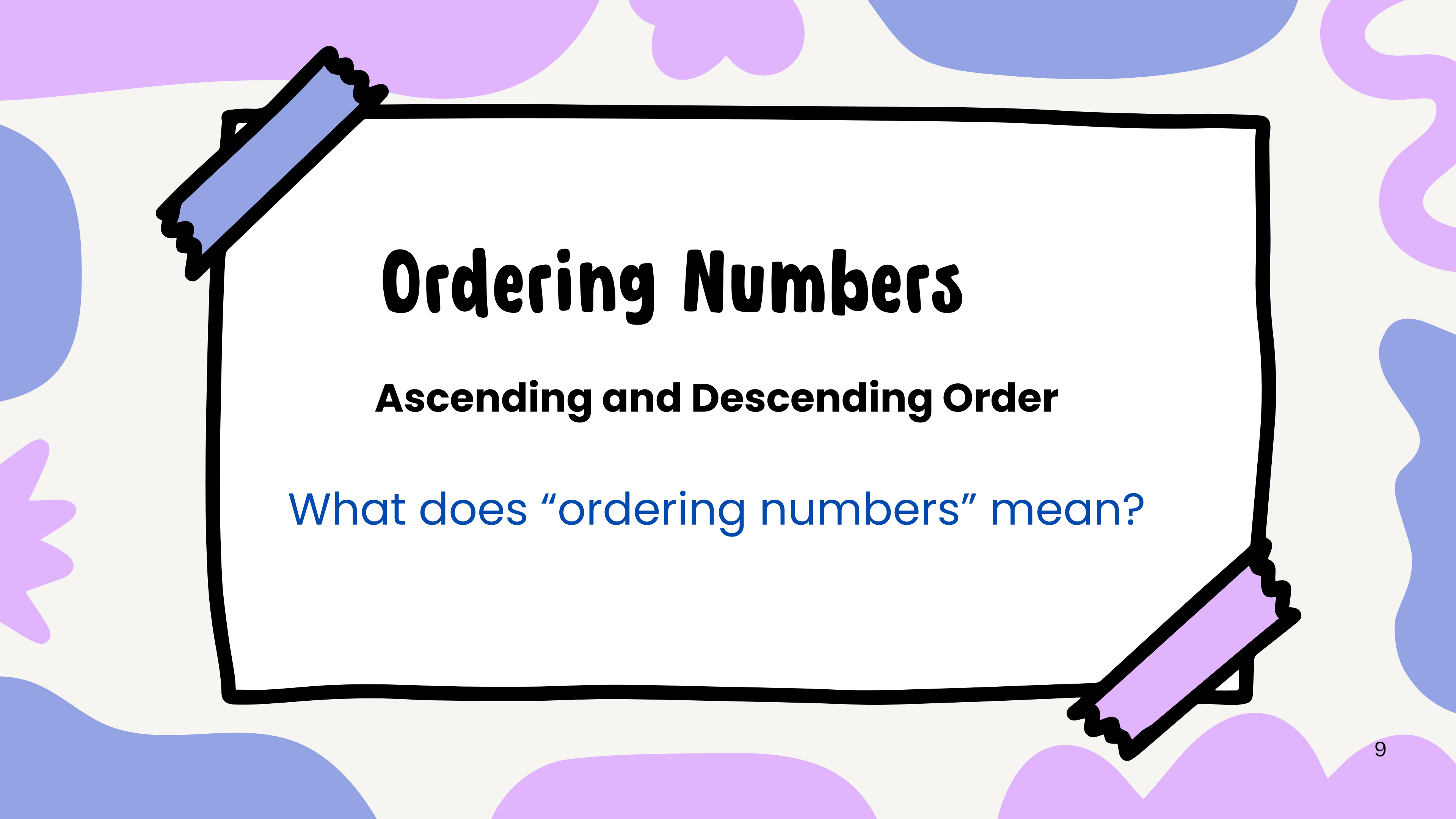
What does it mean?

The definition of absolute value is
“it makes everything positive”

Absolute Value

- Notation: $|a|$.
- Distance is never negative, so $|-7| = 7$ and $|7| = 7$.
- Important: $-|7| = -7$ because the negative sign is outside the absolute-value bars.

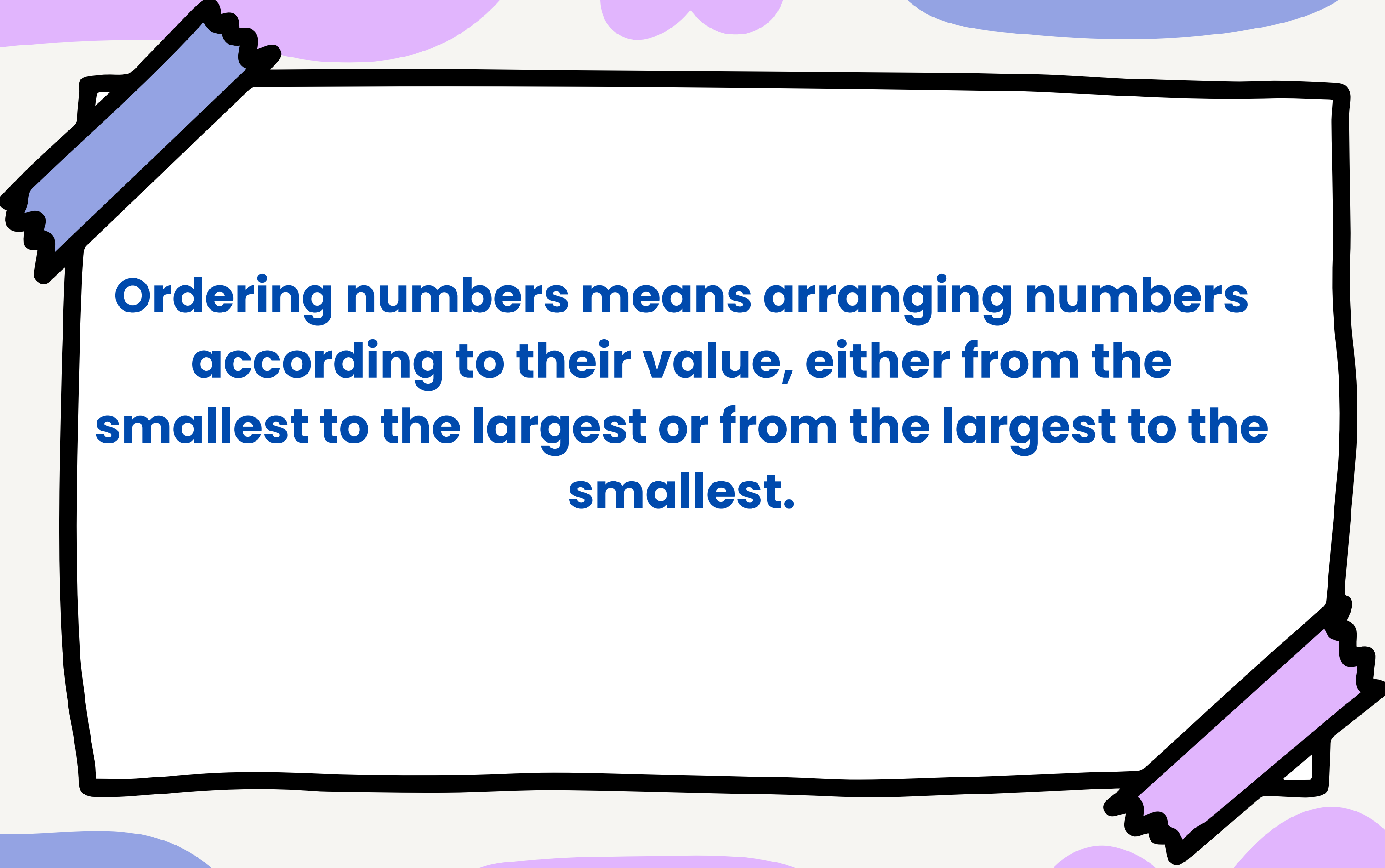
Practice / Check: Find $|-12|$, $|3.5|$, $|0|$, and $-|-9|$.



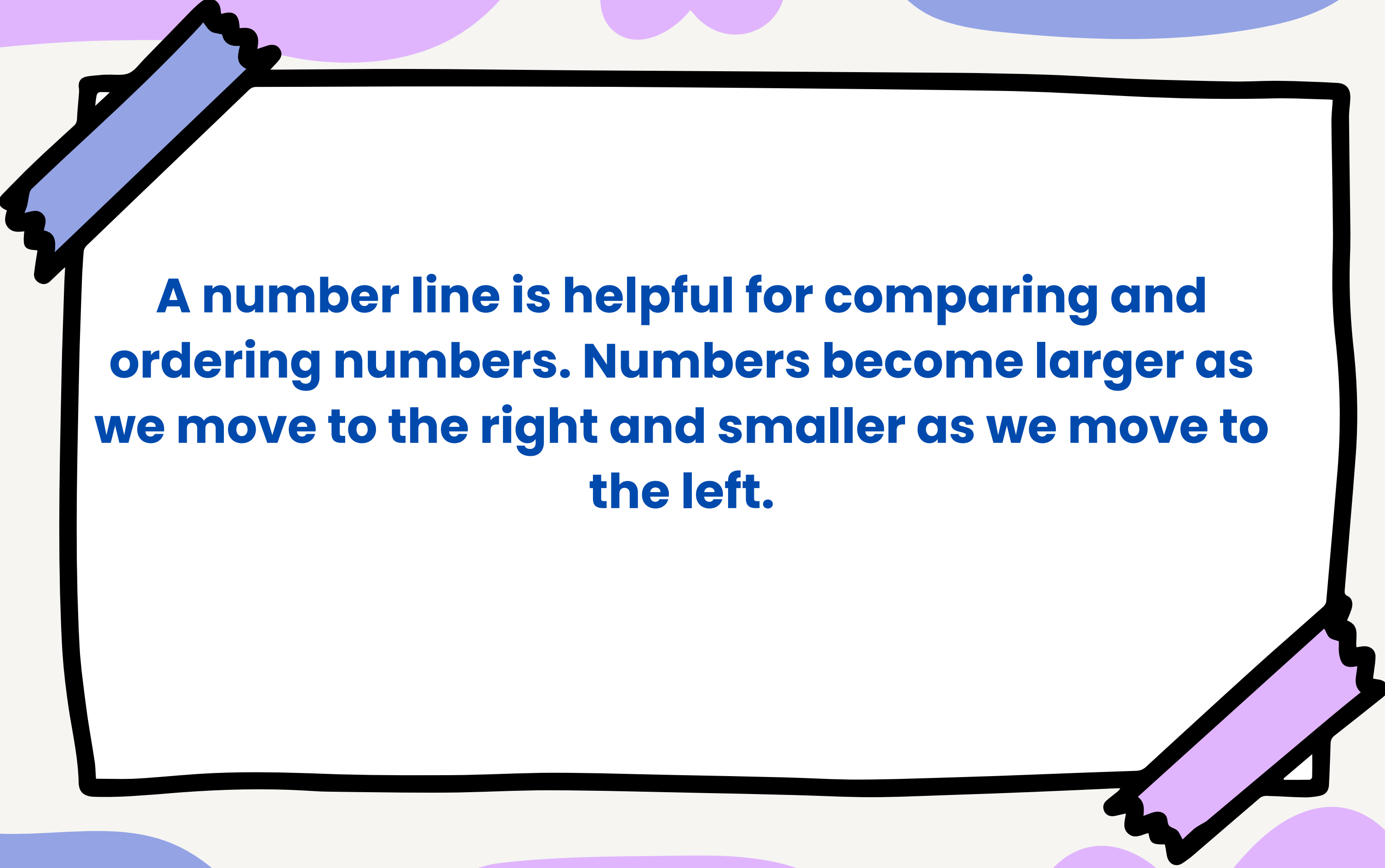
Ordering Numbers

Ascending and Descending Order

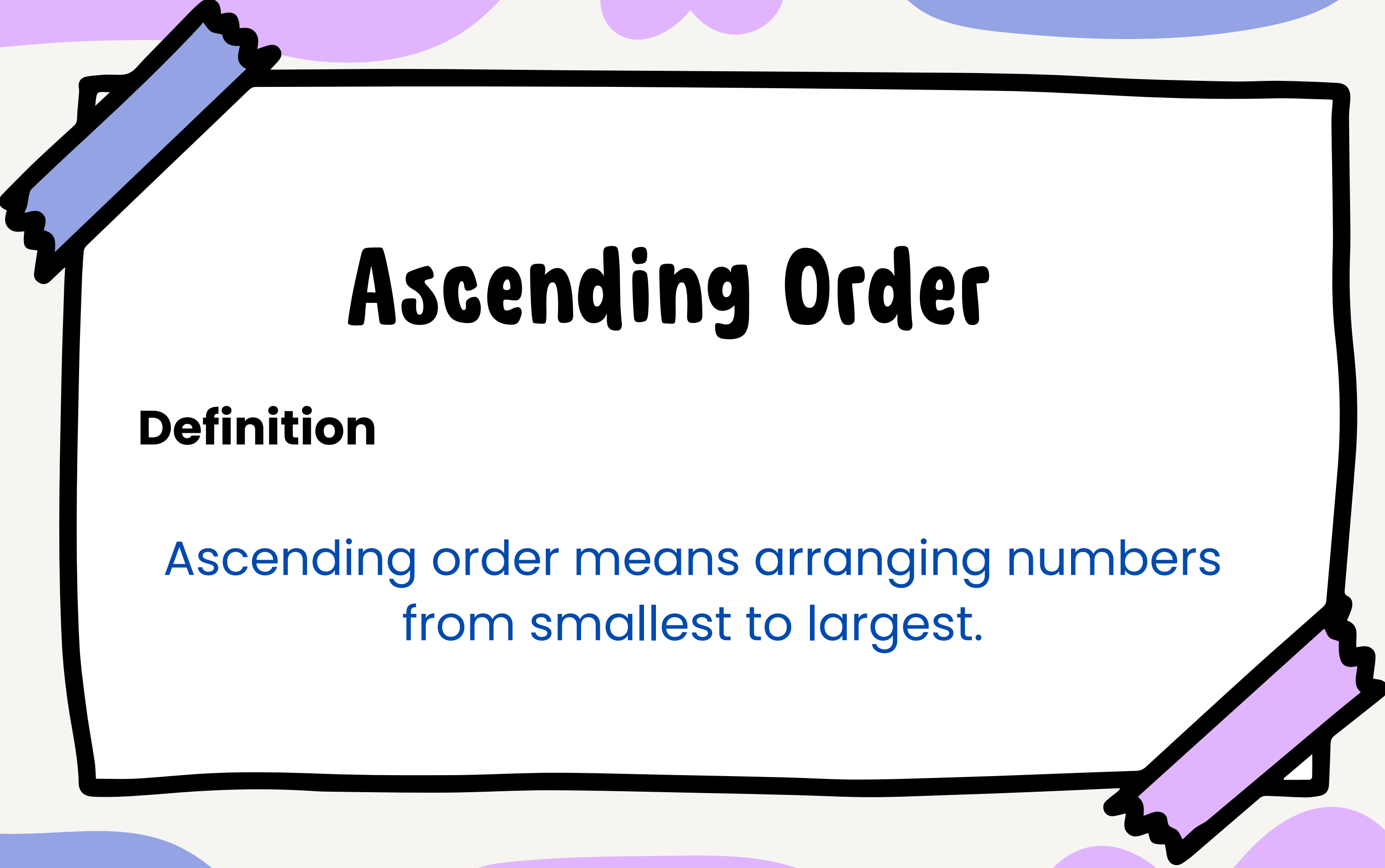
What does “ordering numbers” mean?



Ordering numbers means arranging numbers according to their value, either from the smallest to the largest or from the largest to the smallest.



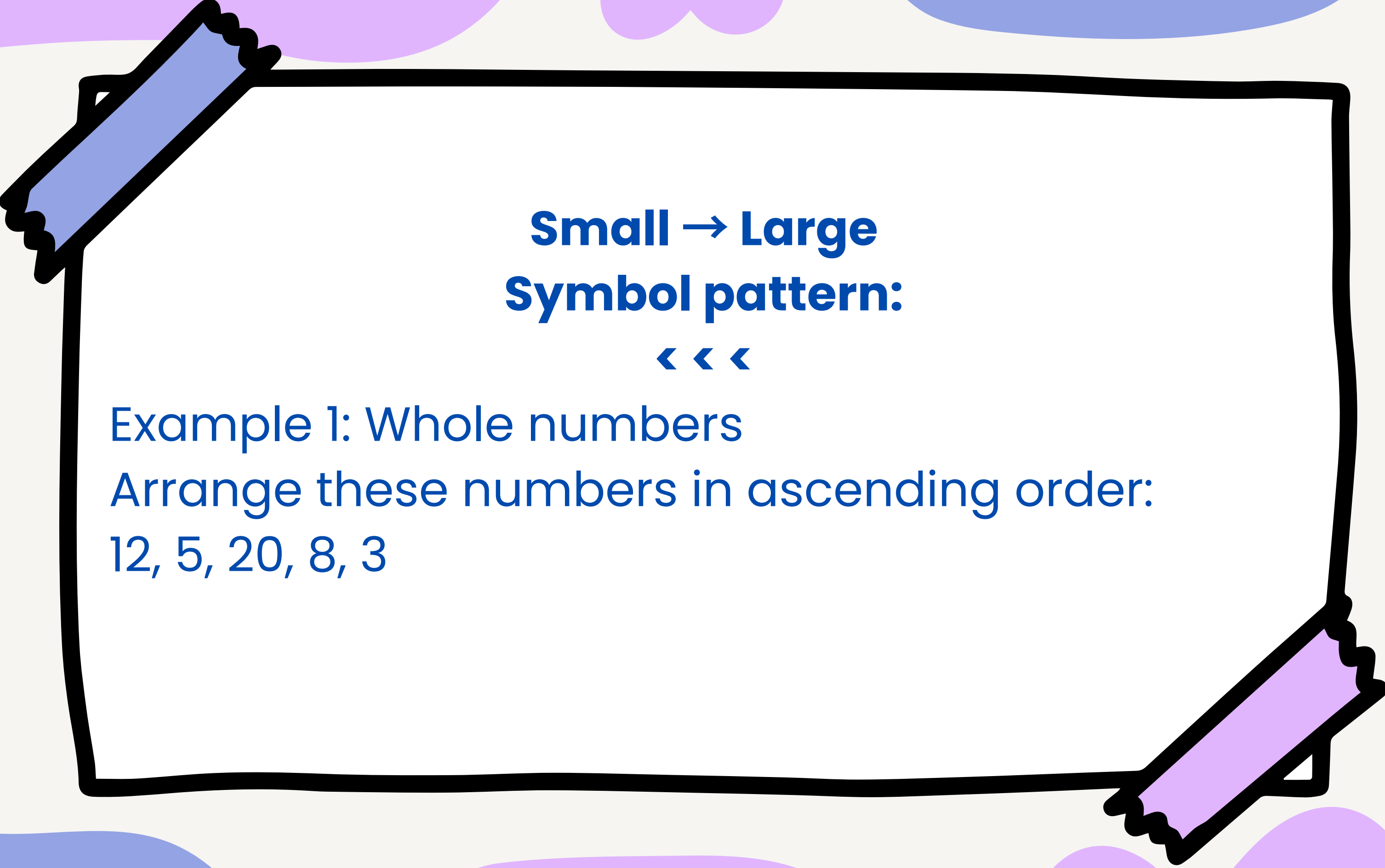
A number line is helpful for comparing and ordering numbers. Numbers become larger as we move to the right and smaller as we move to the left.



Ascending Order

Definition

Ascending order means arranging numbers from smallest to largest.



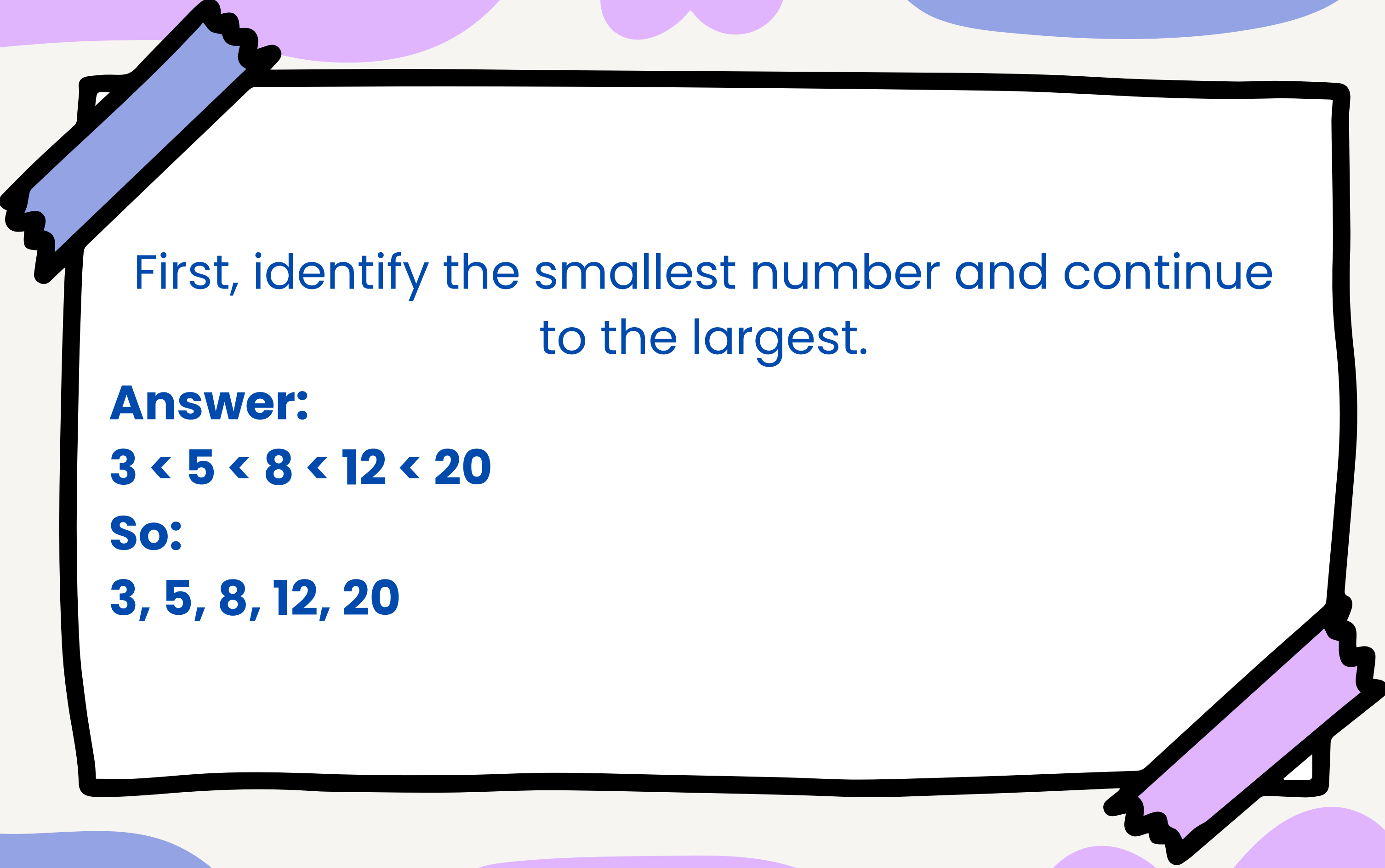
Small → Large
Symbol pattern:

◀ ◀ ◀

Example 1: Whole numbers

Arrange these numbers in ascending order:

12, 5, 20, 8, 3



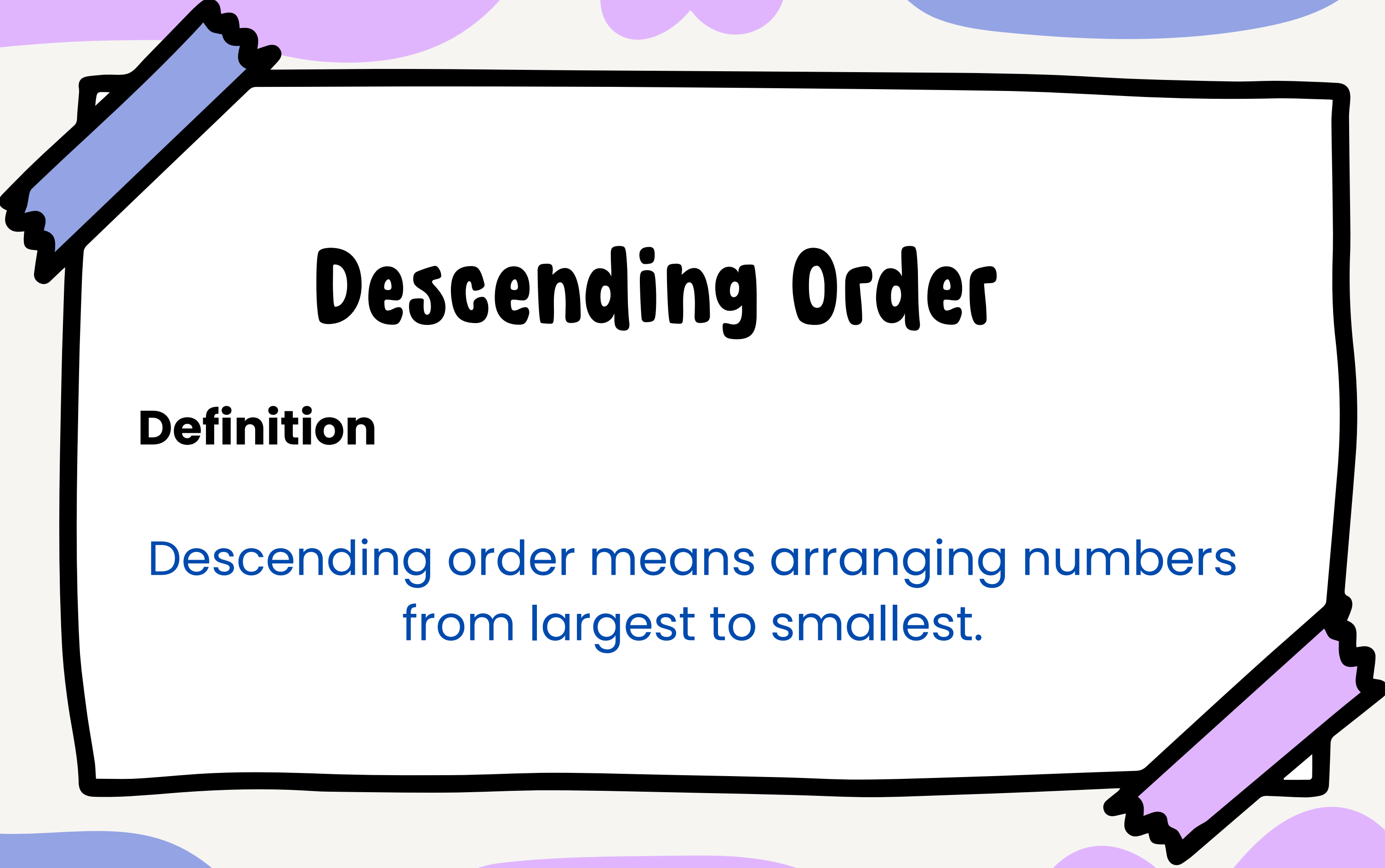
First, identify the smallest number and continue to the largest.

Answer:

$3 < 5 < 8 < 12 < 20$

So:

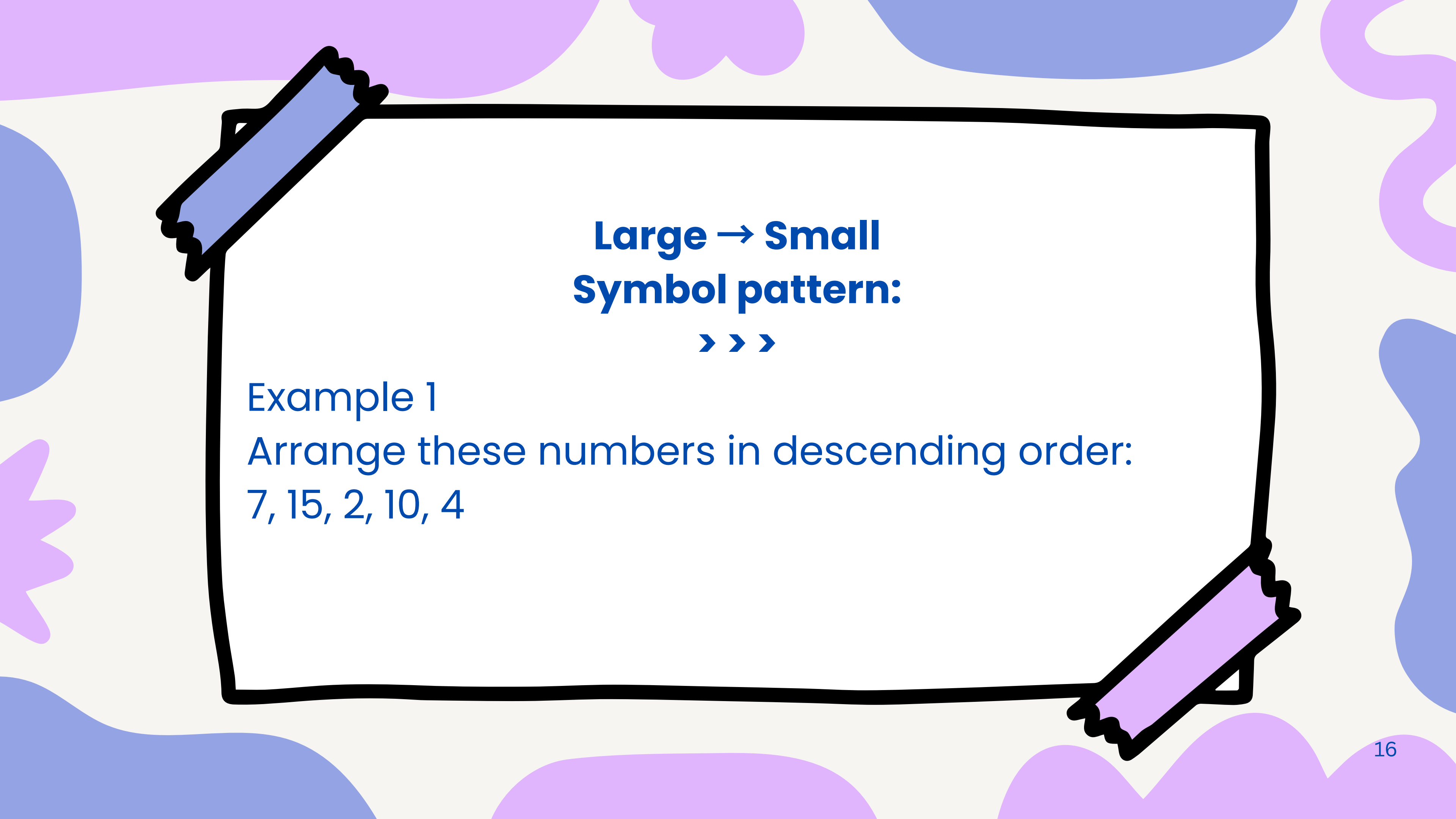
3, 5, 8, 12, 20



Descending Order

Definition

Descending order means arranging numbers from largest to smallest.



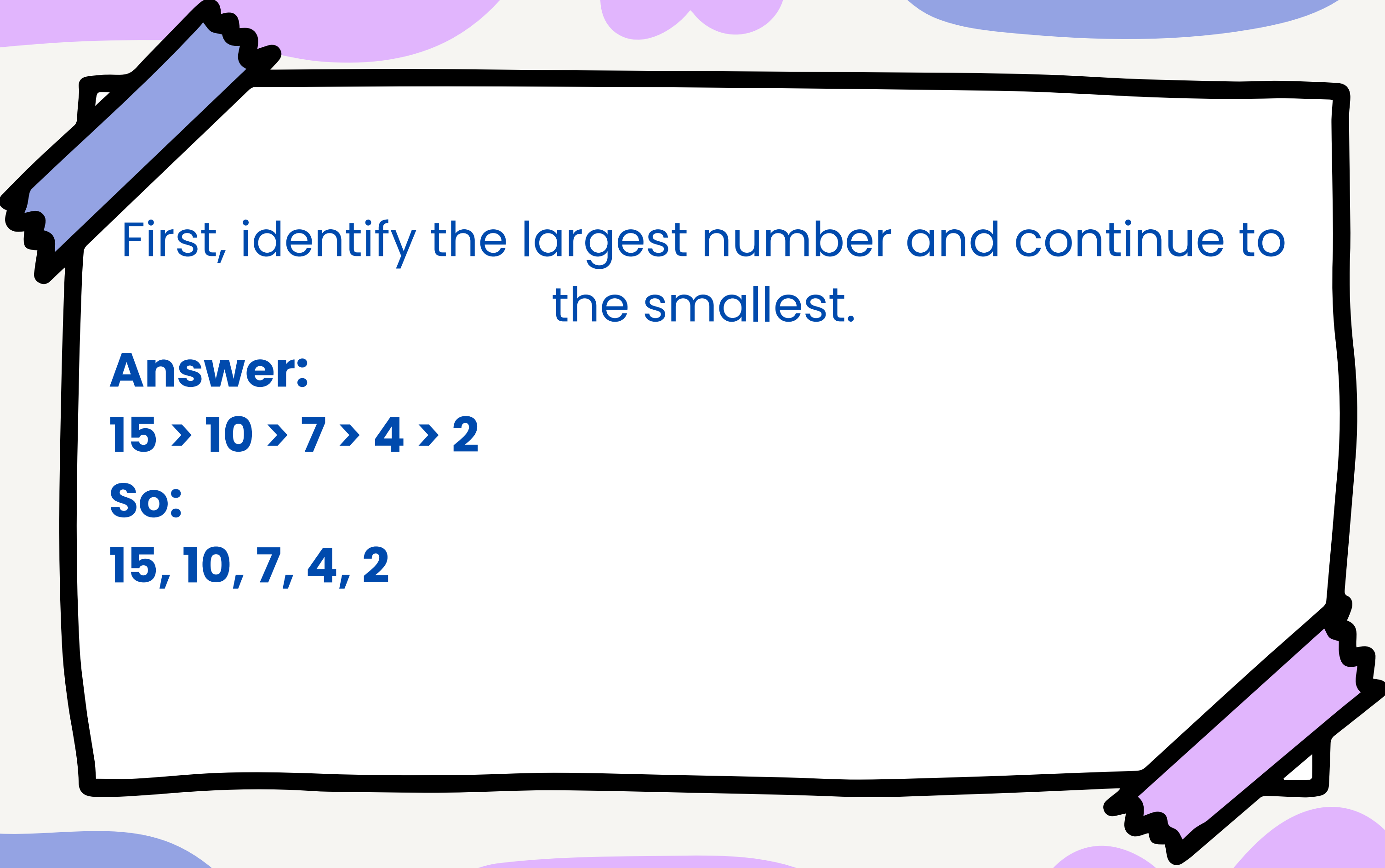
Large → Small
Symbol pattern:

» » »

Example 1

Arrange these numbers in descending order:

7, 15, 2, 10, 4



First, identify the largest number and continue to the smallest.

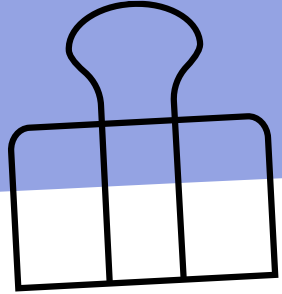
Answer:

$15 > 10 > 7 > 4 > 2$

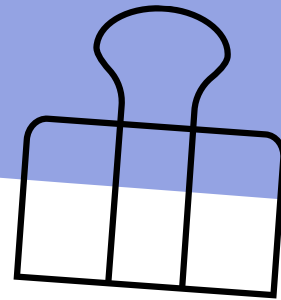
So:

$15, 10, 7, 4, 2$

Mental Math: Addition



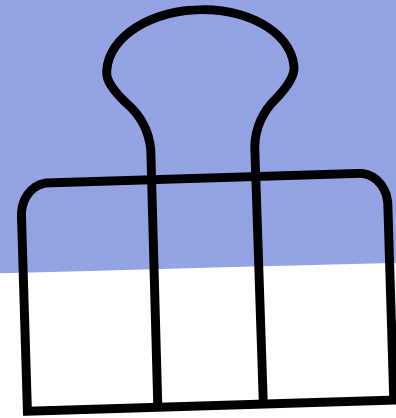
**Practice mental
math**



Idea

simplify mental math
for addition of two
digit
numbers by treating
the digit separately

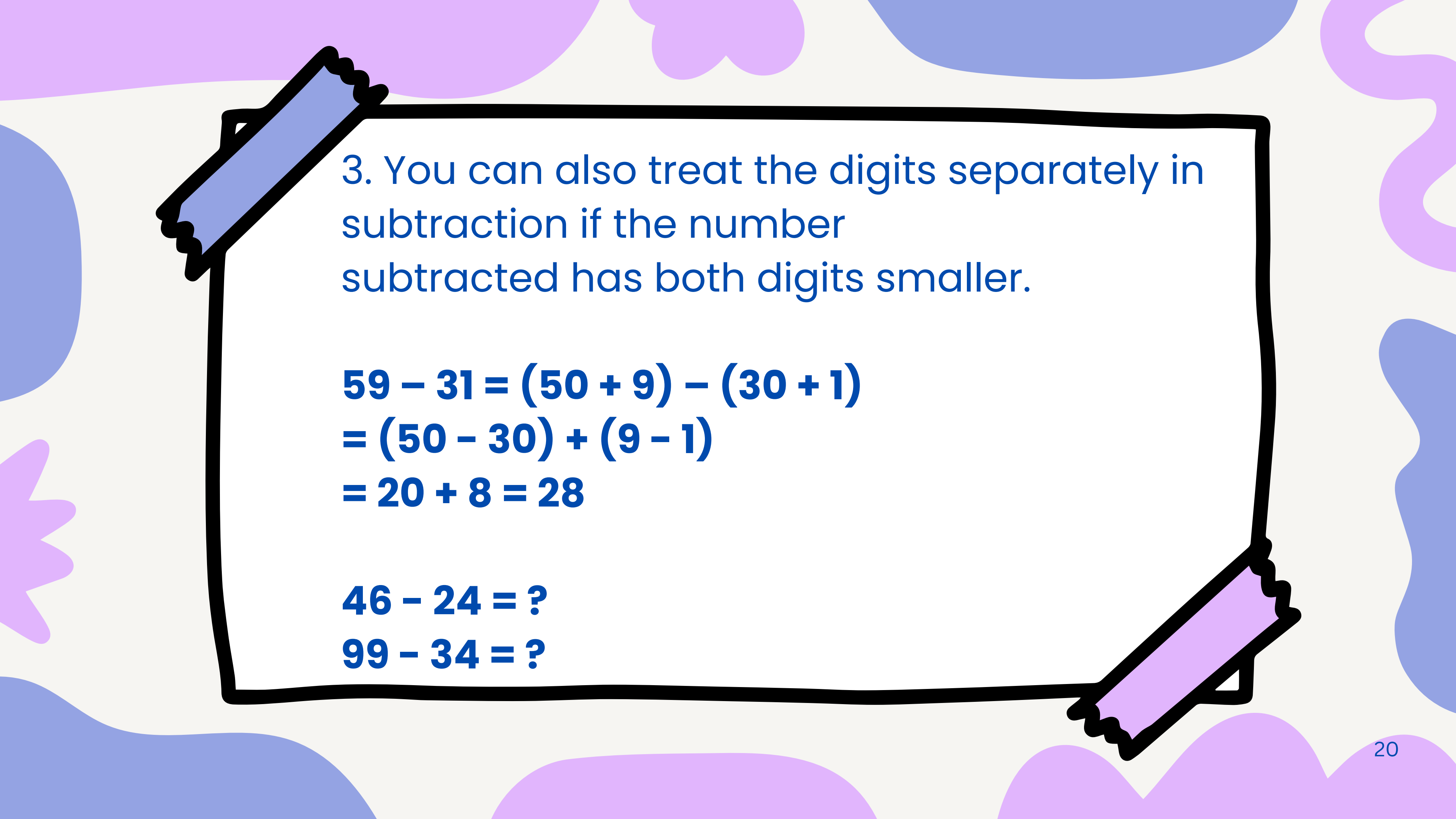
Mental Math: Addition



$$\begin{aligned} 42+17 &= (40 + 2) + (10 + 7) = \\ &(40 + 10) + (2 + 7) = 59 \end{aligned}$$

$$\begin{aligned} 69+37 &= (60+30) + (9 + 7) = \\ 90 + 16 &= 106 \end{aligned}$$

$$73+ 36 = ???$$



3. You can also treat the digits separately in subtraction if the number subtracted has both digits smaller.

$$\begin{aligned} 59 - 31 &= (50 + 9) - (30 + 1) \\ &= (50 - 30) + (9 - 1) \\ &= 20 + 8 = 28 \end{aligned}$$

$$46 - 24 = ?$$

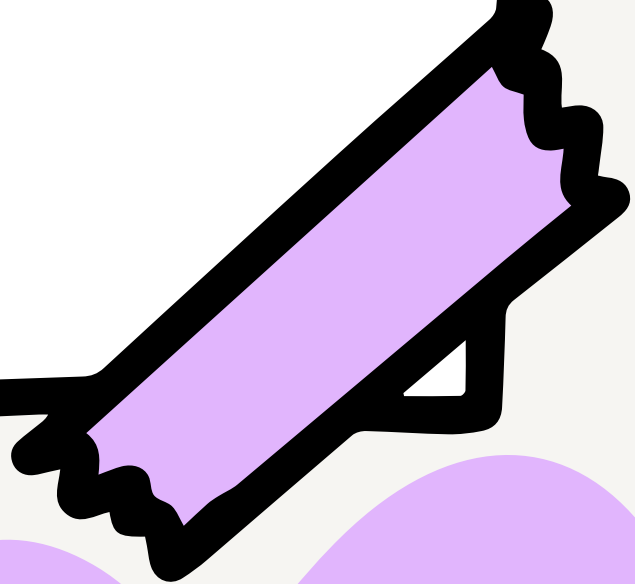
$$99 - 34 = ?$$



4. You can also simplify subtraction by adding the same number to both terms.

$$56 - 19 = (56+1) - (19+1) = 57 - 20 = 37$$

$$71 - 27 = ?$$

$$63 - 18 = ?$$


Mental Math: Explain Your Strategy

CONNECT CALCULATION TO SPOKEN ENGLISH

“I changed ___ to ___ because...”
“First I..., then I..., so the answer is...”

APPROACH

Pair task:

solve $98 + 47$ and $200 - 86$

in two different ways; explain both.

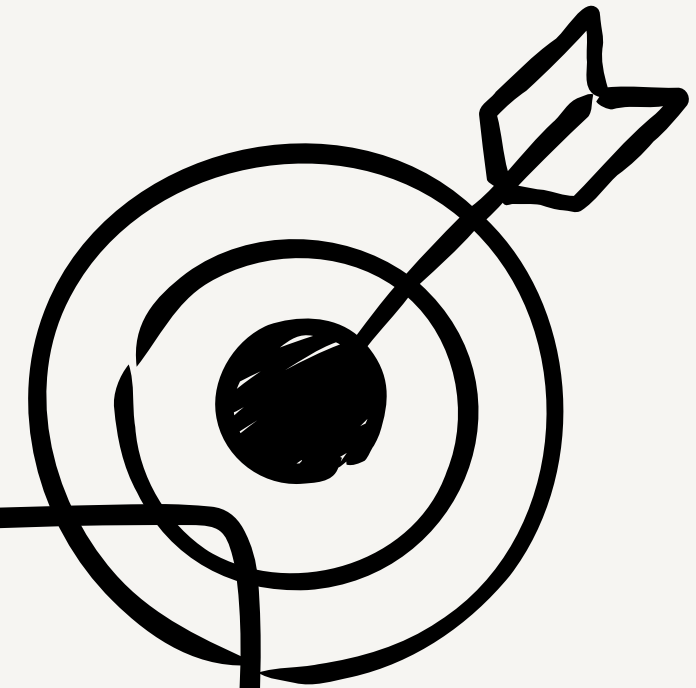
Decimals

**Place Value and
Decimal**

**Adding and
Subtracting
Decimals**

**Multiplication
Decimals**

**Division of
Decimals**



Place Value and Decimal

Name each place correctly

First, the number 234 means.

2

2 hundreds

3

3 tens

4

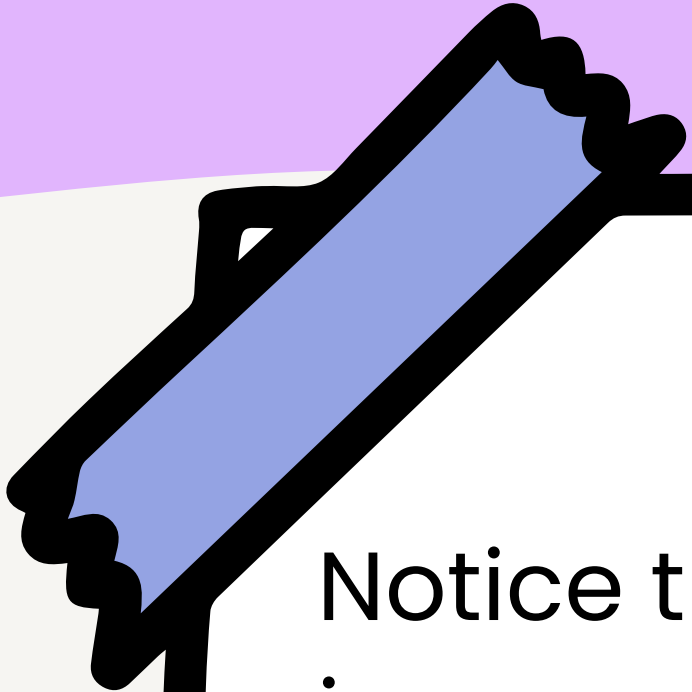
4 ones

Thus , $234 = 2*(100) + 3*(10) + 4*(1)$

Decimal Place Value

- Left of the decimal: ones, tens, hundreds.
- Right of the decimal: tenths, hundredths, thousandths.
- In 42.735, 7 is tenths, 3 is hundredths, 5 is thousandths.

Practice / Check: What is the value of 6 in 18.064?



Notice that, as a digit is moved to the left, the place value is

multiplied by 10

$$33 = 3.3 \times 10 \text{ or } 33 = 0.33 \times 10^2$$

And as we move a digit to the right, the place value is divided

by 10 such as

$$95 = 950 \times 10^{-1} \text{ or } 123 = 12300 \times 10^{-2}$$

Place Value and Decimal

Name each place correctly

First, the number 234 means.

2

2 hundreds

3

3 tens

4

4 ones

Thus , $234 = 2*(100) + 3*(10) + 4*(1)$

Consider the number 98.0675 has

9	in the tens place (10)
8	in the ones place (1)
0	in the tenths place ($\frac{1}{10}$)
6	in the hundredths place ($\frac{1}{100}$)

Consider the number 98.0675 has

7	in the thousandths place ($1/1,000$)
5	in the ten thousandths place ($1/10,000$)

We could write this number as follows:

$$98.0657 = 90 \times 10 + 8 \times 1 + 0 \times \frac{1}{10} + 6 \times \frac{1}{100} + 7 \times \frac{1}{1000} + 5 \times \frac{1}{10000}$$

The decimal places to the right of the decimal point represent negative powers of ten:

0.1	one tenths = $\frac{1}{10} = 10^{-1}$
0.01	one hundredths = $\frac{1}{100} = 10^{-2}$
0.001	one thousandths = $\frac{1}{1000} = 10^{-3}$
0.0001	one ten thousandths = $\frac{1}{10000} = 10^{-4}$

Reading and Writing Decimals

3.05	can be read "three point zero five" or "three and five hundredths."
0.408	four hundred eight thousandths.
0.001	Trailing zeros do not change value: $2.5 = 2.50$.
	Write "seven and thirty-two hundredths" as a decimal.

Notice that additional zeroes to the right of any non-zero digits are meaningless: they make absolutely no difference in the value

First, the number 234 means.

$$3.78 = 3.7800 = 3.780000$$

Adding Decimals

- Line up decimal points.
- Add zeros when helpful.
- Add from right to left.
- Bring the decimal point straight down.

Subtracting Decimals

- Align decimal points and place values.
- Use placeholder zeros when needed.

Adding Decimals

$$2.81 + 3.647$$

$$\begin{array}{r} 2.18 \\ + 3.647 \\ \hline 5.827 \end{array}$$

Subtracting Decimals

$$1.111 - 0.05$$

$$\begin{array}{r} 1.111 \\ - 0.05 \\ \hline 1.061 \end{array}$$

Multiplying Decimals

- Multiply as if the numbers were whole numbers.
- Count total decimal places in both factors.
- Place the decimal in the product.

Dividing Decimals

- Make the divisor a whole number by moving its decimal point.
- Move the dividend decimal the same number of places.
- Then divide normally.

Multiplying Decimals

Example:

$2.4 \times 1.3 \rightarrow 24 \times 13 = 312 \rightarrow$
two decimal places $\rightarrow 3.12$.

Practice : $0.6 \times 0.25 = ?$

$3.45 \times 1.2 = ?$

Multiplying Decimals

For example



Step 1 $(0.02)^3 = 0.\underset{\substack{\text{red bracket} \\ 2}}{02} \times 0.\underset{\substack{\text{blue bracket} \\ 2}}{02} \times 0.\underset{\substack{\text{yellow bracket} \\ 2}}{02}$

Step 2 That is $2+2+2 = 6$ places to the right of the decimal point.

Step 3 $2^3 = 8$

Step 4 So that rightmost 8 must land six places to the right of the decimal.

$$(0.02)^3 = 0.000008$$

Dividing Decimals

- $7.2 \div 0.6 =$

$$\frac{7.2}{0.6} = \frac{7.2}{0.6} \times \frac{10}{10} = \frac{72}{6} = 12$$

$$1 \div 2.45 =$$

$$\frac{1}{2.45} = \frac{1}{2.45} \times \frac{100}{100} = \frac{100}{245} = ?$$

$$\frac{1}{2.45} = \frac{1}{2.45} \times \frac{10}{10} = \frac{10}{24.5} \times \frac{10}{10} = \frac{100}{245}$$

Dividing Decimals

$$\frac{0.56}{0.0007} =$$

$$\frac{0.00013}{0.025} =$$

Rounding

What is rounding?

- Rounding gives an approximate value that is easier to use.
- Round to a specified place value: nearest ten, whole number, tenth, hundredth, etc.
- Look at the digit immediately to the right of the target place.

Why might we round 19.87 to 20 in everyday life

Rounding Rule

- 0–4: keep the target digit the same.
- 5–9: increase the target digit by 1.
- Digits after the target place are removed or changed to zeros.

Example: 4.367 to nearest hundredth = 4.37.

Rounding Rule

- 0–4: keep the target digit the same.
- 5–9: increase the target digit by 1.
- Digits after the target place are removed or changed to zeros.

Example: 4.367 to nearest hundredth = 4.37.

**If the number in the tenth's place is
0–4, then we round down.**

**If the number in the tenth's is
5–9, we round up.**

$$74.9 \rightarrow 75$$

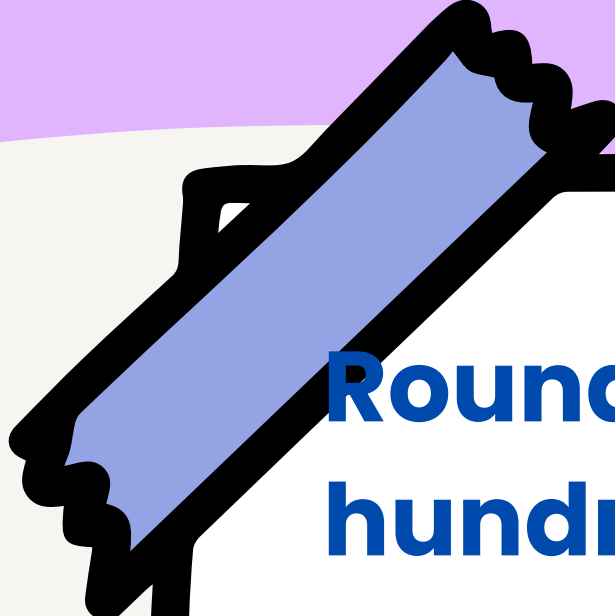
$$37.5 \rightarrow 38$$

$$394.0 \rightarrow 394$$

$$2.4 \rightarrow 2$$

$$29.2 \rightarrow 29$$

$$7.8 \rightarrow 8$$

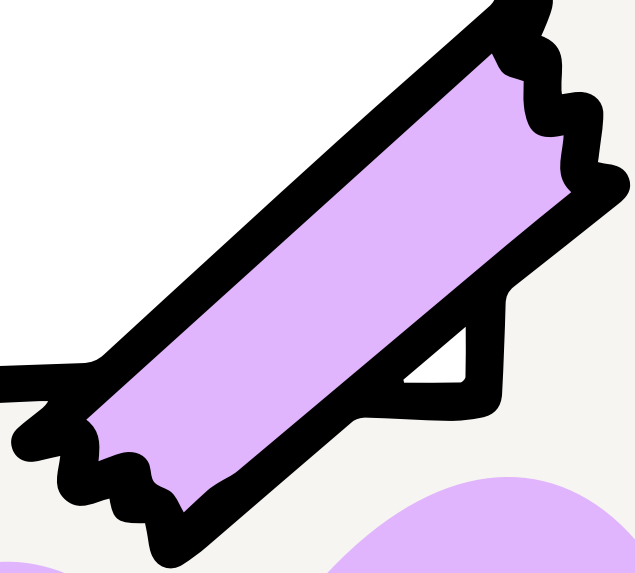


Rounding to any decimal place: the nearest hundredths, the nearest thousandths, etc.

When you are asked to round to a place, look only at the digit in the next place to the right, i.e. the next smallest place. Same rule as above:

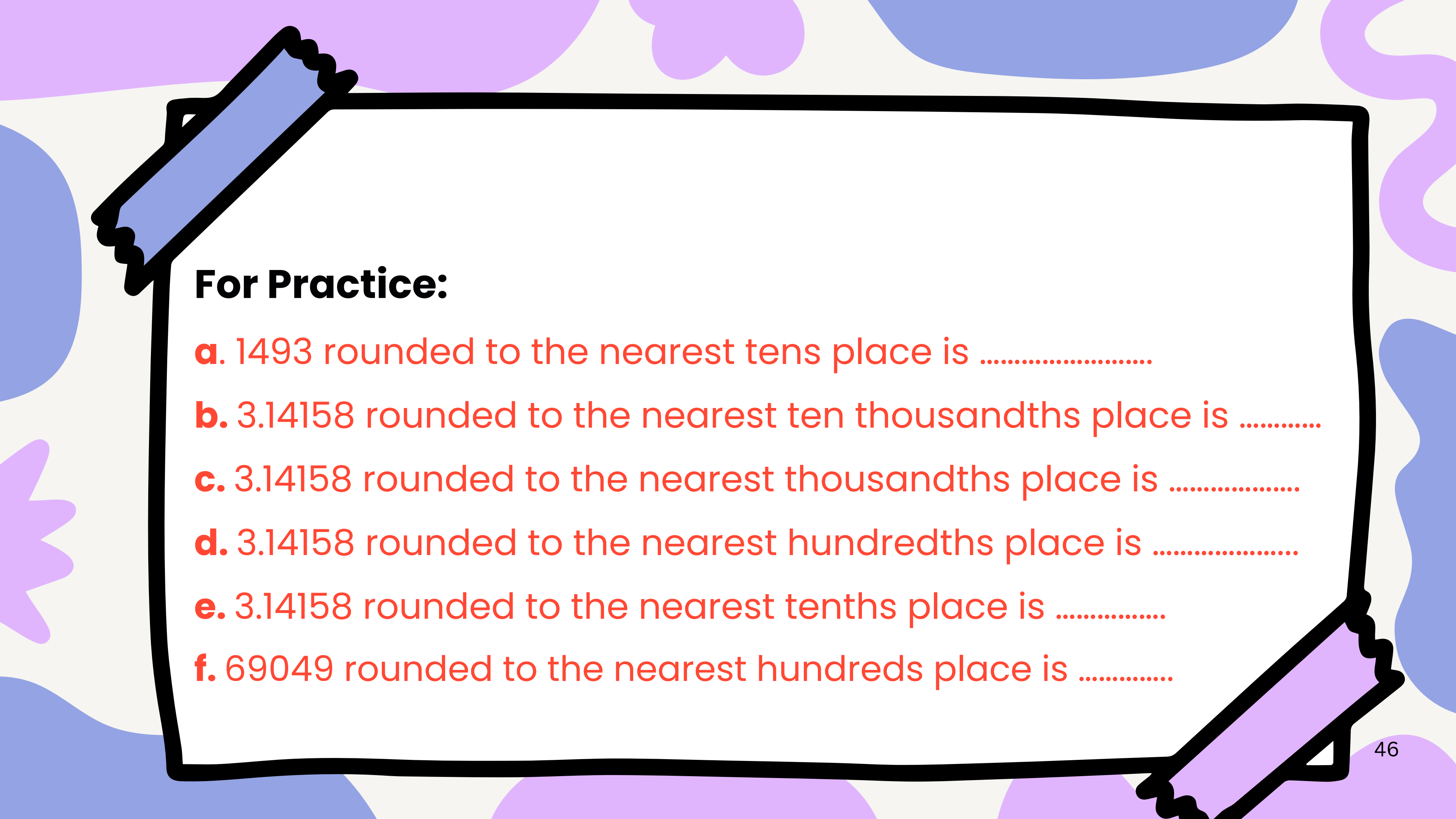
0-4 --> round down

5-9 --> round up



Example

**315.536 rounded to the nearest hundredths is
315.54**



For Practice:

- a.** 1493 rounded to the nearest tens place is
- b.** 3.14158 rounded to the nearest ten thousandths place is
- c.** 3.14158 rounded to the nearest thousandths place is
- d.** 3.14158 rounded to the nearest hundredths place is
- e.** 3.14158 rounded to the nearest tenths place is
- f.** 69049 rounded to the nearest hundreds place is

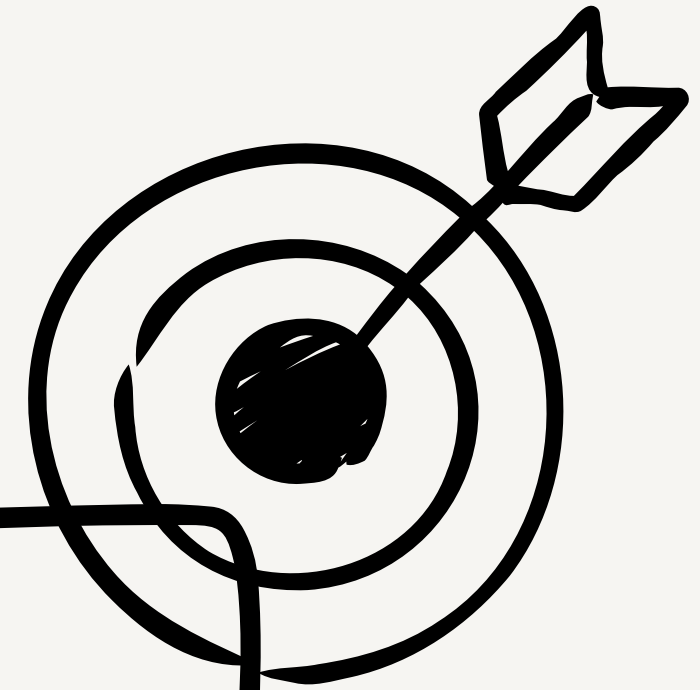
Fractions

Types of Fractions

**Equivalent
Fractions**

**Simplifying
Fractions**

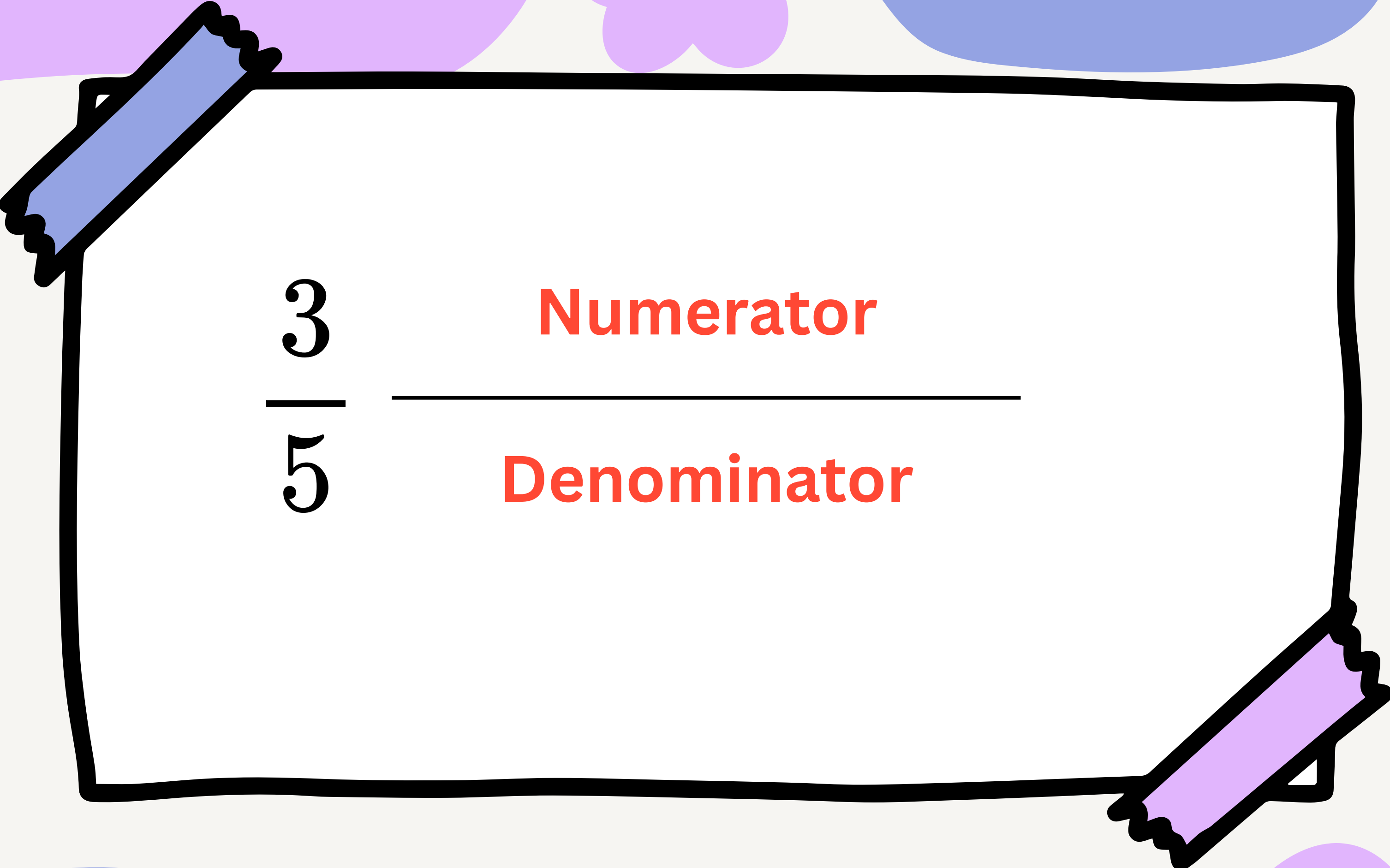
**Fraction Visual
Practice**



What is Fraction?

Fractions terms:

- A fraction represents parts of a whole
- Numerator: top number; the upstairs
- denominator: bottom number; the downstairs
- Example: $\frac{3}{5}$ means three parts when a whole is divided into five equal parts.

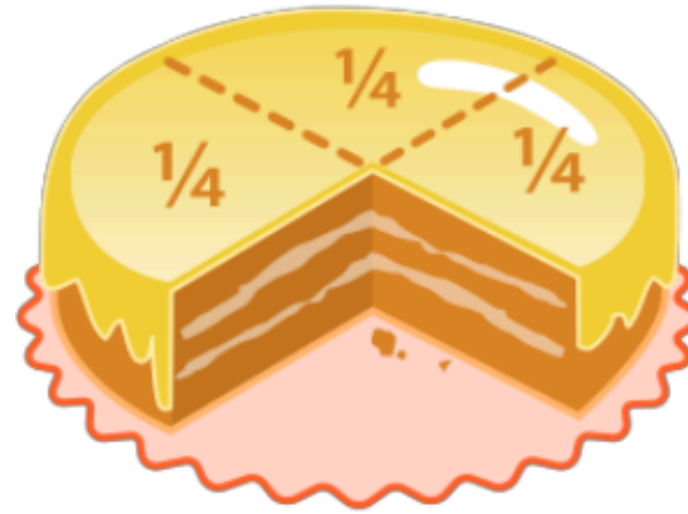

$$\frac{3}{5}$$

Numerator

Denominator

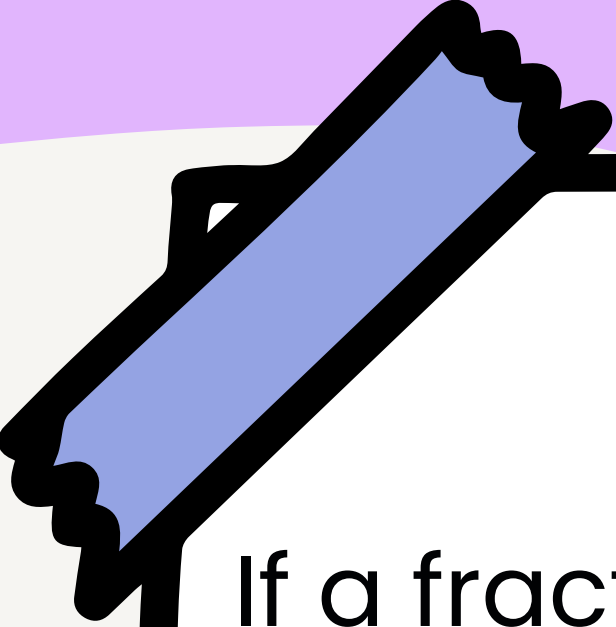
Two ways of thinking about a fraction:

- 1) **Division** – $\frac{3}{4}$ means 3 is divided by 4
- 2) **Pieces of cake** – if a “cake” is cut into four equal pieces, then $\frac{3}{4}$ means three of those four pieces



Types of Fractions

- Proper fraction: numerator $<$ denominator, e.g., $\frac{3}{8}$.
- Improper fraction: numerator $\geq$ denominator, e.g., $\frac{9}{5}$.
- Mixed number: whole number + proper fraction, e.g., $1\frac{4}{5}$.
- Unit fraction: numerator = 1, e.g., $\frac{1}{7}$.



If a fraction is greater than one, we can write the fraction as either:

1. an improper fraction (a fraction with numerator > denominator) $\frac{5}{2}$

or

2. a mixed numeral (integer part + fraction part)

such as $2\frac{1}{2}$

Practice

Classify :

$$\frac{5}{9}$$

$$\frac{11}{4}$$

$$3\frac{2}{5}$$

$$1\frac{1}{3}$$

Equivalent Fractions

- Equivalent fractions have the same value even though they have different numerators and different denominators
- Multiply or divide numerator and denominator by the same nonzero number.

$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9}$$

$$\frac{3}{8} = \frac{12}{32}$$

Practice

Complete:

$$\frac{3}{5} = \frac{\square}{20}$$

$$\frac{18}{24} = \frac{\square}{4}$$

Simplifying Fractions

- A fraction is in simplest form when numerator and denominator have no common factor greater than 1.
- Divide by the greatest common factor (GCF).

• Example: $\frac{18}{24} \div \frac{6}{6} = \frac{3}{4}$

Simplifying Fractions

- multiply both numerator and denominator by the same number,
- we can also factor out the same positive integer from both numerator and denominator.

$$\frac{6}{42} = \frac{\cancel{6} \times 1}{\cancel{6} \times 7} = \frac{1}{7}$$

The 6's cancel. Notice: canceling is a form of division

The equivalent fraction with the lowest possible integer values of numerator and denominator is the fraction written in **lowest terms**.

$$\frac{72}{96} = \frac{12}{16} = \frac{3}{4}$$

รูปลอย่างง่าย

Lowest terms is also known as “**simplest form**”

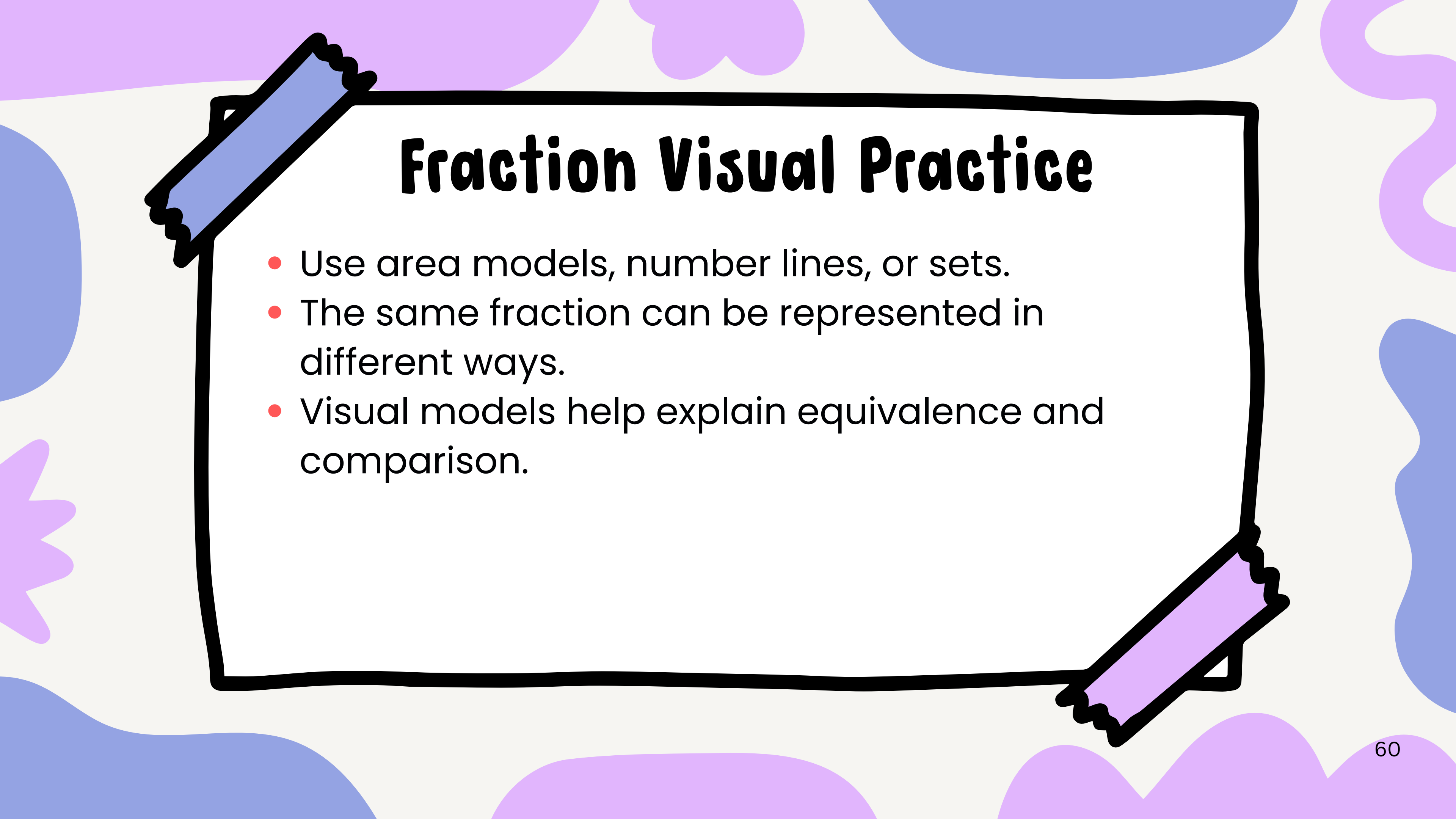
Practice

Simplify

$$\frac{24}{36} = \frac{\square}{\square}$$

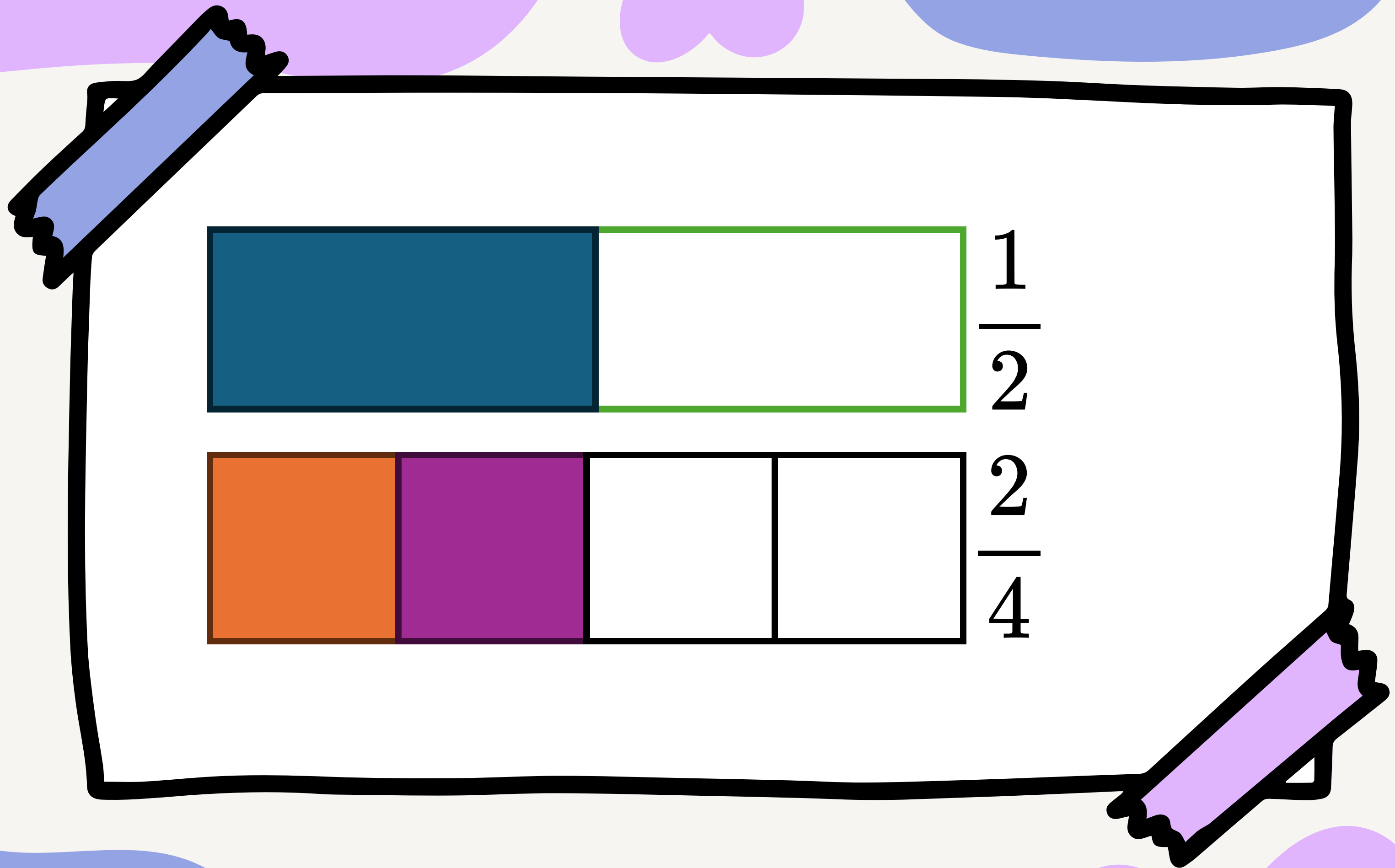
$$\frac{45}{60} = \frac{\square}{\square}$$

$$\frac{14}{49} = \frac{\square}{\square}$$



Fraction Visual Practice

- Use area models, number lines, or sets.
- The same fraction can be represented in different ways.
- Visual models help explain equivalence and comparison.



Practice

Simplify

$$\frac{24}{36} = \frac{\square}{\square}$$

$$\frac{45}{60} = \frac{\square}{\square}$$

$$\frac{14}{49} = \frac{\square}{\square}$$

Practice

Simplify

$$\frac{24}{36} = \frac{\square}{\square}$$

$$\frac{45}{60} = \frac{\square}{\square}$$

$$\frac{14}{49} = \frac{\square}{\square}$$

Fractions to Decimals

- A fraction bar means division.
- To convert a/b to a decimal, calculate $a \div b$.
- Example: $3/4 = 3 \div 4 = 0.75$.

Convert the following to decimals. Identify terminating/repeating.

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

$$\frac{3}{5}$$

$$\frac{7}{8}$$

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

Fraction from a group that mathematicians call the “Rational Numbers”.

(“Rational” because they are “ratios.”)

When we write a fraction, a rational number, as a decimal, one of two things happens: it either terminates or repeats.

Terminating decimals:

0.25

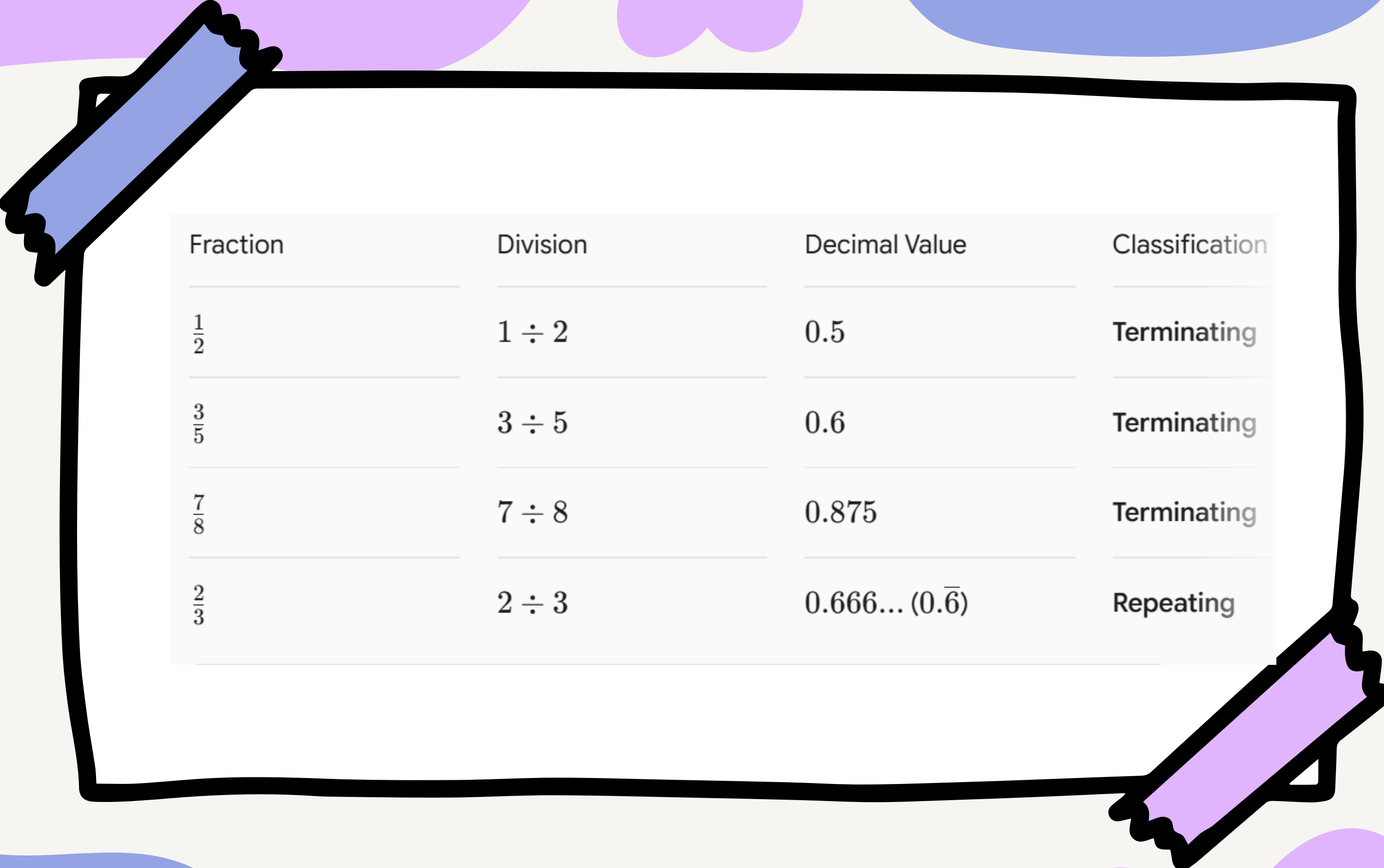
$$\frac{1}{4} = 0.25$$

$$\frac{3}{8} = 0.375$$

Repeating decimals:

$$\frac{1}{3} = 0.333333\bar{3}$$

$$\frac{1}{7} = 0.142857\overline{142857}$$



Fraction	Division	Decimal Value	Classification
$\frac{1}{2}$	$1 \div 2$	0.5	Terminating
$\frac{3}{5}$	$3 \div 5$	0.6	Terminating
$\frac{7}{8}$	$7 \div 8$	0.875	Terminating
$\frac{2}{3}$	$2 \div 3$	0.666... ($0.\bar{6}$)	Repeating

The decimals that neither terminate nor repeat are called the “**irrational numbers**”.

These decimals go on forever in a non-repeating pattern.

$$\pi = \mathbf{3.1415926535898 \dots}$$

$$\mathbf{2 = 3.4142135623731 \dots}$$

Golden Ratio

$$\frac{1 + \sqrt{5}}{2} =$$

$$1.6180339887499 \dots$$

None of these can be written as a fraction of integer over integer.

Decimals to Fractions

Write the decimal over its place-value denominator.

$$0.6 = \frac{6}{10} = \frac{3}{5}$$

$$0.125 = \frac{125}{1000} = \frac{1}{8}$$

Always simplify when possible.

Convert 0.45, 0.32, 1.25 to fractions or mixed numbers.

Decimal	Unsimplified Fraction	Simplified Fraction	Mixed Number
0.45	$\frac{45}{100}$	$\frac{9}{20}$	—
0.32	$\frac{32}{100}$	$\frac{8}{25}$	—
1.25	$\frac{125}{100}$	$\frac{5}{4}$	$1\frac{1}{4}$

There are a few fraction-to-decimal conversions you should have memorized, for efficiency on the test. Many of these are probably familiar already.

$\frac{1}{2}$	→	0.5
$\frac{1}{4}$	→	0.25
$\frac{3}{4}$	→	0.75
$\frac{1}{3}$	→	$0.333\overline{3}$
$\frac{2}{3}$	→	$0.666\overline{6} \approx 0.6667$
$\frac{1}{5}$	→	0.2

$\frac{2}{5}$	→	0.4
$\frac{3}{5}$	→	0.6
$\frac{4}{5}$	→	0.8
$\frac{1}{6}$	→	$0.166\overline{6} \approx 0.1667$
$\frac{2}{6}$	→	$\frac{1}{3}$
$\frac{5}{6}$	→	$0.833\overline{3}$



$\frac{1}{7}$	$\rightarrow 0.\overline{142857} \approx 0.143$
$\frac{1}{8}$	$\rightarrow 0.125$
$\frac{3}{8}$	$\rightarrow 0.375$
$\frac{5}{8}$	$\rightarrow 0.625$
$\frac{7}{8}$	$\rightarrow 0.875$

$\frac{1}{9}$	$\rightarrow 0.111\overline{1}$
$\frac{7}{9}$	$\rightarrow 0.777\overline{7}$
$\frac{1}{10}$	$\rightarrow 0.1$
$\frac{1}{100}$	$\rightarrow 0.01$
$\frac{1}{1000}$	$\rightarrow 0.001$

$\frac{1}{20}$	$\rightarrow \frac{1}{20} \times \frac{5}{5} = \frac{5}{100} = 0.05$
----------------	--



Another way to think about fractions with denominators that are multiples of 10

For example

$$\frac{1}{20} = \frac{1}{2} \times \frac{1}{10} = (0.5)(10^{-1}) = 0.05$$

$$\frac{1}{40} = \frac{1}{4} \times \frac{1}{10} = (0.25)(10^{-1}) = 0.025$$

$$\frac{1}{600} = \frac{1}{6} \times \frac{1}{100} = (0.1666\bar{6})(10^{-2}) = 0.001666\bar{6}$$



Fraction Properties

1. **Equivalent fraction property**
2. **Simplification (common-factor) property**
3. **Multiplicative identity for fractions**
4. **Reciprocal property**

These properties support comparison and operations.

Equivalent fraction property

Multiplying numerator and denominator by the same nonzero number does not change the value.

- $\frac{a}{b} = \frac{a \times n}{b \times n}, n \neq 0.$
- **Example:** $\frac{3}{4} = \frac{15}{20}.$

Simplification and Identity

Simplification: divide numerator and denominator by the same common factor.

Multiplicative identity: multiplying by 1 does not change value.

Example: $\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$; $\frac{4}{4}$ is a form of 1.

Reciprocal

The reciprocal of a/b is b/a , where a and b are nonzero.

A nonzero fraction multiplied by its reciprocal equals 1.

Example: $3/7 \times 7/3 = 1$.

Reciprocals are essential for division of fractions.

Fraction Properties Practice

Match each example to a property.

A) $\frac{6}{8} = \frac{3}{4}$

B) $\frac{2}{5} = \frac{8}{20}$

C) $\frac{7}{9} \times \frac{9}{7} = 1$

D) $\frac{4}{11} \times \frac{3}{3} = \frac{12}{33}$



9. Fraction Properties-I

1. Fractions with a denominator of 1 :

Let n is real number then $n/1 = n$

2. Fractions involving zero:

We cannot divide by zero. It is allowed to divide zero by a non-zero number.

$$0/5 = 0$$

$$0/(-3) = 0$$

Zero divided by any non-zero number equals zero.

3. As long as $n \neq 0$, then $\frac{n}{n} = 1$

4. The reciprocal of a fraction, a/b , is the “**flipped over**” fraction, b/a .
($a \neq 0, b \neq 0$)

ส่วนกลับ

The reciprocal of $3/5$ is $5/3$

The reciprocal of -7 is $-1/7$

The reciprocal of $1/6$ is 6

Comparing Fractions: Same Denominator

- When denominators are equal, compare numerators.
- Example: $\frac{5}{9} > \frac{2}{9}$ because 5 parts of size $\frac{1}{9}$ are more than 2 parts.

Comparing Fractions: Same Denominator

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1. With the same denominator, bigger numerator means a bigger fraction

Comparing Fractions: Same Numerator

For positive fractions with the same numerator, the smaller denominator gives the larger fraction.

Example: $\frac{3}{5} > \frac{3}{8}$ because fifths are larger than eighths.

With the same numerator, bigger denominator means a smaller fraction

Comparing Fractions: Different Numerators and Denominators

Method 1: Find a common denominator.

Method 2: Cross-multiply for positive fractions.

•Example: $5/6$ vs $7/9 \rightarrow 5 \times 9 = 45, 7 \times 6 = 42$, so $5/6 > 7/9$.

Comparing Fractions Practice

- Order from least to greatest: $\frac{2}{3}$, $\frac{3}{5}$, $\frac{5}{8}$.
Compare $\frac{9}{10}$ and $\frac{17}{20}$.
- Compare $\frac{4}{7}$ and 0.6 by converting one representation.

Answer: $\frac{3}{5} < \frac{5}{8} < \frac{2}{3}$

$$\frac{9}{10} > \frac{17}{20}$$

$$\frac{4}{7} < 0.6$$

Adding and Subtracting Fractions: Same Denominator

•Keep the denominator; add or subtract numerators.

Example: $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$.

Simplify final answers when possible.

Practice / Check: $\frac{7}{12} - \frac{5}{12}$; $\frac{4}{9} + \frac{2}{9}$.

Adding and Subtracting Fractions: Unlike Denominators

- Find a common denominator, preferably the least common denominator (LCD).
- Rewrite as equivalent fractions.
- Add/subtract numerators.
- Example: $\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$.

Practice

$$\begin{array}{l} : \frac{5}{6} - \frac{1}{4}; \\ \frac{3}{5} + \frac{7}{10}. \end{array}$$



11. Operations with Fractions

1. With common denominators, we just add or subtract across the numerators.

Adding and subtracting fractions: finding a common denominator in case of the fraction do not have the same denominator.

$$\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$$

$$\frac{9}{13} - \frac{6}{13} = \frac{3}{13}$$

$$\frac{1}{5} + \frac{1}{10} = \frac{1}{5} \times \frac{2}{2} + \frac{1}{10} = \frac{2}{10} + \frac{1}{10} = \frac{3}{10}$$

$$\frac{2}{3} - \frac{2}{4} = \frac{2}{3} \times \frac{4}{4} - \frac{2}{4} \times \frac{3}{3} = \frac{8}{12} - \frac{6}{12} = \frac{2}{12} = \frac{1}{6}$$

Multiplying Fractions

Multiply numerators.

Multiply denominators.

Simplify before or after multiplying.

Example: $\frac{3}{4} \times \frac{2}{5} = \frac{6}{20} = \frac{3}{10}$.

Practice : $\frac{7}{9} \times \frac{3}{14}$; simplify efficiently.

Dividing Fractions

Keep the first fraction.

- Change $\div$ to $\times$.

- Flip the second fraction (use its reciprocal).

Example: $\frac{3}{5} \div \frac{2}{7} = \frac{3}{5} \times \frac{7}{2} = \frac{21}{10} = 2 \frac{1}{10}$.

Practice $\frac{4}{9} \div \frac{2}{3}; 1\frac{1}{2} \div \frac{3}{4}$.

2. What's a little trickier about the multiplication of fraction is what you can cancel.

Cancel BEFORE you multiply

$$\frac{5}{14} \times \frac{7}{15} = \frac{1}{14} \times \frac{7}{3} = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

3. Dividing with fractions, including a number divided by a fraction, a fraction divided by a number.

$$\frac{3/4}{5/6} = \frac{3}{4} \times \frac{6}{5} = \frac{9}{10}$$

$$\frac{2}{5/2} = 2 \times \frac{2}{5} = \frac{4}{5}$$

$$\frac{3/4}{2} = \frac{3}{4 \times 2} = \frac{3}{8}$$





You may remember that an **improper fraction** is $\frac{17}{3}$, $\frac{40}{11}$

A mixed numeral expresses $5\frac{2}{3}$, $3\frac{7}{11}$

It's important to be comfortable changing back and forth between improper fractions and mixed numerals.

$$\frac{28}{5} = \frac{25}{5} + \frac{3}{5} = 5\frac{3}{5},$$

$$\frac{60}{7} = \frac{56}{7} + \frac{4}{7} = 8\frac{4}{7}$$

$$12\frac{1}{2} = \frac{24}{2} + \frac{1}{2} = \frac{25}{2}$$



Operations with Fractions: Mixed Practice

Purpose: Integrate all operations

A) $\frac{3}{7} + \frac{5}{14}$

B) $\frac{11}{12} - \frac{2}{9}$

C) $\frac{4}{5} \times \frac{15}{16}$

D) $\frac{7}{8} \div \frac{21}{32}$

E) State the operation rule used for one problem.

Fraction Word Problems:

READ-PLAN-SOLVE-CHECK

- READ: What information is given? What is asked?
- PLAN: Which operation is needed? Why?
- SOLVE: Show clear mathematical steps.
- CHECK: Is the answer reasonable? Include units.

Word Problem 1: Fraction of a Quantity

- Problem: A class has 32 students. Three-fourths submitted the assignment on time. How many students submitted on time?
 - Plan: "of" often suggests multiplication.
 - $\frac{3}{4} \times 32 = 24$.
 - Answer sentence: 24 students submitted on time.
- Practice / Check: Practice: $\frac{2}{5}$ of 45 students joined a workshop. How many?

Word Problem 2:

Add/Subtract Fractions

- Problem: Mina studied $1\frac{1}{2}$ hours in the morning and $\frac{3}{4}$ hour in the evening. How long altogether?
- $1\frac{1}{2} + \frac{3}{4} = 1\frac{2}{4} + \frac{3}{4} = 2\frac{1}{4}$ hours.
- Use an answer sentence with correct units.

Practice : A tank was $\frac{5}{6}$ full. Then $\frac{1}{4}$ of the tank capacity was used. What fraction remains?

As a general rule, when translating from words to math:

=

The word “is” means equals

The word “of” means multiply $\times$

For example, Bill’s monthly cable bill is $2/7$ of his monthly rent. If he pays \$300 on cable each month, what is his monthly rent?



Let C = cable , R = rent

$$C = \frac{2}{7}R$$

$$300 = \frac{2}{7}R$$

$$R = 300 \times \frac{7}{2} = \$ 1050$$

Chit's salary is $\frac{3}{7}$ of June's salary and is $\frac{5}{4}$ of Bank's salary.

June's salary is what fraction of Bank's salary?

Let C= Chit's salary , J=June's salary and B = Bank's salary
The question ask June's salary is what fraction of Bank's salary.

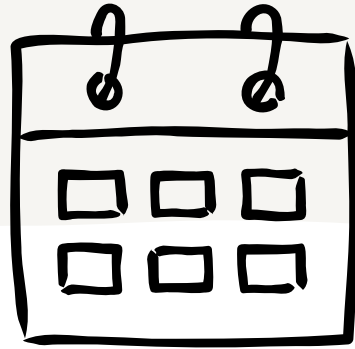
$$\therefore C = \frac{3}{7}J = \frac{5}{4}B$$

$$\frac{3}{7}J = \frac{5}{4}B \rightarrow J = \frac{7}{3} \times \frac{5}{4}B = \frac{35}{12}B$$

Thus, $\frac{35}{12}$ is the answer.



Conclusions/Lesson Summary



CONCLUSION 1

- **Signed numbers: absolute value.**
- **Decimals: place value and four operations.**



CONCLUSION 2

- **Fractions: types, equivalence, comparison, conversion, operations, word problems.**



CONCLUSION 3

“One thing I can explain confidently now is...”



**Thank you
so much**

