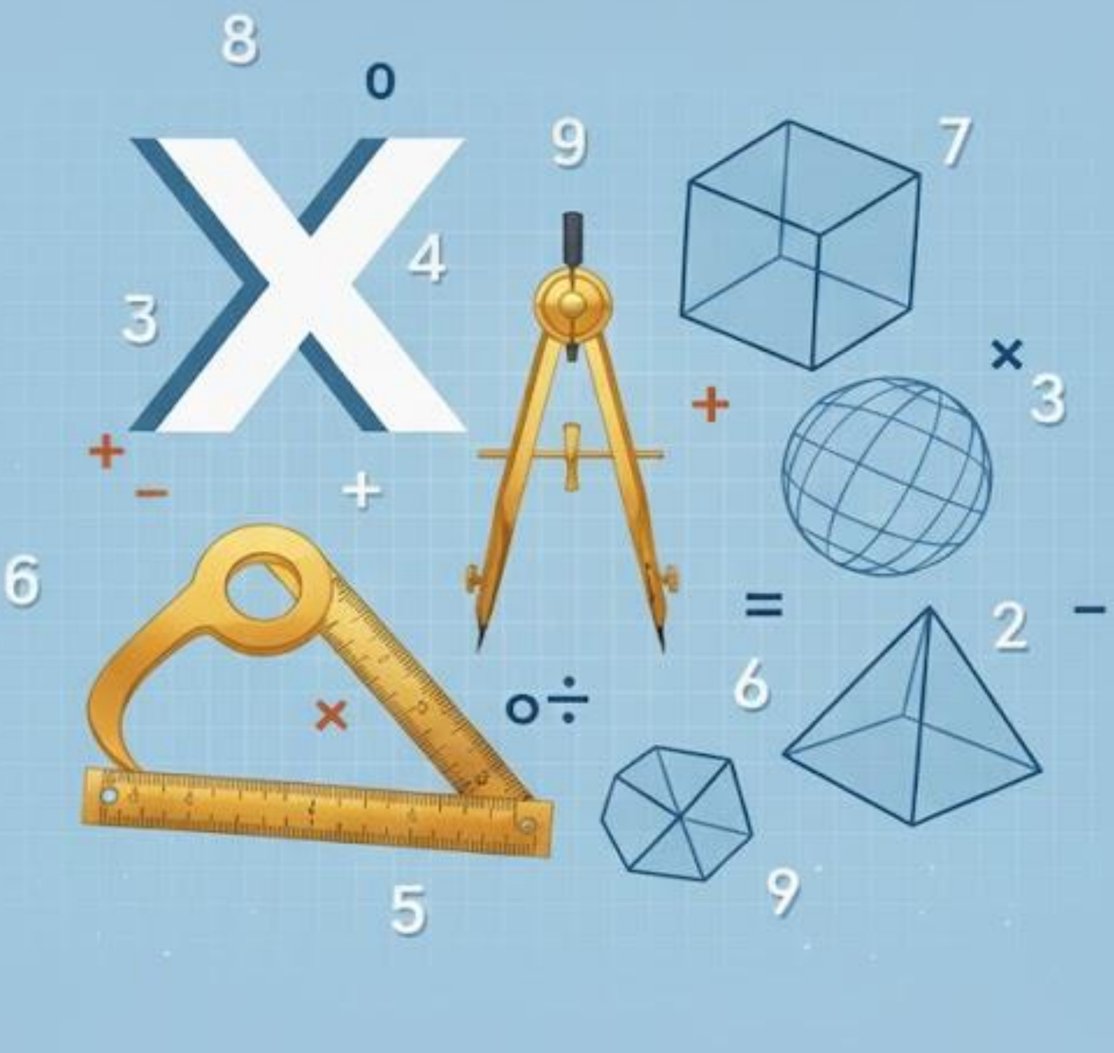
MATHEMATICS

FOR BASIC 4



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Strand 1: NUMBER

Sub-strand 1: Counting, Representation & Cardinality

INDICATOR: B4.1.1.1.1 Model number quantities, place value for multi-digit using graph sheets or multi-base materials up to 100,000

Lesson: Modeling Number Quantities

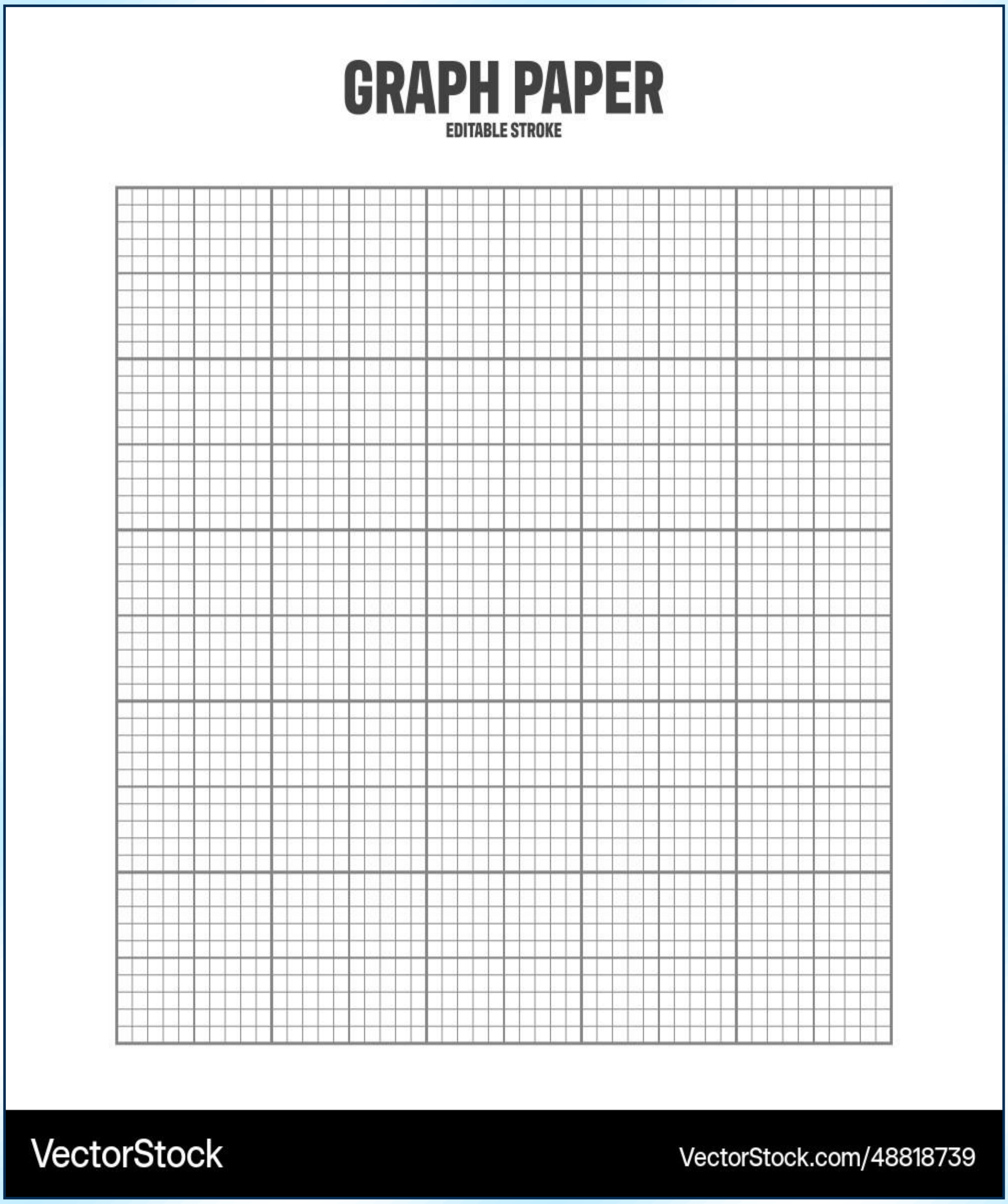
Welcome, young mathematicians! In this lesson, we will become experts at showing big numbers up to 100,000 using different tools like graph sheets and multi-base materials. This will help us truly understand the value of each digit in a number.

What Does "Modeling" Mean?

Modeling a number means showing what that number looks like using objects or pictures. Instead of just writing the digits, we use materials to represent the quantity.

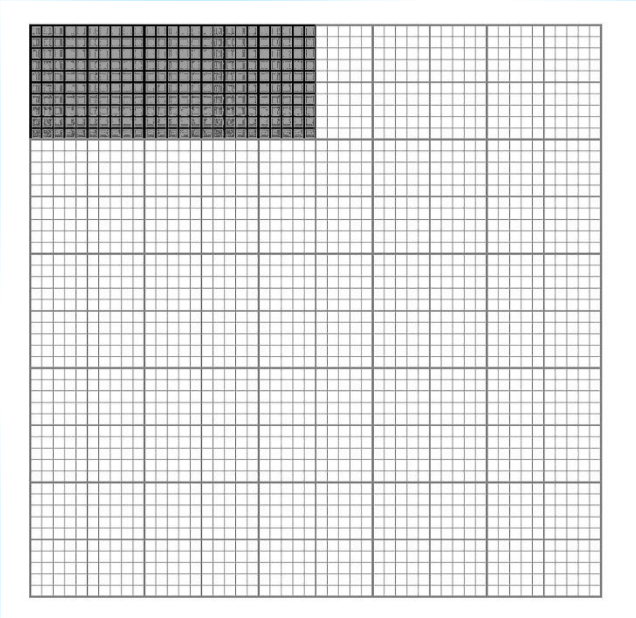
Modeling with Graph Sheets

Remember how we can use squares on a graph sheet to represent numbers? Let's explore this further.



Example 1: Representing 10

We can group 10 small squares together. You could outline a rectangle that is 1 unit wide and 10 units long, or any shape that

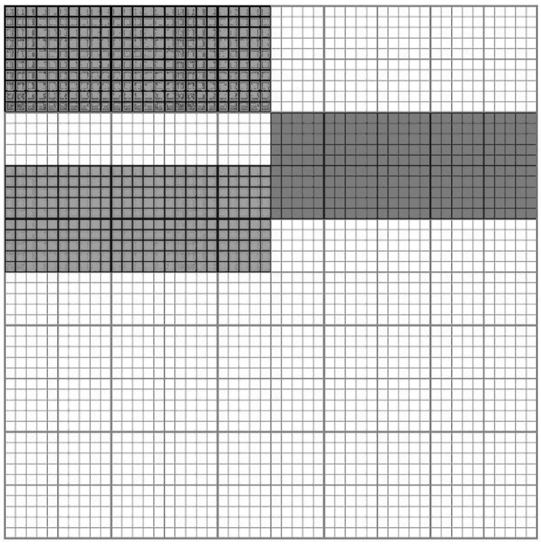


covers exactly 10 small squares.

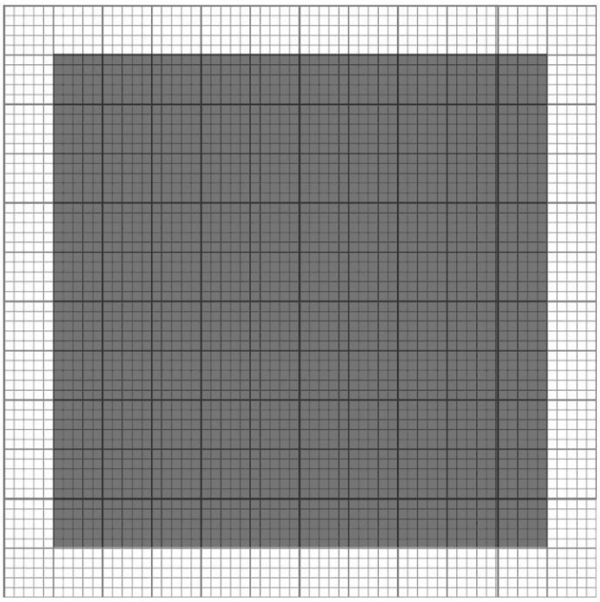
In the example provided earlier, a 2cm×2cm square represented 10 units. This is just a different way to group units on the graph sheet. If each small square is 1 unit, then an area covering the space of four small squares (2×2) is indeed representing something related to units, but the example stated it *represents* 10 units for that specific task. We will stick to the idea that **one small square = one unit** for our basic modeling and then understand how groups can represent larger values.

Modeling Larger Numbers:

Let's model the number **30**. We would need to shade 30 individual small squares on our graph sheet.

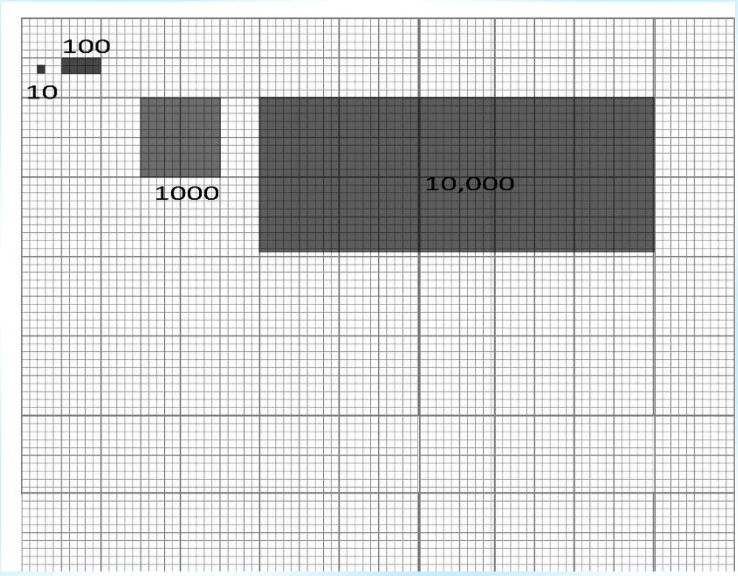


Now, what if we want to model **100**? We would need to shade 100 small squares. This could be a 10×10 square of the small units.



Modeling Up to 100,000 (Conceptually with Graph Sheets):

Modeling very large numbers like 100,000 using individual small squares would



take a very large graph sheet! Instead, we can think of groups of squares representing larger place values.

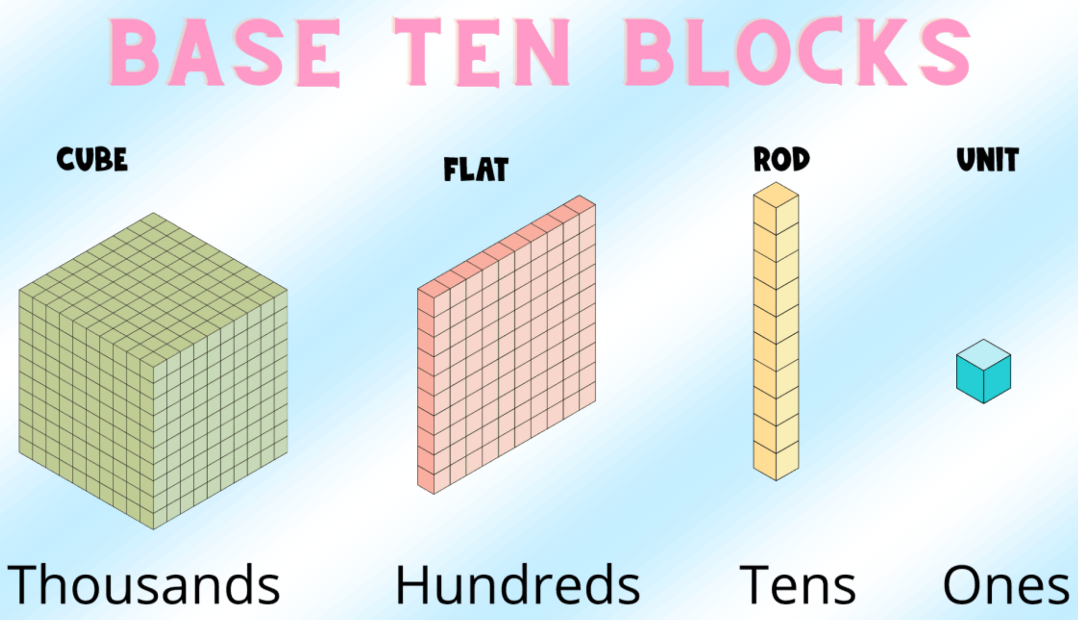
If 1 small square = 1 unit, then:

- A block of 10×10 squares = 100 units (Hundreds place)
- To represent 1,000, you would imagine 10 of these 10×10 blocks stacked together (Thousands place).
- To represent 10,000, you would imagine 10 of these "thousands stacks" (Ten Thousands place).
- To represent 100,000, you would imagine 10 of these "ten thousands collections" (Hundred Thousands place).

While we won't draw all those tiny squares, understanding this helps us visualize the size of these numbers.

Modeling with Multi-Base Materials (Blocks)

Multi-base blocks make modeling larger numbers much easier! Let's remind ourselves what each block represents:

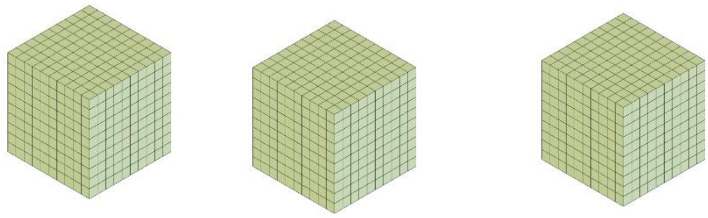


- **Unit Cube:** Represents 1
- **Rod:** Represents 10 (It's made of 10 unit cubes joined together)
- **Flat:** Represents 100 (It's a square made of 10×10 unit cubes, or 10 rods)
- **Small Cube (for Thousands):** Represents 1,000 (It's a larger cube made of 10×10×10 unit cubes, or 10 flats)

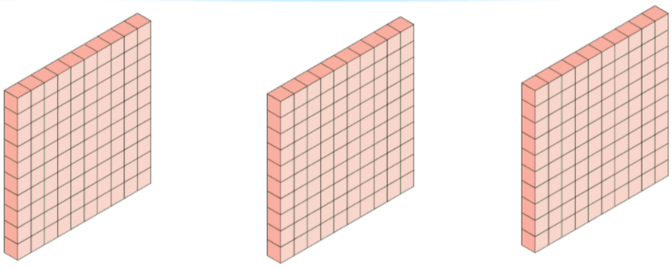
Example 2: Modeling 3,342 with Multi-Base Blocks

To model 3,342 we need to think about the place value of each digit:

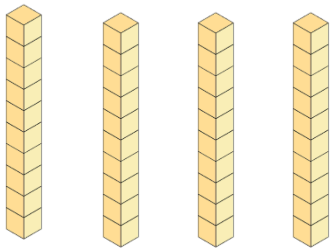
- The '3' in the thousands place means 3 sets of 1,000 → We need **3 cubes** (3 x 10,000 = 30,000).



- The '3' in the hundred place means 2 sets of 100 → We need **2 flat**(2 x 1,000 = 2,000).

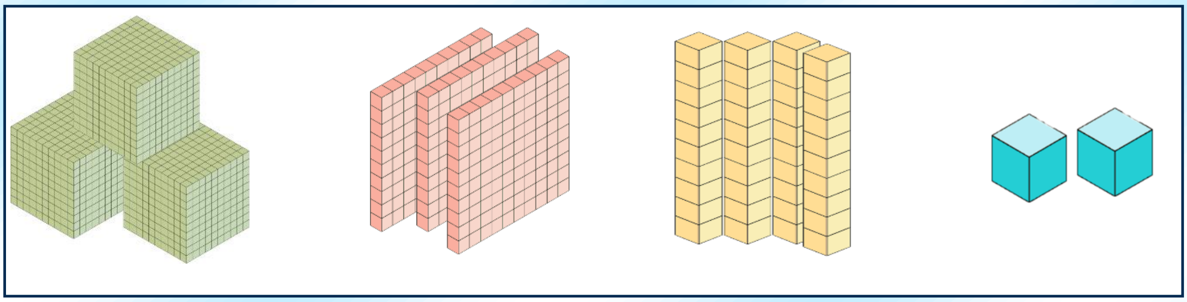


- The '4' in the hundreds place means 3 sets of 100 → We need **4 rods** (4 x 100 = 00).



- The '2' in the once place means we need **2 unit**.

So, the number 3,342 is modeled by 3 cubes, 2 flats, 4 rods and 2 units



Your Turn!

Try to think about how you would model the following numbers using multi-base materials:

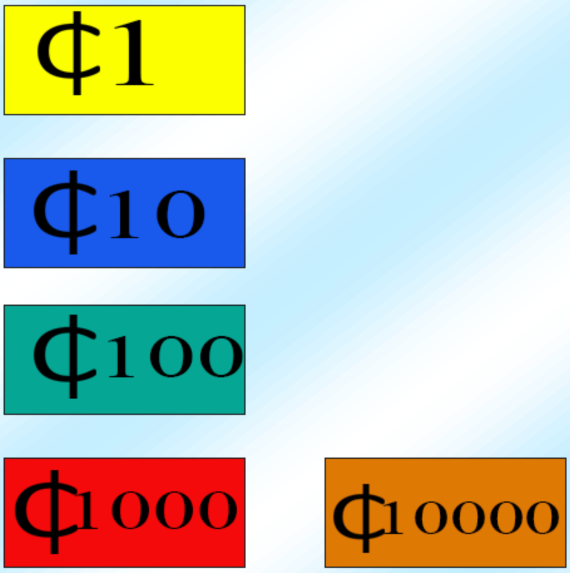
1. 15,000
2. 8,120
3. 100,000

Lesson: Modeling with Token Currency and Reading & Writing Numbers

Welcome back, number explorers! In our previous lesson, we used graph sheets and multi-base materials to understand big numbers. Now, we're going to use pretend money and a number wheel to become even better at working with numbers up to 100,000!

Modeling with Token Currency

Imagine your teacher has given you some play money:



We can use these notes to show different amounts of money, which helps us understand place value.

Example 1: Modeling ¢2,480

To make ¢2,480, we need to think about how many of each note we need:

- **Thousands Place (2,000):** We need 2 of the ¢1,000 notes (2 x ¢1,000 = ¢2,000)
- **Hundreds Place (400):** We need 4 of the ¢100 notes (4 x ¢100 = ¢400
- **Tens Place (80):** We need 8 of the ¢10 notes (8 x ¢10 = ¢80).
- **Ones Place (0):** We need 0 of the ¢1 notes.

to show ¢2,480, you would pick 2 red notes, 4 green notes, and 8 blue notes.

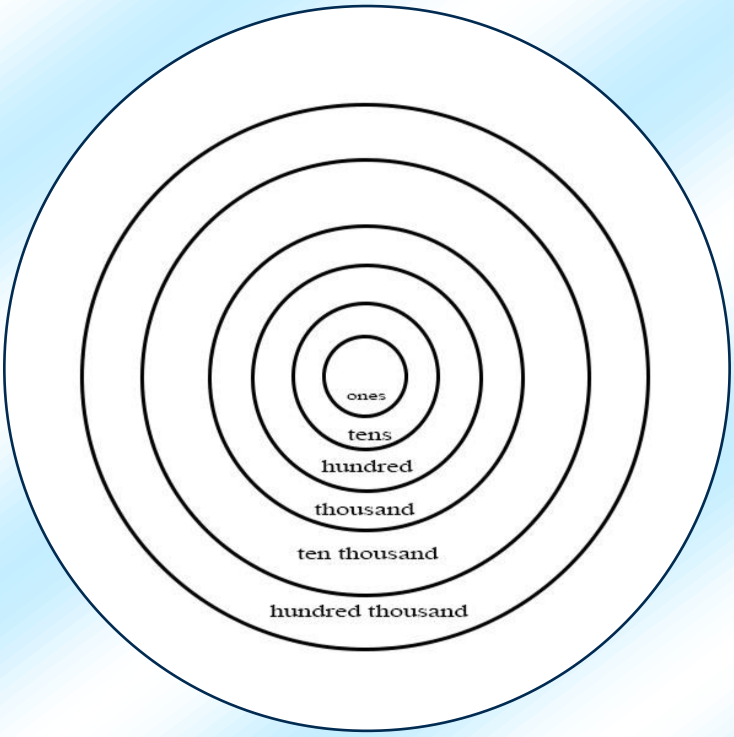
Your Turn!

Use your pretend money to model the following amounts:

1. ¢1,320
2. ¢5,060
3. ¢9,800

Reading and Writing Numbers: The Number Wheel Game

Let's play a game to help us read and write big numbers! Imagine a wheel with rings for each place value up to hundred thousands.



Here's how we play:

1. Your teacher will have a number wheel.
2. They will throw some pebbles (or small stones) onto the wheel.
3. We count how many pebbles land in each ring.
4. The number of pebbles in each ring tells us the digit for that place value.
5. Then, we say and write the number!

Example Game:

Suppose the pebbles land like this:

- Hundred Thousands ring: 1 pebble
- Ten Thousands ring: 3 pebbles
- Thousands ring: 0 pebbles

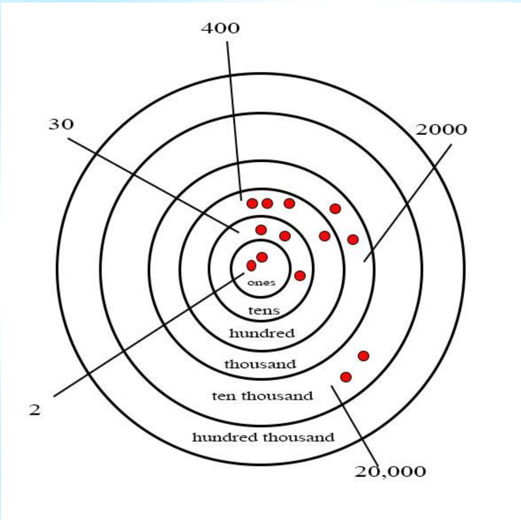
- Hundreds ring: 5 pebbles
- Tens ring: 2 pebbles
- Ones ring: 4 pebbles

This means the number generated is:

- 1 hundred thousand → 100,000
- 3 ten thousands → 30,000
- 0 thousands → 0
- 5 hundreds → 500
- 2 tens → 20
- 4 ones → 4

Adding these together: 100,000+30,000+0+500+20+4= 130,524.

We read this number as "one hundred and thirty thousand, five hundred and twenty-four".



Matching Number Words and Figures

Finally, let's practice matching numbers written in figures with their word forms.

Here are some numbers in figures and words. Can you match them?

Figures:

1. 45,210
2. 9,075
3. 100,000
4. 63,801

Words:

a) one hundred thousand

b) nine thousand and seventy-five

c) forty-five thousand, two hundred and ten

d) sixty-three thousand, eight hundred and one

(Answers: 1-c, 2-b, 3-a, 4-d)

INDICATORS:

- B4.1.1.1.1 Model number quantities, place value for multi-digit using graph sheets or multi-base materials up to 100,000
- B4.1.1.1.2 Read and write numbers in figures and in words up to 100,000

Lesson: Expanded Form and Number Charts/Lines

Hello again, brilliant mathematicians! We've explored modeling numbers with materials and reading/writing them. Now, we'll learn two more powerful ways to understand the value of each digit in a number: the **expanded form** and using **number charts/lines**.

Expanded Form: Breaking Down Numbers

The expanded form of a number shows the value of each digit separately. It's like taking the number apart based on its place value.

Example 1: Let's look at the number 14,031.

- The digit '1' is in the ten thousands place, so its value is $1\times10{,}000=10{,}000$.
- The digit '4' is in the thousands place, so its value is $4\times1{,}000=4{,}000$.
- The digit '0' is in the hundreds place, so its value is $0\times100=0$.
- The digit '3' is in the tens place, so its value is $3\times10=30$.
- The digit '1' is in the ones place, so its value is $1\times1=1$.

Putting it all together, the expanded form of 14,031 is:

$10{,}000+4{,}000+0+30+1$

Sometimes, we don't write the '0' part, so it can also be written as:

$10{,}000+4{,}000+30+1$

Example 2: Let's try another number: 52,608

- 5 is in the ten thousands place: $5\times10{,}000=50{,}000$

- 2 is in the thousands place: 2×1,000=2,000
- 6 is in the hundreds place: 6×100=600
- 0 is in the tens place: 0×10=0
- 8 is in the ones place: 8×1=8

The expanded form of 52,608 is:

50,000+2,000+600+0+8 or 50,000+2,000+600+8

DIGITS	PLACE VALUE
5	50,000
2	2,000
6	600
0	0
8	8

Your Turn!

Write the following numbers in expanded form:

1. 23,456
2. 90,102
3. 7,080

Number Charts and Number Lines

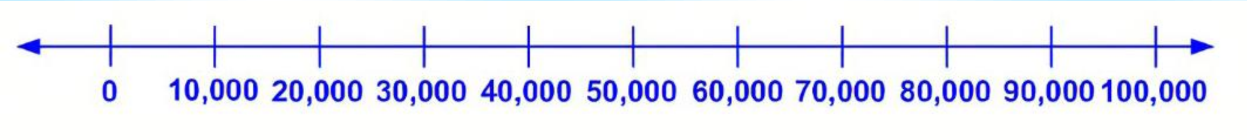
Number charts and number lines help us see the position of numbers and how they relate to each other.

Imagine a number line that shows numbers increasing from left to right.

Now, let's think about a special number line with multiples of 500 between 10,000 and 50,000. This means the numbers on our line will jump by 500 each time.

Our number line might look something like this (though not all numbers can be shown):

10,000, 20,000, 30,000, 40,000, 50,000… 100,000



Identifying Numbers Around a Given Number:

Let's say we are given the number 25,000 on our number line. We can easily find the numbers that come just before and just after it (if they are multiples of 500).

- The multiple of 500 just before 25,000 is 24,500.
- The multiple of 500 just after 25,000 is 25,500.

What if we are given a number that is not a multiple of 500, like 31,200? We can find the multiples of 500 that are closest to it.

- 31,000 is a multiple of 500 and is less than 31,200.
- 31,500 is a multiple of 500 and is greater than 31,200.

So, 31,200 lies between 31,000 and 31,500 on our number line.

Using a Number Chart:

A number chart would show these numbers in a more organized way perhaps in rows

10000	10500	11000	11500	12000	12500	13000	13500	14000	14500	15000
15500	16000	16500	17000	17500	18000	18500	19000	19500	20000.	

By looking at the chart or the number line, you can answer questions like:

- What number is 1,000 more than 15,000? (Answer: 16,000)
- What number is 500 less than 20,000? (Answer: 19,500)

Your Turn!

Using the idea of a number line with multiples of 500 between 10,000 and 50,000:

1. What are the two multiples of 500 that are closest to 42,300?
2. What number is 1,500 more than 20,000?

INDICATOR: B4.1.1.1.3 Identify numbers in different positions around a given number in a number chart

Welcome back! Today, we're going to use a number chart to help us see how numbers are organized and find numbers that are close to each other.

The Number Chart

Look at this number chart. It shows numbers increasing in steps of 500.

10,000	10,500	11,000	11,500	12,000	12,500
20,000	20,500	21,000	21,500	22,000	22,500
30,000	30,500	31,000	31,500	32,000	32,500
40,000	40,500	41,000	41,500	42,000	42,500
50,000	50,500	51,000	51,500	52,000	52,500
60,000	60,500	61,000	61,500	62,000	62,500
70,000	70,500	71,000	71,500	72,000	72,500
80,000	80,500	81,000	81,500	82,000	82,500
90,000	90,500	91,000	91,500	92,000	92,500

Finding Numbers Around a Given Number

Let's pick a number from the chart, say **31,500**. Now, let's find the numbers around it:

- **To the right:** The number immediately to the right of 31,500 is **32,000**. This is 500 more than 31,500.
- **To the left:** The number immediately to the left of 31,500 is **31,000**. This is 500 less than 31,500.
- **Above:** The number directly above 31,500 is **21,500**. This is 10,000 less than 31,500.
- **Below:** The number directly below 31,500 is **41,500**. This is 10,000 more than 31,500.

See how the chart helps us easily find numbers that are a certain amount more or less than our chosen number?

Working in Pairs

Now, let's work in pairs. Your teacher will give each pair a copy of this number chart.

1. One person in the pair chooses a number from the chart and points to it.
2. The other person has to say the number that is:

- 500 more
- 500 less
- 10,000 more (if possible on the chart)
- 10,000 less (if possible on the chart)

Take turns choosing numbers and identifying those around them.

This activity helps us understand how numbers are positioned relative to each other and reinforces our understanding of place value, especially the difference of 500 and 10,000.

Lesson 2: Comparing and Ordering Whole Numbers

INDICATOR: B4.1.1.1.4 Compare and order whole numbers up to 100,000 and represent comparisons using the symbols **“<”, “=”, “>”**

Hello again! Today, we will learn how to compare numbers to see which is bigger or smaller, and how to put them in order.

Comparing Numbers

When we compare numbers, we want to see if they are equal, or if one is greater than (bigger than) the other, or less than (smaller than) the other. We use special symbols for this:

- **=** means "equal to" (the numbers are the same). **Example: 1200=1200**

- **>** means "greater than" (the number on the left is bigger). **Example: 27345 > 26355**

- **<** means "less than" (the number on the left is smaller). **Example: $21345 < 21534$**

How to Compare:

We compare numbers by looking at their place values from left to right.

Example 1: Compare 27,345 and 26,355.

1. Look at the ten thousands place: Both have '2'.

2. Look at the thousands place: 27,345 has '7', and 26,355 has '6'. Since 7 is greater than 6, we know that **27,345 > 26,355.**

Example 2: Compare 21,345 and 21,534.

1. Ten thousands place: Both have '2'.

2. Thousands place: Both have '1'.

3. Hundreds place: 21,345 has '3', and 21,534 has '5'. Since 3 is less than 5, we know that

21,345 < 21,534.

Ordering Numbers

Ordering numbers means arranging them from the smallest to the largest **(ascending order)** or from the largest to the smallest **(descending order).**

Example: Order the numbers 1020, 1025, 2673, 2873 in ascending order.

1. Compare the numbers. All are in the thousands.

2. Look at the hundreds place: 1020 and 1025 have 0 hundreds, while 2673 and 2873 have more. So, 1020 and 1025 are smaller.

3. Compare 1020 and 1025: They have the same thousands, hundreds, and tens. Look at the ones place: 0 is less than 5. So, 1020 is smaller than 1025.

4. Now compare 2673 and 2873: They have the same thousands and hundreds. Look at the tens place: 7 is less than 8. So, 2673 is smaller than 2873.

The ascending order is: **1020, 1025, 2673, 2873.**

Working in Groups

Your teacher will give each group two numbers between 10,000 and 100,000. Discuss with your group and say as many things as you can about the two numbers. For example, if you have 21,345 and 21,534:

- "21,345 is less than 21,534."
- "21,534 is greater than 21,345."
- "They both have 2 in the ten thousands place and 1 in the thousands place."
- "The hundreds digit in 21,345 is 3, and in 21,534 it is 5."
- "21,345 is almost 200 less than 21,534."

Then, your teacher will give your group a set of more than two numbers to order in ascending and descending order.

This lesson helps us to think carefully about the value of each digit when comparing numbers and to arrange them in a specific order.

Lesson 3: Rounding Whole Numbers

INDICATOR: B4. 1.1.1.5 Round (off, up, down) whole numbers up to 10,000 to the nearest thousands, hundreds and tens

Hello again! Today, we're going to learn about rounding numbers. Rounding helps us to estimate and talk about numbers in a simpler way. We'll focus on rounding to the nearest ten, hundred, and thousand (for numbers up to 10,000).

Rounding to the Nearest Ten

When we round to the nearest ten, we look at the ones digit.

- If the ones digit is 0, 1, 2, 3, or 4, we round down (the tens digit stays the same, and the ones digit becomes 0). Example: 23 becomes 20.

- If the ones digit is 5, 6, 7, 8, or 9, we round up (the tens digit increases by 1, and the ones digit becomes 0). Example: 27 becomes 30.

Example: Round 48 to the nearest ten. The ones digit is 8, so we round up to 50. Round 63 to the nearest ten. The ones digit is 3, so we round down to 60.

Rounding to the Nearest Hundred

When we round to the nearest hundred, we look at the tens digit.

- If the tens digit is 0, 1, 2, 3, or 4, we round down (the hundreds digit stays the same, and the tens and ones digits become 0). Example: 320 becomes 300.

- If the tens digit is 5, 6, 7, 8, or 9, we round up (the hundreds digit increases by 1, and the tens and ones digits become 0). Example: 380 becomes 400.

Example: Round 765 to the nearest hundred. The tens digit is 6, so we round up to 800. Round 512 to the nearest hundred. The tens digit is 1, so we round down to 500.

Rounding to the Nearest Thousand

When we round to the nearest thousand, we look at the hundreds digit.

- If the hundreds digit is 0, 1, 2, 3, or 4, we round down (the thousands digit stays the same, and the hundreds, tens, and ones digits become 0). Example: 1200 becomes 1000.

- If the hundreds digit is 5, 6, 7, 8, or 9, we round up (the thousands digit increases by 1, and the hundreds, tens, and ones digits become 0). Example: 1800 becomes 2000.

Example: Round 9500 to the nearest thousand. The hundreds digit is 5, so we round up to 10,000. Round 9100 to the nearest thousand. The hundreds digit is 1, so we round down to 9,000.

Name Date

ROUNDING TO THE NEAREST 10, 100 & 1000

SHEET 1 ANSWERS

Round these numbers to the nearest 10

1) 47	→	50	2) 64	→	60	3) 128	→	130
4) 93	→	90	5) 315	→	320	6) 173	→	170
7) 908	→	910	8) 209	→	210	9) 167	→	170
10) 245	→	250	11) 373	→	370	12) 196	→	200

Round these numbers to the nearest 100

1) 732	→	700	2) 569	→	600	3) 306	→	300
4) 817	→	800	5) 763	→	800	6) 284	→	300
7) 455	→	500	8) 1372	→	1400	9) 2408	→	2400
10) 1375	→	1400	11) 956	→	1000	12) 4347	→	4300

Round these numbers to the nearest 1000

1) 1348	→	1000	2) 5027	→	5000	3) 1608	→	2000
4) 827	→	1000	5) 5981	→	6000	6) 4389	→	4000
7) 2715	→	3000	8) 1595	→	2000	9) 6375	→	6000
10) 3811	→	4000	11) 375	→	0	12) 7287	→	7000

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Rounding Up and Rounding Down for Estimation

Sometimes, we talk about "rounding up" and "rounding down" to estimate.

- **Round Down:** We take the smaller of the two nearest rounded numbers. For example, when rounding 14765 to the nearest ten, rounding down gives 14760.

- **Round Up:** We take the larger of the two nearest rounded numbers. For example, when rounding 14765 to the nearest ten, rounding up gives 14770.

"Round off" usually follows the rules we learned earlier (looking at the next digit).

Example for Estimation:

Let's estimate 230+160 by rounding to the nearest hundred:

- Rounding 230 to the nearest hundred gives 200 (since the tens digit is 3).
- Rounding 160 to the nearest hundred gives 200 (since the tens digit is 6).
- Estimated sum: 200+200=400.

Working Together

In your groups, practice rounding the numbers your teacher gives you to the nearest ten, hundred, and thousand. Also, practice rounding up and rounding down.

This helps us make quick estimates and understand the approximate value of numbers.

Lesson 4: Skip Counting Forwards and Backwards

INDICATOR: B4.1.1.1.6. Skip count forwards and backwards in 50s and 100s up to and from 10000

Hello again, math adventurers! Today, we'll practice skip counting by 50s and 100s. This is like counting, but we jump by a fixed amount each time.

Skip Counting Forwards

Skip counting by 50s: We add 50 each time.

Example starting from 240: 240, 240+50=290, 290+50=340, 340+50=390, 390+50=440, 440+50=490, and so on.

Skip counting by 100s: We add 100 each time.

Example starting from 1200: 1200, 1200+100=1300, 1300+100=1400, 1400+100=1500, and so on.

Skip Counting Backwards

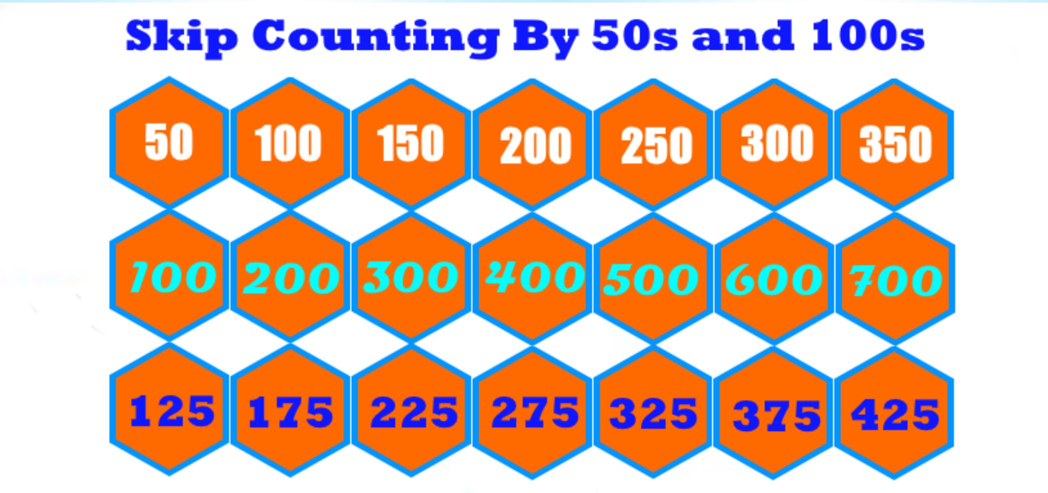
Skip counting backwards by 50s: We subtract 50 each time.

Example starting from 490: 490, 490−50=440, 440−50=390, 390−50=340, and so on.

Skip counting backwards by 100s: We subtract 100 each time.

Example starting from 1285:

1285, 1285−100=1185, 1185−100=1085, 1085−100=985, and so on.



Group Activity

Let's work in groups.

1. One person shouts out a starting number.

2. The next person starts skip counting forwards by 50s (or 100s) and continues for five counts.

3. Then, another person shouts out a starting number, and the next person skip counts backwards by 50s (or 100s) for five counts.

We can also try to find errors in skip counting sequences. For example, if someone says: 1500, 1600, 1750, 1800... we can see that 1750 is not the correct next number when skip counting by 100s from 1600. It should be 1700.

INDICATOR: B4.1.1.2.1 Develop an understanding of Roman Numeral system up XXX (i.e. 30)

Hello, curious learners! Today, we're going to explore a different way of writing numbers called Roman numerals. Long ago, people in ancient Rome used these numerals. We will learn to recognize them up to the number 30.

The Main Roman Numerals We Need

For numbers up to 30, we mainly use these Roman symbols:

- **I** represents 1
- **V** represents 5
- **X** represents 10

I	II	III	IV	V
1	2	3	4	5
VI	VII	VIII	IX	X
6	7	8	9	10

Building Roman Numerals

The Romans had some rules for combining these symbols to make other numbers:

1. **Repetition:** If you repeat a symbol, you add its value each time. You can repeat I and X up to three times.

- II = 1+1=2
- III = 1+1+1=3
- XX = 10+10=20
- XXX = 10+10+10=30

2. **Subtraction:** If you put a smaller symbol before a larger one, you subtract the smaller value from the larger one. This is only done with I before V (IV = 4) and I before X (IX = 9).

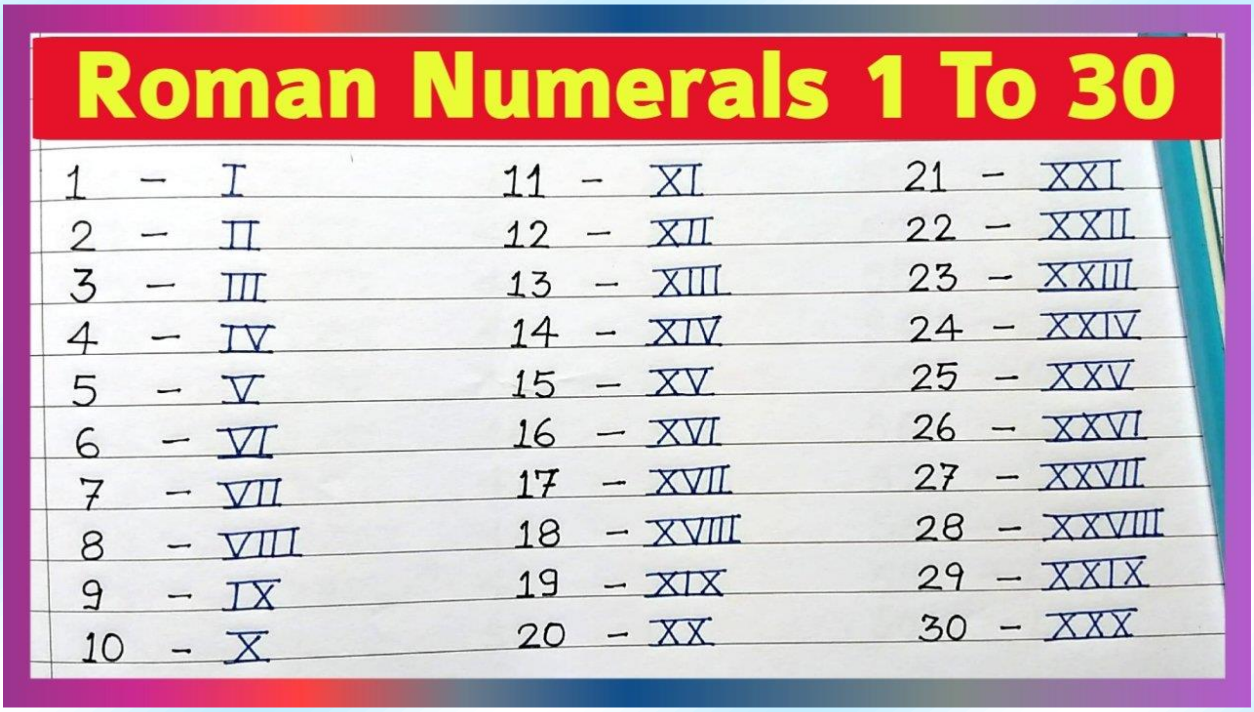
- IV = 5−1=4
- IX = 10−1=9

3. **Addition:** If you put a smaller symbol after a larger one, you add the values.

- VI = 5+1=6
- XI = 10+1=11
- XV = 10+5=15

Roman Numeral Chart (1-30)

Let's look at a chart of Roman numerals from 1 to 30:



Identifying Roman Numerals

Look at the chart. Can you find the Roman numeral for 7? (Answer: VII) How about 19? (Answer: XIX)

Your teacher will call out a Roman numeral, and you should point to it on the chart.

Matching Activity

Let's match the Roman numerals with our regular numbers:

- I = ?
- V = ?
- X = ?
- XV = ?

Your teacher will mention some Roman numerals randomly, and you point to them on the chart.

This lesson helps us to recognize the basic Roman numerals and how they are combined to represent numbers up to 30.

INDICATOR: B4.1.1.2.2 Count and convert Hindu Arabic numerals to Roman numerals up to 30 and vice versa

Welcome back! Now that we can recognize Roman numerals, we will learn to count using them and switch between our regular numbers (Hindu-Arabic) and Roman numerals.

Reading the Roman Numeral Chart

Let's read our Roman numeral chart in different ways:

- **Sequentially:** Read it from I, II, III all the way to XXX. Then, try reading it backwards from XXX to I.
- **Vertically:** Read down each column.
- **Zig-zag:** Try reading in a zig-zag pattern across the chart.

Writing Roman Numerals

Your teacher will call out a Roman numeral (e.g., XIII), and you should write it down on your paper.

Converting Hindu-Arabic to Roman Numerals

Let's learn how to change our regular numbers into Roman numerals.

Example 1: Convert 12 to Roman numerals.

- We know X = 10.
- We need 2 more, which is II.
- So, 12 in Roman numerals is XII.

Example 2: Convert 24 to Roman numerals.

- We have 20, which is XX.
- We need 4 more, which is IV.
- So, 24 in Roman numerals is XXIV.

10 + 2 ⟶ X + II = XII

20 + 4 ⟶ XX + IV = XXIV.

Converting Roman Numerals to Hindu-Arabic

Now, let's learn to change Roman numerals back to our regular numbers.

Example 1: Convert XVI to Hindu-Arabic.

- X = 10
- V = 5
- I = 1
- Since the smaller values are after the larger one, we add them: 10+5+1=16.
- So, XVI is 16.

Example 2: Convert XIX to Hindu-Arabic.

- X = 10
- IX = 9 (because I is before X, we subtract 10−1=9)
- So, XIX is 10+9=19.

Practice Time!

Your teacher will give you some numbers in the Hindu-Arabic system, and you will convert them to Roman numerals. Then, you will be given some Roman numerals to convert back to Hindu-Arabic numbers. For example:

- Convert 17 to Roman numerals. (Answer: XVII)
- Convert XXVIII to Hindu-Arabic. (Answer: 28)

INDICATOR: B4.1.1.3.1 Determine set of factors of a given number up to 50

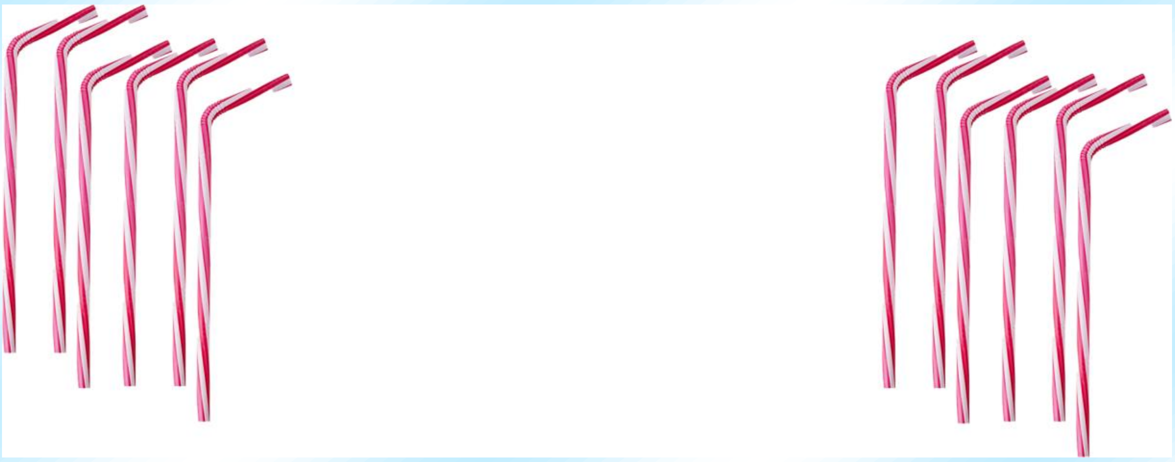
Hello, smart thinkers! Today, we're going to learn about factors. Factors are numbers that you can multiply together to get another number.

Making Equal Groups

Let's take 12 straws as an example. We want to see in how many equal groups we can arrange these 12 straws.

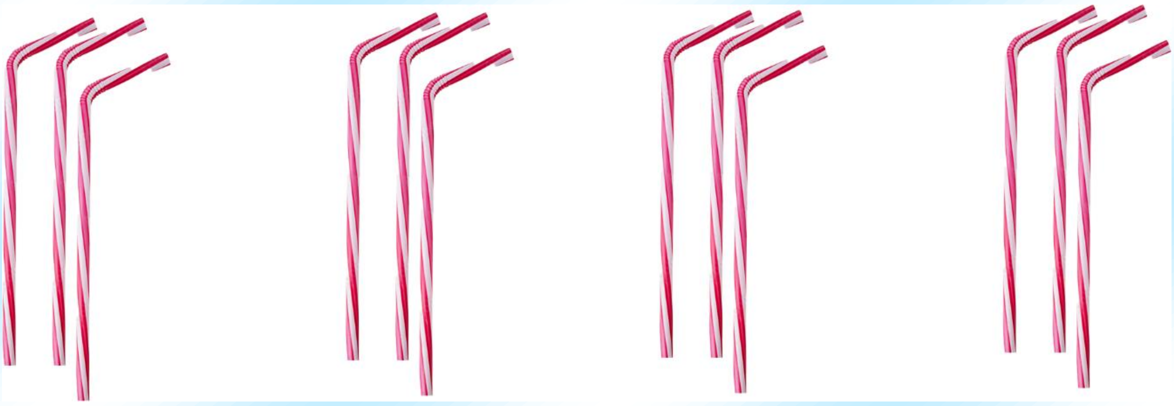
1. **1 group:** We can put all 12 straws in one group. (1 group of 12)

2. **2 groups:** We can divide them into 2 equal groups of 6 straws each. (2 groups of 6)



3. 3 groups: We can divide them into 3 equal groups of 4 straws each. (3 groups of 4)

4. 4 groups: We can divide them into 4 equal groups of 3 straws each. (4 groups of 3)



5. 6 groups: We can divide them into 6 equal groups of 2 straws each. (6 groups of 2)

6. **12 groups:** We can divide them into 12 equal groups of 1 straw each. (12 groups of 1)

Factors as Pairs

Notice that each way of making equal groups gives us a pair of numbers that multiply to 12:

- 1 group of 12 → (1, 12)
- 2 groups of 6 → (2, 6)
- 3 groups of 4 → (3, 4)
- 4 groups of 3 → (4, 3)
- 6 groups of 2 → (6, 2)
- 12 groups of 1 → (12, 1)

These numbers (1, 12, 2, 6, 3, 4) are the factors of 12.

The Set of Factors

If we collect all these factors, we get the set of factors of 12:

{1,2,3,4,6,12}

Your Turn!

Use drawings or objects to find the factors of 10. In how many ways can you arrange 10 objects into equal groups? What are the pairs of factors you find? What is the set of factors of 10?

This lesson helps us understand what factors are by using objects to make equal groups.

Lesson 2: Highest Common Factor (HCF)

INDICATOR: B4.1.1.3.2 Determine the highest common factor (HCF) of any two whole numbers between 1 and 50.

Hello again! Today, we'll learn how to find the Highest Common Factor (HCF) of two numbers. The HCF is the largest number that is a factor of both numbers.

Finding Common Factors

Let's find the HCF of 12 and 24.

1. First, we list the factors of 12: {1,2,3,4,6,12}
2. Then, we list the factors of 24: {1,2,3,4,6,8,12,24}

Now, let's find the factors that are common to both sets. These are the numbers that appear in both lists:

Common factors of 12 and 24: {1,2,3,4,6,12}

{1, 2, 3, 4, 6, 12}

{1, 2, 3, 4, 6, 8, 12, 24}

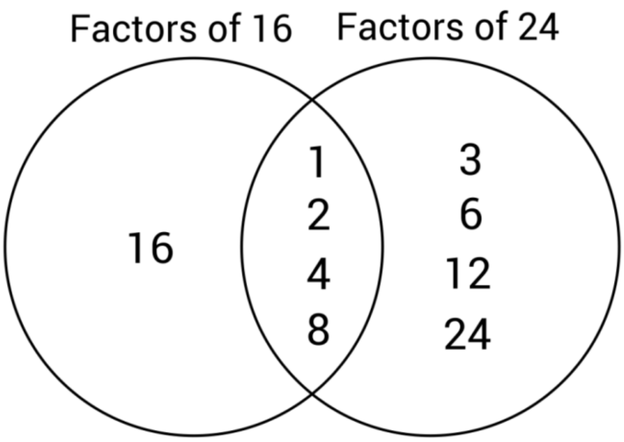
The highest number in this set of common factors is 12. So, the Highest Common Factor (HCF) of 12 and 24 is 12.

Using Venn Diagrams

We can also use Venn diagrams to find the HCF. Let's find the HCF of 16 and 24.

1. Factors of 16: 1,2,4,8,16}
2. Factors of 24: {1,2,3,4,6,8,12,24}

Now, let's put these factors in a Venn diagram. The overlapping part will show the common factors.



The common factors of 16 and 24 are {1,2,4,8}. The highest of these common factors is 4.

So, the HCF of 12 and 20 is 8.

Your Turn!

Find the HCF of the following pairs of numbers:

1. 8 and 12
2. 15 and 25

This lesson helps us find the largest factor that two numbers share.

Lesson 3: Lowest Common Multiple (LCM)

Hello again, multiple masters! Today, we're going to learn about multiples and how to find the Lowest Common Multiple (LCM) of two numbers. The LCM is the smallest number that is a multiple of both numbers.

What are Multiples?

Multiples of a number are what you get when you multiply that number by 1, 2, 3, and so on. It's like skip counting!

- **Multiples of 5: 5, 10, 15, 20, 25, 30, ..., 100, ...**
- **Multiples of 10: 10, 20, 30, 40, 50, 60, ..., 100, ...**

Finding Common Multiples

Let's find the LCM of 5 and 10.

1. List the multiples of 5 up to 100: {5,10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85,90,95,100}
2. List the multiples of 10 up to 100: {10,20,30,40,50,60,70,80,90,100}

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

10, 20, 30, 40, 50, 60, 70, 80, 90, 100

Now, let's find the multiples that are common to both lists:

Common multiples of 5 and 10: {10,20,30,40,50,60,70,80,90,100}

The smallest number in this set of common multiples is 10. So, the Lowest Common Multiple (LCM) of 5 and 10 is 10.

Your Turn!

Find the LCM of the following pairs of numbers (you might need to list multiples up to 100):

1. 2 and 3
2. 4 and 6

INDICATOR: B4.1.1.3.4 Recognise the relationship between factors and multiples.

Hello, number detectives! Today, we're going to explore how factors and multiples are connected.

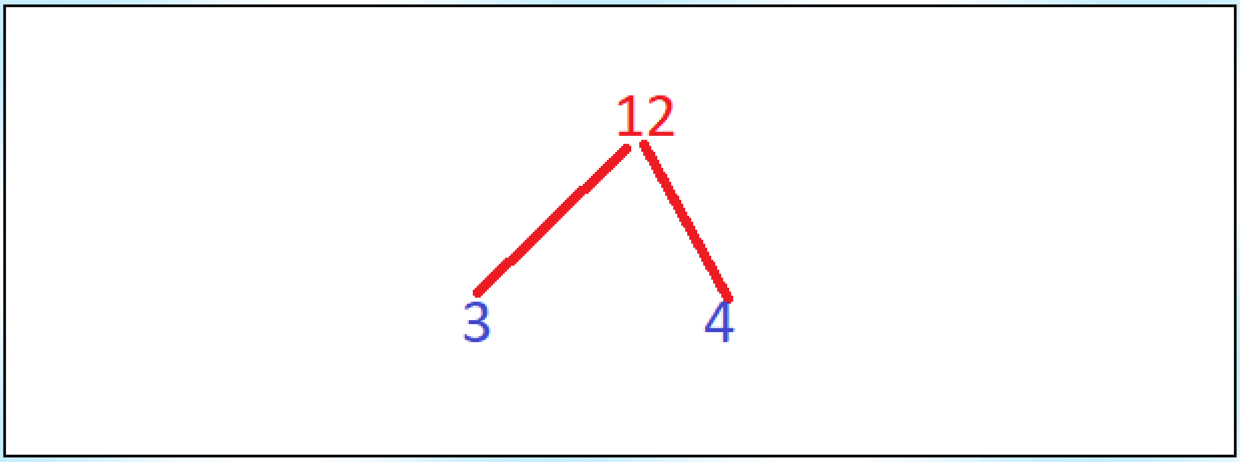
Factors Make Multiples

Remember factors? They are numbers we multiply to get another number. That "another number" is a multiple of those factors!

Example: We know that 4×3=12.

- This means that **4 and 3 are factors of 12**.
- It also means that **12 is a multiple of 3** (because we can get 12 by multiplying 3 by 4).
- And **12 is also a multiple of 4** (because we can get 12 by multiplying 4 by 3).

So, factors help us build multiples!



Breaking Down Multiples into Factors

We can also go the other way. If we have a multiple, we can find its factors.

Example: Let's take the multiple 18. What are its factors? We need to find pairs of numbers that multiply to 18:

- 1×18=18, so 1 and 18 are factors.
- 2×9=18, so 2 and 9 are factors.

- 3×6=18, so 3 and 6 are factors.

The factors of 18 are {1,2,3,6,9,18}. And 18 is a multiple of each of these numbers.

Even and Odd Numbers

Let's think about multiples of 2. Numbers that are multiples of 2 are called **even numbers** (e.g., 2, 4, 6, 8...). What do you notice about even numbers? (Answer: They all end in 0, 2, 4, 6, or 8).

Numbers that are NOT multiples of 2 are called **odd numbers** (e.g., 1, 3, 5, 7...). What do you notice about odd numbers? (Answer: They all end in 1, 3, 5, 7, or 9).

Multiples of 3, 4, and 5

- **Multiples of 3:** 3, 6, 9, 12, 15... How can we tell if a number is a multiple of 3? (One way is to add up the digits. If the sum is a multiple of 3, then the number is a multiple of 3).

- **Multiples of 4:** 4, 8, 12, 16, 20... How can we tell if a number is a multiple of 4? (If the number formed by the last two digits is a multiple of 4).

- **Multiples of 5:** 5, 10, 15, 20, 25... How can we tell if a number is a multiple of 5? (They always end in 0 or 5).

Your Turn!

1. What are two factors of 20? Is 20 a multiple of those factors?

2. Is 35 a multiple of 5? What is the other factor that gives you 35 when multiplied by 5?

3. Is 27 an even or odd number? Is it a multiple of 3? How do you know?

This lesson helps us see the close relationship between factors and multiples and explore some properties of numbers.

Lesson 2: Generating and Analysing Patterns in Square Numbers

INDICATOR: B4.1.1.3.5 Generate and analyse patterns in square numbers

Hello, pattern finders! Today, we're going to learn about square numbers and look for interesting patterns in them.

What are Square Numbers?

A square number is what you get when you multiply a number by itself.

- 1×1=1 (1 squared, written as 12)
- 2×2=4 (2 squared, written as 22)
- 3×3=9 (3 squared, written as 32)
- 4×4=16 (4 squared, written as 42)

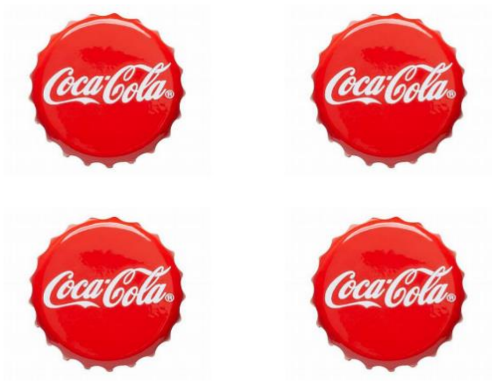
Generating Square Numbers with Bottle Tops

Let's use bottle tops to see the pattern of square numbers:

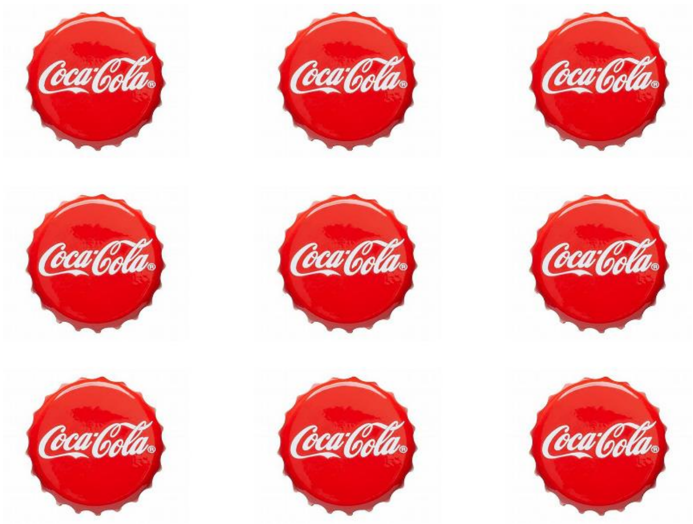
- **1st square number:** Arrange 1 bottle top in a 1×1 square.

(Total: 1)

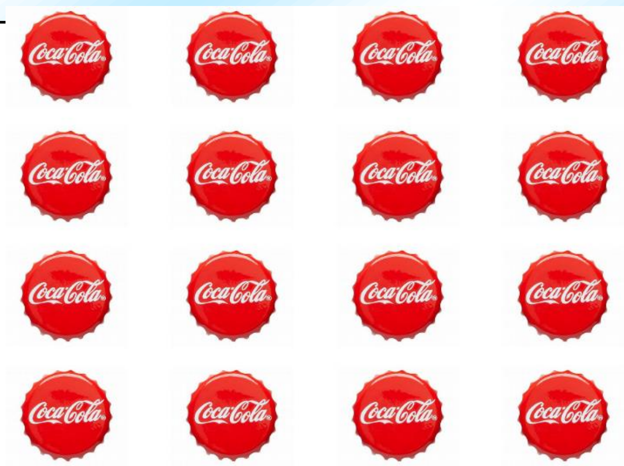
- **2nd square number:** Arrange 2×2=4 bottle tops in a square. (Total: 4)



- **3rd square number:** Arrange 3×3=9 bottle tops in a square. (Total: 9)



- **4th square number:** Arrange 4×4=16 bottle tops in a square. (Total: 16)



Continue this pattern up to the 10th square number in your groups using your bottle tops and A4 sheet. What are the first 10 square numbers? (Answer: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100)

Square Numbers and Odd Numbers

Look at the difference between consecutive square numbers:

- $4-1=3$ (which is the 2nd odd number)
- $9-4=5$ (which is the 3rd odd number)
- $16-9=7$ (which is the 4th odd number)

It seems that the difference between two consecutive square numbers is the next odd number!

Also, notice that a square number is the sum of the first 'that many' odd numbers:

- $1=1$ (1st odd number)
- $4=1+3$ (sum of the first 2 odd numbers)
- $9=1+3+5$ (sum of the first 3 odd numbers)
- $16=1+3+5+7$ (sum of the first 4 odd numbers)

Isn't that interesting?

Your Turn!

1. What is the 5th square number? Show it with a drawing of bottle tops.
2. What is the difference between the 5th and 6th square numbers? Is it an odd number? Which one?
3. What is the sum of the first 6 odd numbers? What square number should it be equal to?

This lesson helps us discover patterns within square numbers and their relationship with odd numbers.

Lesson 3: Representing Square Numbers Using Factors

INDICATOR: B4.1.1.3.6 Represent square numbers using factors

Hello again! Today, we'll see how factors help us understand square numbers.

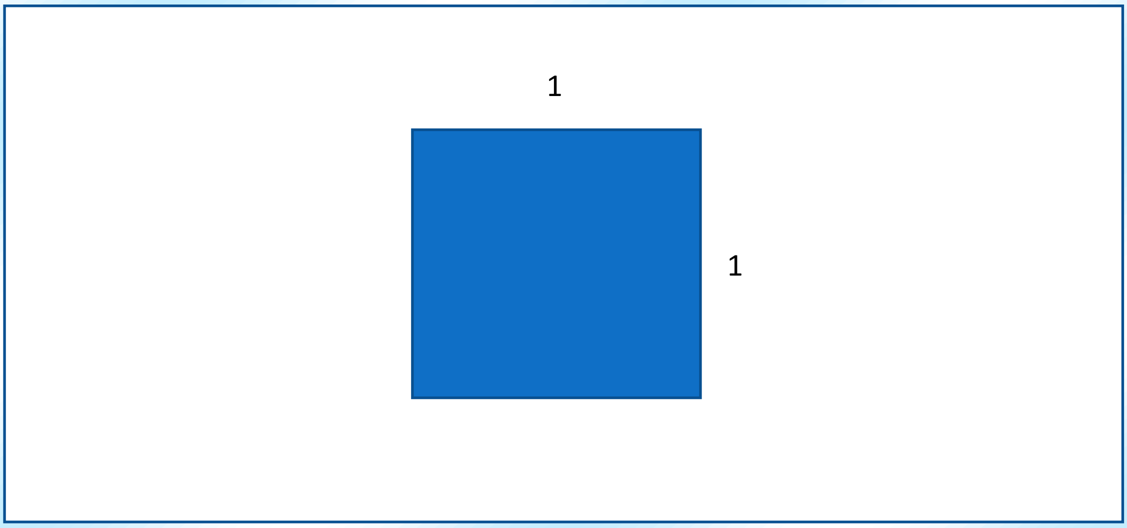
Square Numbers and Their Factors

Remember that a square number is a number multiplied by itself.

- $1=1\times1$. The factors are just 1.
- $4=2\times2$. The factors include 2 (and also 1 and 4).
- $9=3\times3$. The factors include 3 (and also 1 and 9).
- $16=4\times4$. The factors include 4 (and also 1, 2, 8, 16).

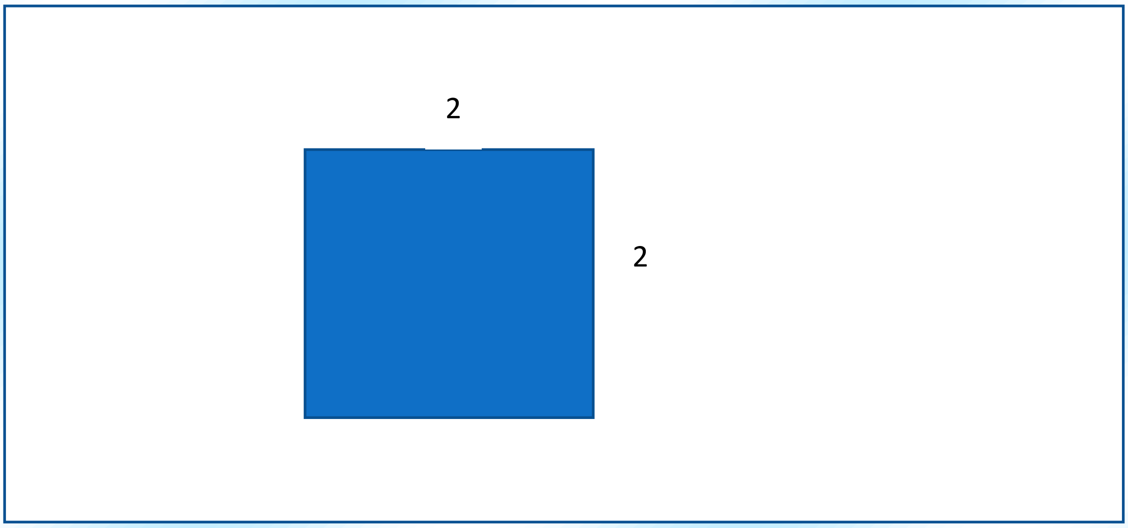
Notice that for a square number, one of the factors is multiplied by itself to get the number.

Drawing Squares and Finding Area

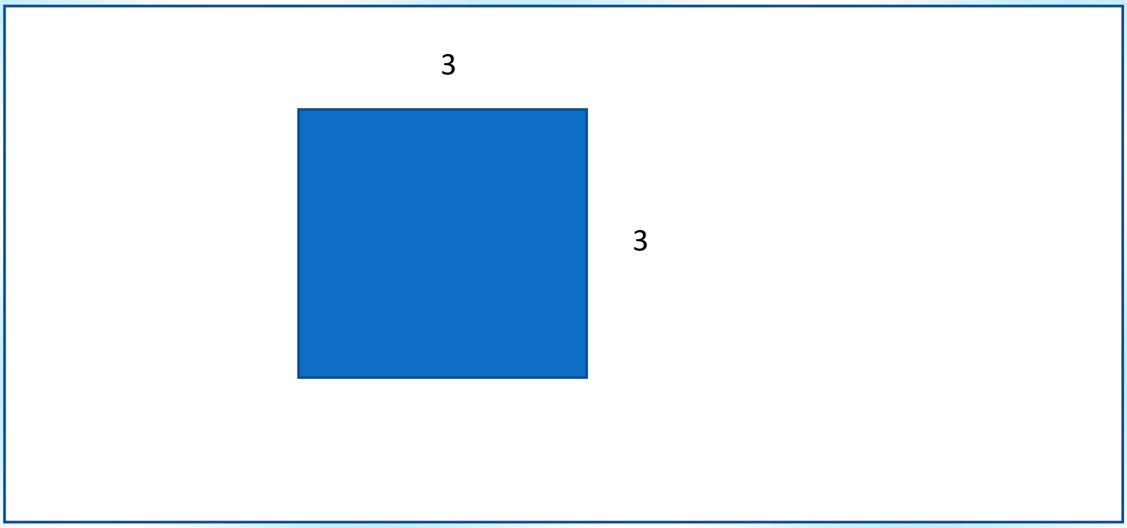


1. Draw a square that is 1 unit by 1 unit. What is its area? (Answer: $1\times1=1$ square unit)

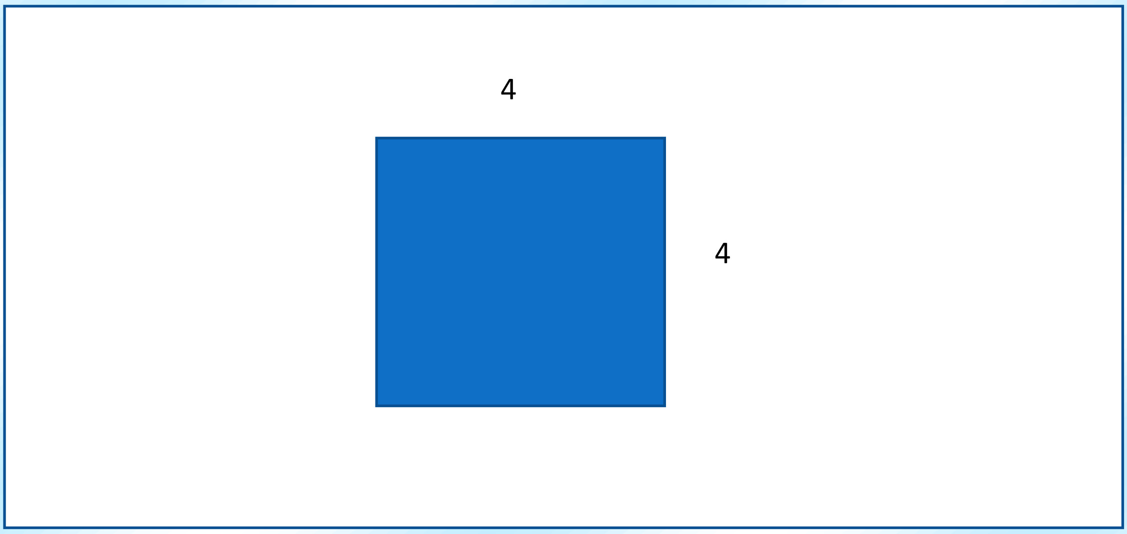
2. Draw a square that is 2 units by 2 units. What is its area? (Answer: 2×2=4 square units)



3. Draw a square that is 3 units by 3 units. What is its area? (Answer: 3×3=9 square units)



4. Draw a square that is 4 units by 4 units. What is its area? (Answer: 4×4=16 square units)



The areas we found (1, 4, 9, 16) are all square numbers! The side length of the square is the factor that is multiplied by itself.

Factors of 144

Let's think about the square number 144. We know that 12×12=144. So, 12 is a factor that is multiplied by itself to get 144. What are some other factors of 144? (e.g., 1, 2, 3, 4, 6, 8, 9, 12, 16, ...)

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2											
3											
4											
5											
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11											
12											

Your Turn!

1. What are the factors that you multiply by themselves to get the square numbers 25 and 49?

2. Draw a square with an area of 9 square units. What is the length of each side? How does this relate to the factors of 9?

This lesson shows us how the idea of factors is connected to the shape of a square and how square numbers are formed.

Finally, let's briefly touch on positive and negative numbers based on the last indicator you provided.

Lesson 4: Interpreting Positive and Negative Numbers

INDICATOR: B4.1.1.4.1 Describe real life situations using positive and negative values

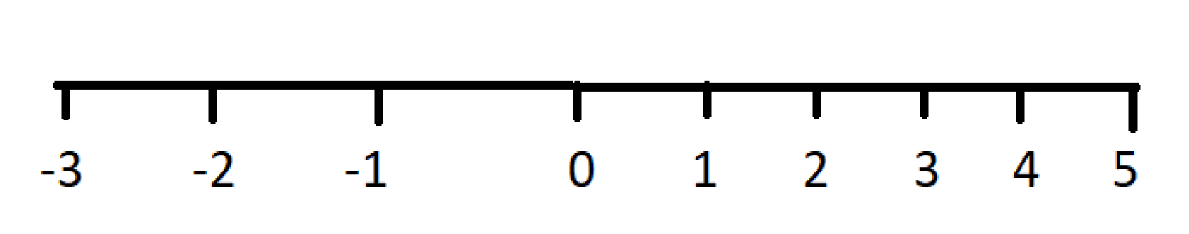
Hello, number explorers! Today, we'll see how we use numbers to describe things that are more than zero (positive) and less than zero (negative).

Real-Life Situations

Think about these situations:

- **Savings and Debt:** If you have ¢50 in your piggy bank, we can say you have **+50**. If you borrow ¢30 from a friend, we can say you have **-30** (you owe 30).
- **Profit and Loss:** If a shopkeeper makes a profit of ¢100, we can say **+100**. If they make a loss of ¢20, we can say **-20**.
- **Movement on a Number Line:** If you start at zero and move 5 steps to the right, you are at **+5**. If you move 3 steps to the left from zero, you are at **-3**.

Positive numbers are usually written with a plus sign (+) or without any sign. Negat



ive numbers are always written with a minus sign (-).

Your Turn!

Can you think of other real-life situations where we might use positive and negative numbers? (e.g., temperature above and below zero, floors above and below ground level).

Sub-strand 2: Number Operations

INDICATOR: B4.1.2.1.1 Determine basic multiplication facts up to 12 x 12

Hello, multiplication masters! Today, we're going to become even better at remembering our multiplication facts up to 12x12. Knowing these facts quickly will help us solve bigger math problems later!

What is Multiplication?

Remember that multiplication is like adding the same number many times. For example, 2 x 3 means adding 2 three times (2+2+2=6), or adding 3 two times (3+3=6).

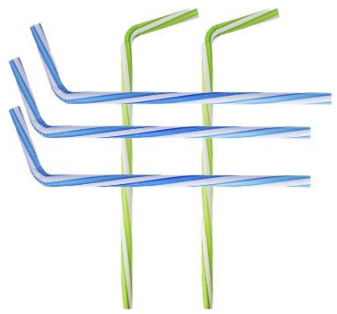
Using Straws to Multiply

Let's use straws to understand multiplication.

Example 1: Finding 2times3

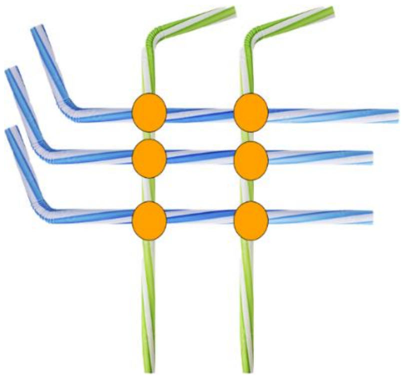
1. Take 2 straws and lay them down vertically (these are our "legs").

2. Now, take 3 more straws and lay them across the vertical ones horizontally (these are our "arms").



3. Count the number of places where the straws cross (the intersections). There are 6 intersections.

So, 2 x 3=6.

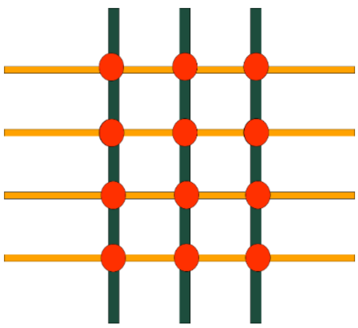


Example 2: Modeling 3times4

How many vertical straws ("legs") would you use? (Answer: 3) How many horizontal straws ("arms") would you put across them? (Answer: 4) How many intersections would you count? (Answer: 12)

So, 3 x 4 =12.

You can also draw lines instead of using straws! Draw 3 vertical lines and then 4 horizontal lines across them, and count the intersections. You should get the same answer.



The Multiplication Chart Game

Let's play a game called "3-in-a-Line" using a multiplication chart. We'll make a 6 by 6 chart for numbers 5 to 10.

Here's what the game board looks like:

x	5	6	7	8	9	10
5	25	30	35	40	45	50
6	30	36	42	48	54	60
7	35	42	49	56	63	70
8	40	48	56	64	72	80
9	45	54	63	72	81	90
10	50	60	70	80	90	100

How to Play:

1. You need a partner, a game board (the chart), two dice (or playing cards numbered 5 to 10), and different colored markers or counters for each player.

2. Players take turns. On your turn, roll the two dice (or pick two cards).

3. Multiply the two numbers you rolled/picked.

4. Find the product on the game board and mark it with your marker. If the product is already marked, you lose your turn.

5. The first player to get three of their markers in a straight line (horizontally, vertically, or diagonally) wins!

Doubles and Squares

- **Doubles:** Finding the double of a number is like multiplying it by 2. What is the double of 7? (7 x 2=14) What is the double of 9? (9 x 2=18)

- **Squares:** Finding the square of a number is like multiplying it by itself. What is the square of 3? (3 x 3=9) What is the square of 8? (8 x 8=64)

Skip Counting

We can also use skip counting to learn multiplication facts:

- Skip counting in 4s: 4, 8, 12 (3 x 4=12), 16 (4 x 4=16), ...

- Skip counting in 5s: 5, 10, 15 (3 x 5=15), 20 (4 x 5=20), ...
- Skip counting in 8s: 8, 16 (2 x 8=16), 24 (3 x 8=24), ...

Your Turn!

1. Use the straw/line method to find 4 x 5.
2. Play the 3-in-a-Line multiplication game with a partner.
3. What is the double of 11? What is the square of 6?
4. Continue the skip counting sequence for 8s up to 5 x 8.

INDICATOR: B4.1.2.2.1 Apply mental mathematics strategies and number properties, such as skip counting from a known fact using doubling or halving using patterns in the 9s facts using repeated doubling or halving to determine answers for basic multiplication facts to 81 and related division facts

Hello, mental math whizzes! Today, we're going to learn some clever tricks to help us solve multiplication and division problems in our heads quickly! These strategies will make math easier and faster.

Skip Counting from a Known Fact

If we know one multiplication fact, we can use skip counting to find others nearby.

Example 1: Finding 6×7 using 5×7=35

We know that 5×7=35. To find 6×7, we just need one more group of 7. So, 6×7=35+7=42.

Example 2: Finding 7×7 using 5×7=35

To find 7×7, we need two more groups of 7 than 5×7. So, 7×7=35+7+7=35+14=49.

Going Down:

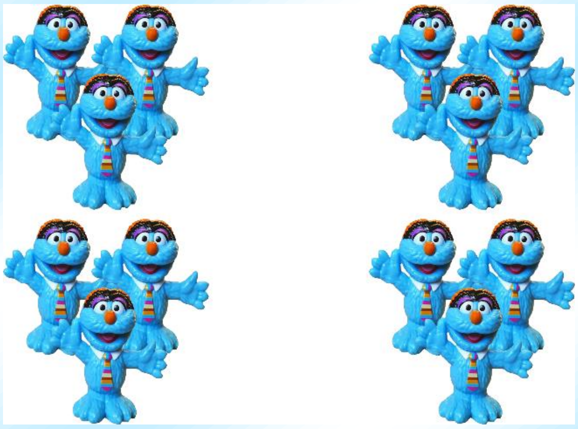
If we know 8×8=64, we can find 7×8 by taking away one group of 8: 7×8=64−8=56. And 6×8=56−8=48.

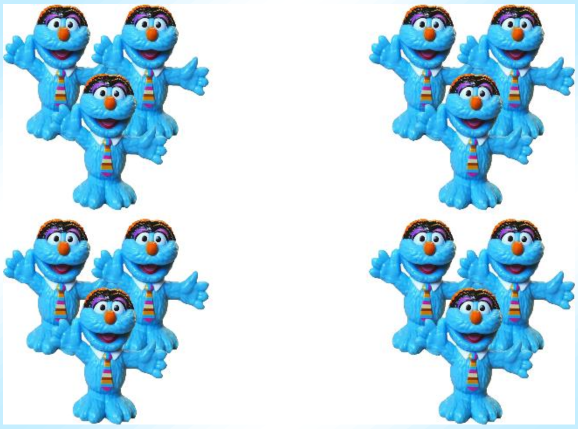
Doubling

Sometimes, we can use doubling to find the answer.

Example: Finding 8×3

Think: We know 4×3=12. Since 8 is double 4, then 8×3 is double 4×3. So,





8×3=12+12=24.

A visual showing 4 groups of 3 items, and then another identical set to represent doubling to 8 groups of 3.)

Patterns When Multiplying by 9

There's a cool pattern when multiplying by 9!

Example: Finding 9×6

Think: 10×6=60. Since 9 is one less than 10, 9×6 will be 6 less than 60. So, 9×6=60−6=54.

Example: Finding 7×9

Think: 7×10=70. So, 7×9 will be 7 less than 70. So, 7×9=70−7=63.

Repeated Doubling

We can double the result multiple times.

Example: Finding 8×6

We know 2×6=12. Double it: 4×6=12+12=24. Double it again: 8×6=24+24=48.

Repeated Halving (for Division)

We can halve the number we are dividing multiple times.

Example: Finding 60÷4

Halve 60: 60÷2=30. Halve 30: 30÷2=15. So, 60÷4=15.

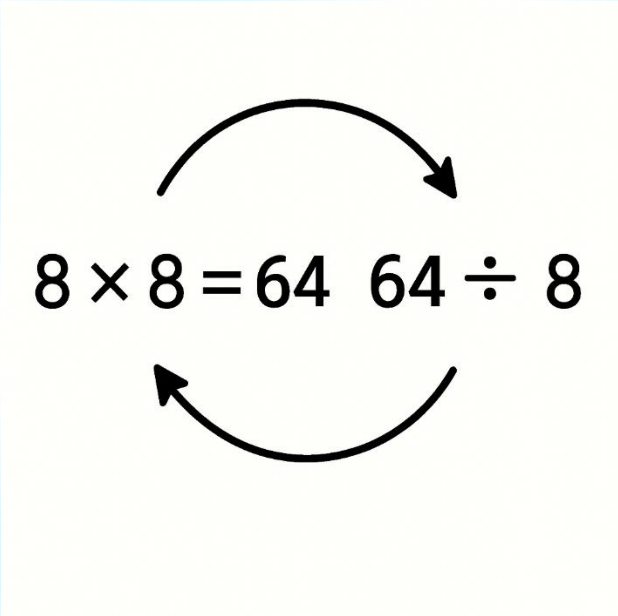
Relating Division to Multiplication

We can think of division as the opposite of multiplication.

Example: Finding 64÷8

Think: "What number multiplied by 8 equals 64?" We know that 8×8=64. So, 64÷8=8.

Okay, here's a diagram illustrating the relationship between the multiplication 8×8=64 and the division 64÷8=8:



Explanation:

- **Multiplication:** We start with two factors, 8 and 8. When we multiply them, we get the product, 64. This is shown in the top part of the diagram.
- **Division:** Division is the inverse operation of multiplication. If we start with the product (64) and divide it by one of the factors (8), we get the other factor (8). This is shown in the bott

Your Turn!

Use these mental math strategies to solve the following:

1. If 4×9=36, what is 5×9?
2. Use doubling to find 6×4 (think 3×4=12).
3. Use the pattern for multiplying by 9 to find 9×8.
4. Use repeated halving to find 48÷4.
5. Think of multiplication to solve 35÷5.

INDICATOR: B4.1.2.2.2 Apply mental mathematics strategies for multiplication, such as annexing then adding zero halving and doubling using the distributive property

Hello again, mental math experts! Today, we'll add even more cool strategies to our mental math toolbox for multiplication!

Annexing Zeroes

When you multiply by multiples of 10, 100, or 1000, you can multiply by the non-zero part and then just add the zeroes at the end. This is called "annexing zeroes".

Example 1: 3 × 200

Think: First, multiply 3 × 2= 6. Since 200 has two zeroes, we add two zeroes to our answer. So, 3×200=600.

Example 2: 7 × 30

Think: First, multiply 7 × 3 = 21. Since 30 has one zero, we add one zero to our answer. So, 7×30=210.

Okay, here's a diagram showing the relationship between 3×2=6 and 3×200=600, with arrows indicating the addition of zeros:

3	x	2	=	6
			↓	+0
3	x	20	=	60
			↓	+0
3	x	200	=	600

Explanation:

- *We start with the basic multiplication fact: 3×2=6.*
- *To get to 3×20, we've essentially multiplied the 2 by 10 (added one zero). The result, 6, also gets multiplied by 10 (gains one zero) to become 60. This is indicated by the first downward arrow and "+0".*

- *Similarly, to get to 3×200, we've multiplied the original 2 by 100 (added two zeros). The result, 6, also gets multiplied by 100 (gains two zeros) to become 600. This is indicated by the second downward arrow and "+0".*

Halving and Doubling

Sometimes, we can make a multiplication problem easier by halving one factor and doubling the other. The answer stays the same!

Example: 32 times 5

Think: Halve 32 to get 16, and double 5 to get 10. Now we have 16times10, which is easy! 16times10= 160. So, 32times5=160.

illustration showing the transformation from 32×5 to 16×10 with arrows and the results:

```
     32     x      5    =    160
    /  \          / \
   /    \        /   \
  /      \      /     \
16    x    10         =   160
```

Explanation:

- *We start with 32×5=160.*
- *To transform this to 16×10, we halve 32 (32 / 2 = 16) and double 5 (5 x 2 = 10).*
- *The result remains the same (160). This illustrates how you can manipulate the factors in multiplication without changing the product.*

Distributive Property

The distributive property helps us multiply when one of the factors is close to a multiple of 10. We can break down the number into parts.

Example: 29 x 7

Think: 29 is very close to 30. We can think of 29 as 30−1. So, 29x7=(30−1)x7. Using the distributive property, this is (30x7)−(1x7). 30x7=210. 1x7=7. So, 210−7=203. Therefore, 29x7=203.

here's an example showing 29×7 broken down as (30×7)−(1×7) with the calculations:

We can think of 29 as (30−1). So, we can rewrite the multiplication as:
29×7 = (30−1)×7

Now, we can use the distributive property:
(30−1) × 7 = (30×7)−(1×7)
Let's calculate each part:
30×7 = 210
1×7 = 7

Now, subtract the second result from the first:
210−7 = 203
So,
29×7 = 203

The breakdown shows:
29×7 ⟶(30×7)−(1×7) ⟶210−7 = 203
This method can sometimes make mental calculations easier!

Your Turn!

Use these mental math strategies to solve the following:

1. 5x400=?
2. 16x5=? (Use halving and doubling)
3. 19x6=? (Use the distributive property: (20x6)−(1x6))

Keep practicing these strategies to become a mental math superstar!

Lesson 2: Multiplying Multi-Digit Numbers by a 1-Digit Number

INDICATOR: B4. 1.2.3.1 Multiply multi-digit numbers efficiently

Hello, efficient multipliers! Today, we'll learn some methods to multiply numbers with two or three digits by a single-digit number.

Method 1: Expand and Box (Partial Decomposition)

Let's multiply 448times2 using the expand and box method.

1. **Expand the multi-digit number:** 448=400+40+8.

2.**Draw a box and label the parts:** Draw a box with sections for each part of the expanded number and write the single-digit multiplier on the side.

x	400	40	8
2			

4. **Multiply each part:**

- 2x400=800
- 2x40=80
- 2x8=16

5.**Fill in the box with the products:**

X	400	40	8
2	800	80	16

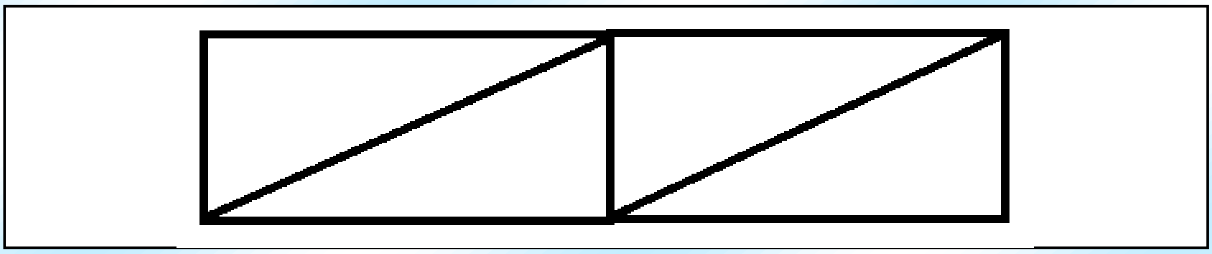
6. **Add the products:** 800+80+16=896.

So, 448x2 = 896.

Method 2: Lattice Method

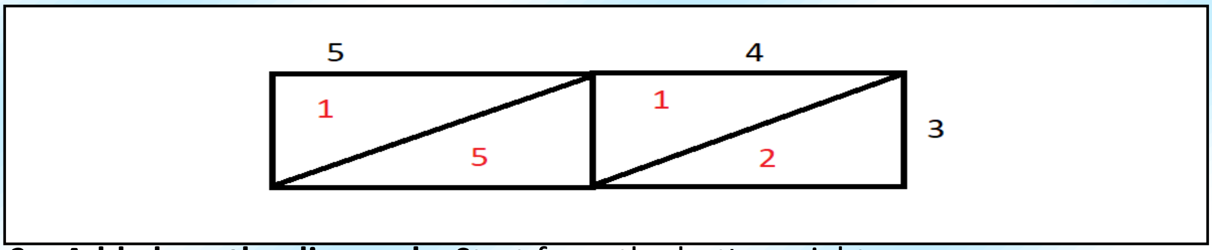
Let's multiply 54x3 using the lattice method.

1.**Draw a box:** Since 54 has two digits and 3 has one, draw a 2x1 rectangular box. Divide each cell diagonally.



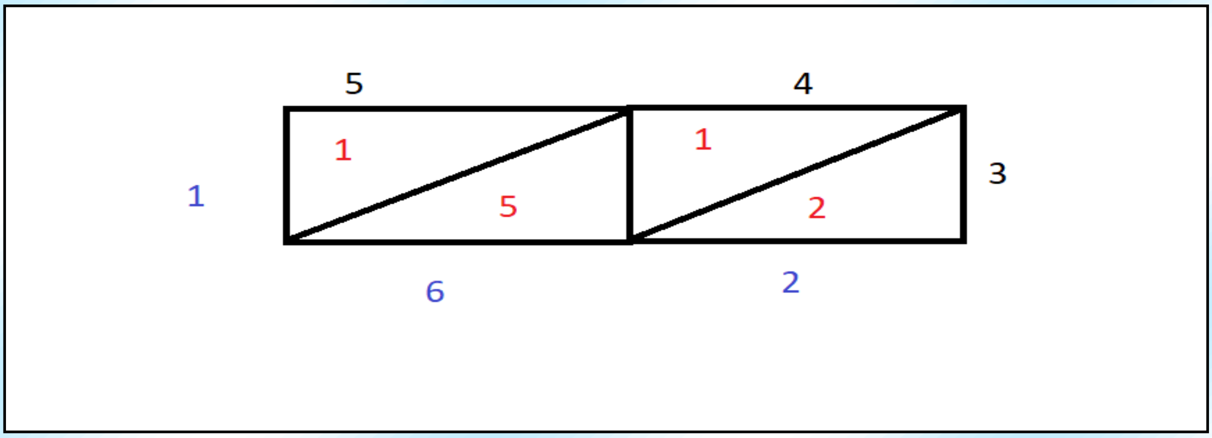
2. **Multiply and fill the cells:** Multiply each digit of 54 by 3. Write the tens digit above the diagonal and the ones digit below.

- 3x5=15
- 3x4=12



3. **Add along the diagonals:** Start from the bottom right.

- Bottom right diagonal: 2
- Next diagonal: 5+1=6
- Top left diagonal: 1



4. **Read the answer:** Read the numbers from the top left down to the bottom right: 162.

So, 54x3=162.

Multiplying a 3-digit by a 1-digit number using Expand and Box (Example from the text)

We already saw 448x2. Let's do another one, say 325x3:

1. Expand 325: 300+20+5

2.Draw the box

x	300	20	5
3			

3. Multiply:

- 3x300=900
- 3x20=60
- 3x5=15

4.Fill the box:

x	300	20	5
3	900	60	15

5. Add: 900+60+15 = 975.

So, 325 x 3 = 975.

Your Turn!

1. Use the expand and box method to solve 231x4.

2. Use the lattice method to solve 63x2.

INDICATOR: B4. 1.2.4.1 Determine basic division fact up to 81

Hello, division dynamos! Today, we're going to work on remembering our basic division facts, especially those up to 81. Knowing these will make solving division problems much quicker!

What is Division?

Remember that division is like sharing equally or finding out how many times one number fits into another. For example, 6div2 means sharing 6 items equally between 2 groups, and each group gets 3. It also means how many times does 2 fit into 6? (3 times).

Division is the opposite of multiplication! If 2times3=6, then 6div2=3 and 6div3=2.

Divisibility Tests

Knowing some divisibility rules can help us with division:

- **Divisible by 2:** A number is divisible by 2 if it ends in 0, 2, 4, 6, or 8 (it's an even number).
  - Example: 12 is divisible by 2 because it ends in 2. $12 \div 2 = 6$.
- **Divisible by 3:** A number is divisible by 3 if the sum of its digits is divisible by 3.
  - Example: For 15, 1+5=6. Since 6 is divisible by 3, then 15 is divisible by 3. 15÷3=5.
- **Divisible by 4:** A number is divisible by 4 if the number formed by its last two digits is divisible by 4.

- Example: For 24, the last two digits form 24, which is divisible by 4. So, 24 is divisible by 4. 24÷4=6.

- **Divisible by 5:** A number is divisible by 5 if it ends in 0 or 5.
  - Example: 30 and 35 are divisible by 5. 30÷5=6, 35÷5=7.

Divisor	Divisibility Rule	Examples (Divisible)	Examples (Not Divisible)
2	The last digit is an even number (0, 2, 4, 6, or 8).	12, 236, 780	23, 453, 987
3	The sum of its digits is divisible by 3.	123 (1+2+3=6), 456 (4+5+6=15), 93 (9+3=12)	235 (2+3+5=10), 833 (8+3+3=14)
4	The number formed by its last two digits is divisible by 4, or the last two digits are "00".	1236 (36 is divisible by 4), 1600 (ends in 00), 456832960 (60 is divisible by 4)	1234 (34 is not divisible by 4), 5678 (78 is not divisible by 4), 31098 (98 is not divisible by 4)
5	The last digit is either 0 or 5.	125, 230, 790, 5440	341, 987, 672

Division Game: 3-in-a-Line

Let's play a division version of our 3-in-a-Line game using a 6 by 6 multiplication chart (we can use the one from the multiplication lesson).

x	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

We can extend this to a 9x9 chart if needed to include products up to 81. For simplicity, let's use the 6times6 for now and focus on the idea.

How to Play:

1. You need a partner, a game board (a multiplication chart), one die, and different colored markers or counters for each player.

2. Players take turns. On your turn, roll the die.

3. Look at the numbers on the game board. Find a number that can be divided evenly by the number you rolled (the result of the division is a whole number).

4. Mark (or cover) that number with your marker.

5. The first player to get three of their markers in a straight line (horizontally, vertically, or diagonally) wins!

Example: If you roll a 3, you could mark 6 (because 6÷3=2), or 9 (if it's on the board), or 12, etc.

Your Turn!

1. Is 28 divisible by 4? How do you know? What is 28÷4?

2. Is 33 divisible by 3? How do you know? What is 33÷3?

3. Play the 3-in-a-Line division game with a partner.

This lesson helps us recall basic division facts and think about divisibility in a fun way!

Lesson 2: Dividing 2-Digit Numbers by a 1-Digit Number

INDICATOR: B4.1.2.5.1 Divide 2-digit numbers by 1-digit number efficiently

Hello, division experts! Today, we're going to learn how to divide 2-digit numbers by 1-digit numbers using a method called repeated subtraction, which is related to long division.

Division as Repeated Subtraction

Division asks us how many times one number (the divisor) can be taken away from another number (the dividend) until we reach zero (or have a remainder).

Example: $25 \div 5 = ?$

We want to see how many times we can subtract 5 from 25:

1. $25 - 5 = 20$ (1 time)
2. $20 - 5 = 15$ (2 times)
3. $15 - 5 = 10$ (3 times)
4. $10 - 5 = 5$ (4 times)
5. $5 - 5 = 0$ (5 times)

We subtracted 5 from 25 five times to reach zero. So, $25 \div 5 = 5$.

Another Example: 32div4=?

Let's subtract 4 repeatedly from 32:

1. $32 - 4 = 28$ (1 time)
2. $28 - 4 = 24$ (2 times)
3. $24 - 4 = 20$ (3 times)
4. $20 - 4 = 16$ (4 times)
5. $16 - 4 = 12$ (5 times)
6. $12 - 4 = 8$ (6 times)
7. $8 - 4 = 4$ (7 times)

8. $4-4=0$ (8 times)

We subtracted 4 eight times to reach zero. So, $32 \div 4=8$.

What if there's a remainder?

Let's try 27div5=?

1. $27-5=22$ (1 time)
2. $22-5=17$ (2 times)
3. $17-5=12$ (3 times)
4. $12-5=7$ (4 times)
5. $7-5=2$ (5 times)

We can't subtract 5 from 2 anymore without going into negative numbers. We subtracted 5 five times, and we have a remainder of 2. So, $27 \div 5=5$ remainder 2.

Your Turn!

Use repeated subtraction to solve:

1. $18 \div 3=?$
2. $23 \div 4=?$ (What is the remainder?)

INDICATOR: B4.1.2.5.1 Divide 2-digit numbers by 1-digit number efficiently (This method extends to 3-digit numbers as well)

Hello, estimation experts! Today, we're going to learn a new way to do division called the "Big 7" method. It uses estimation to break down the division into easier steps.

The "Big 7" Method

Let's solve 276div3=? using this method. We ask ourselves, "About how many groups of 3 can fit into 276?"

1.**Set up the "Big 7":** Draw a division symbol where the vertical line is longer and extends below the horizontal line, looking a bit like a '7' on its side. Write the dividend (276) inside and the divisor (3) outside to the left.

$$\mathbf{3\sqrt{(276)}}$$

2.**Estimate the first part of the quotient:** Let's estimate. Can we fit 40 groups of 3 into 276? 3x40=120. Yes, 120 is less than 276. Write 40 to the right of the horizontal line.

3.**Subtract this amount from the dividend:** 276−120=156. Write 156 below 276.

4.**Estimate the next part of the quotient:** Now, how many groups of 3 can fit into 156? Let's try 50. 3times50=150. Yes, 150 is less than 156. Write 50 below 40 on the right.

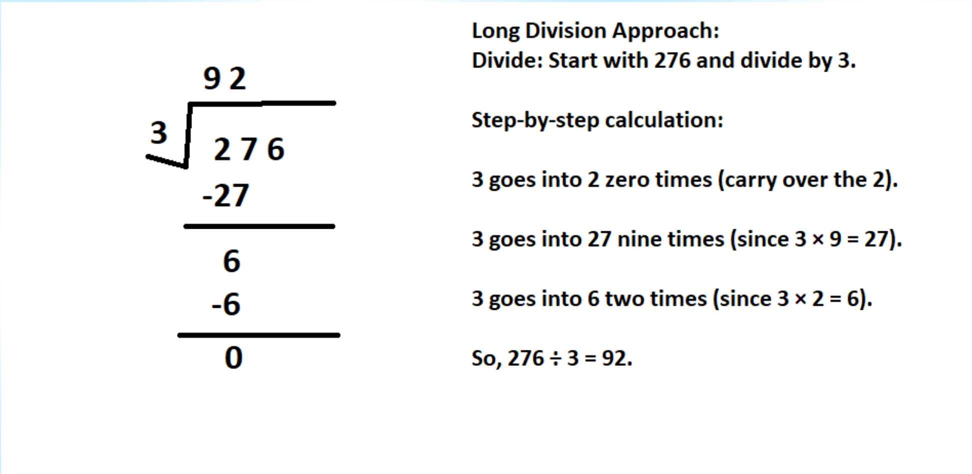
5.**Subtract this amount from the remaining dividend:** 156−150=6. Write 6 below 156.

6. **Estimate the final part of the quotient:** How many groups of 3 can fit into 6? We know 3times2=6. Write 2 below 50 on the right.

7. **Subtract this final amount:** 6−6=0. We have reached zero, so we are done dividing.

8. **Add the estimates on the right to find the quotient:** 40+50+2=92.

Okay, here is the "Big 7" division setup and the steps you described for 276÷3:



Your Turn!

Use the "Big 7" method to solve:

1. 168÷4=?
2. 252÷6=?

This method helps us break down division into manageable estimations and subtractions.

Lesson 2: Solving Multi-Step Word Problems

Hello, problem solvers! Today, we're going to tackle word problems that require us to use more than one operation (addition, subtraction, multiplication, or division) to find the answer.

Steps to Solve Multi-Step Word Problems

1. **Read and Understand:** Read the problem carefully. What is the question asking you to find? What information are you given?

2. **Plan:** Decide which operations you need to use and in what order. Sometimes it helps to draw a picture or model the situation.

3. **Solve:** Carry out the operations you planned.

4. **Check:** Does your answer make sense? You can sometimes use the relationship between operations (like multiplication and division) to check your work.

Examples

Example 1: Addition and Multiplication

Problem: A shop sells pencils in packs of 5. Kofi buys 3 packs, and Ama buys 2 extra pencils. How many pencils do they have in total?

1. **Understand:** We need to find the total number of pencils Kofi and Ama have.

2. **Plan:** First, find how many pencils Kofi bought (multiplication). Then, add the extra pencils Ama bought (addition).

3. **Solve:**

- Kofi's pencils: 3 text packs x 5textpencils =15 text pencils.
- Total pencils: 15 texts (Kofi’s) + 2 text (Ama’s extra) = 17 text pencils.

4. **Check:** Does 17 seem reasonable? Yes, Kofi has more than one pack, and Ama has a couple more.

Example 2: Division and Subtraction

Problem: There are 30 cookies on a tray. 6 friends share them equally. If Kofi eats 2 of his share, how many cookies does Kofi have left?

1. **Understand:** We need to find how many cookies Kofi has after eating some.
2. **Plan:** First, find how many cookies each friend gets (division). Then, subtract the number Kofi ate (subtraction).
3. **Solve:**
   - Cookies per friend: 30cookies ÷ 6 friends = 5 cookies / friend.
   - Cookies Kofi has left: 5(initial share) −2(eaten) = 3 cookies.
4. **Check:** If Kofi has 3 left and ate 2, he started with 5, which matches the equal sharing.

Role Playing

Sometimes, acting out the word problem can help us understand what steps to take! Let's try role-playing some problems in groups.

Your Turn!

Solve the following word problem:

A farmer has 2 fields. In the first field, he plants 4 rows of corn with 12 plants in each row. In the second field, he plants 3 rows of beans with 15 plants in each row. How many plants does he have in total?

Sub-strand 3: Fractions

INDICATOR: B4.1.3.1.1 Generate unit fractions and locate a unit fraction, e.g. one-eighth, on a number line by defining the interval from 0 to 1 as the whole and partitioning it into 8 equal parts and that each part has size 81.

Hello, fraction finders! Today, we're going to explore a special type of fraction called a **unit fraction** and see where it fits on a number line.

What is a Unit Fraction?

A unit fraction is a fraction where the top number (the numerator) is always 1. Examples of unit fractions are:

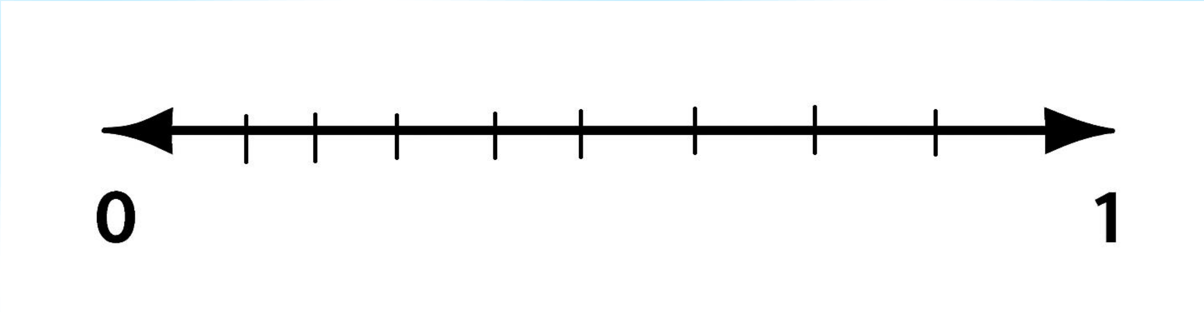
21,31,41,51,81,101, and so on.

In each of these, we have one part out of a total number of equal parts.

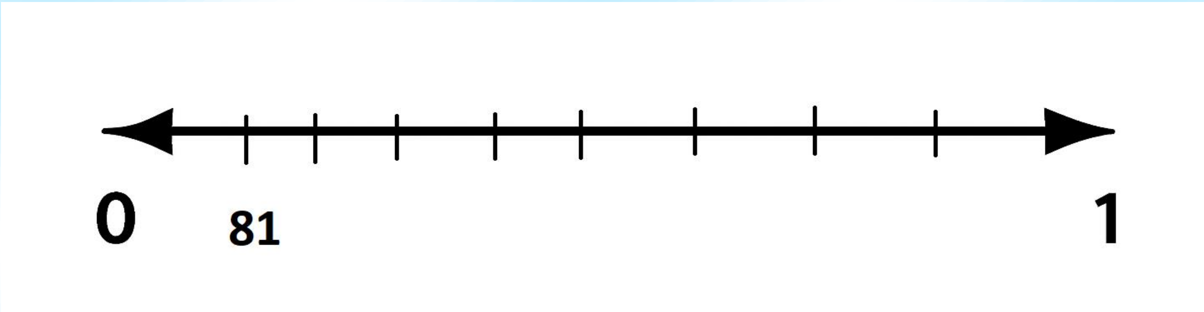
Locating 81 on a Number Line

Imagine a number line starting at 0 and ending at 1. This whole length from 0 to 1 represents one whole.

To locate 81 on this number line, we need to divide the whole (from 0 to 1) into 8 equal parts.



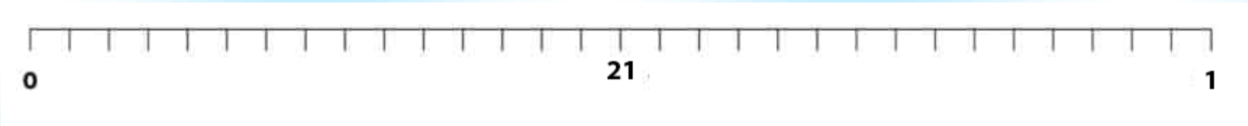
Each of these equal parts represents 81 of the whole. The first mark after 0 represents the location of 81 .



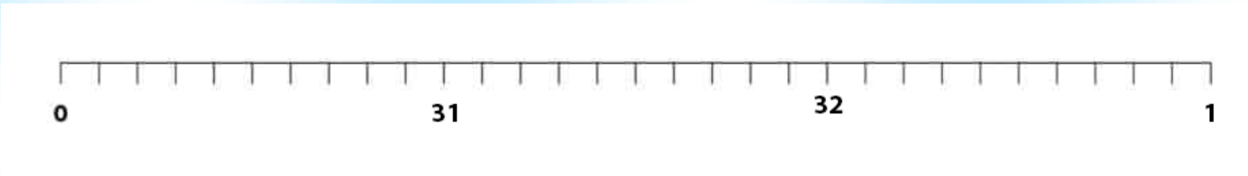
Partitioning the Number Line for Other Unit Fractions

Let's draw some number lines of 30 units each and mark the ends as 0 and 1. We will then partition each line to show different unit fractions.

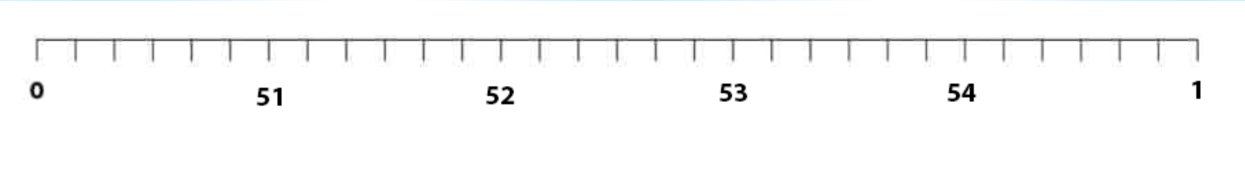
1. Partitioning for 21: We need to divide the line into 2 equal parts. The mark in the middle will be 21.



2. Partitioning for 31: We need to divide the line into 3 equal parts. This will be approximately every 10 units. The first mark will be 31, and the second will be 32



3. Partitioning for 51: We need to divide the line into 5 equal parts. This will be every 6 units. The first mark is 51, the second 52, and so on.



Your Turn!

Draw your own 30-unit number lines (with 0 and 1 at the ends) and partition them to show:

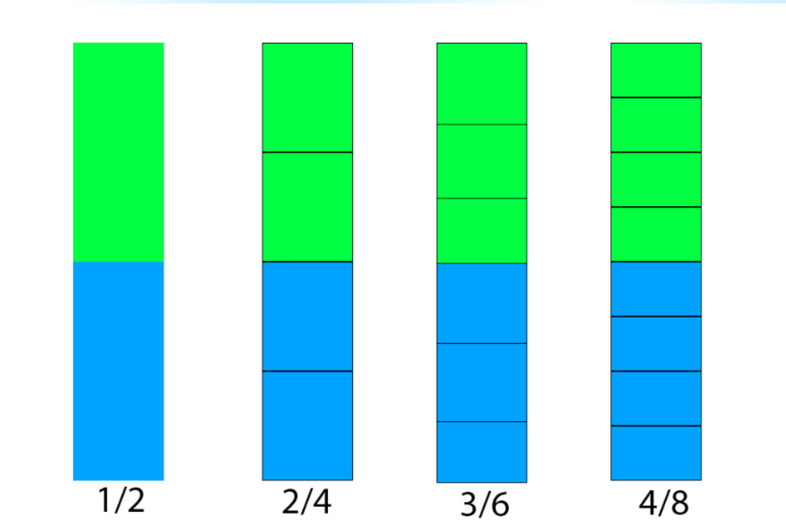
1. 61 (into 6 equal parts)
2. 101 (into 10 equal parts)

INDICATOR: B4.1.3.1.2 Recognise and name equivalent fractions using pictorial representations and number line to determine the Lowest Common Denominator (LCD).

Hello, fraction friends! Today, we're going to learn about **equivalent fractions**. These are fractions that look different but represent the same amount.

Using a Fraction Chart

Look at this fraction chart:



Notice how the same amount can be represented by different fractions:

- One-half ($\frac{1}{2}$) is the same length as two-fourths ($\frac{2}{4}$), three-sixths ($\frac{3}{6}$), and four-eighths ($\frac{4}{8}$). So, $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$. These are equivalent fractions.

The Relationship Between Equivalent Fractions

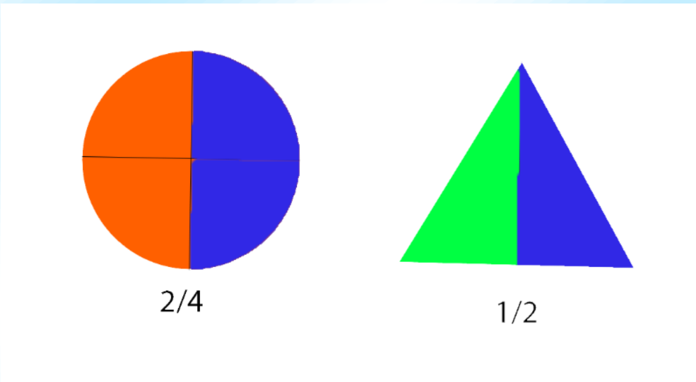
Let's look at how we get these equivalent fractions:

- To go from $\frac{1}{2}$ to $\frac{2}{4}$, we multiply both the numerator and the denominator by 2: 2×21×2=42
- To go from $\frac{1}{2}$ to $\frac{3}{6}$, we multiply both by 3: 2×31×3=63
- To go from $\frac{1}{2}$ to $\frac{4}{8}$, we multiply both by 4: 2×41×4=84

The rule is: If you multiply (or divide) both the numerator and the denominator of a fraction by the same non-zero number, you get an equivalent fraction.

Colouring Equivalent Fractions

Your teacher will give you shapes divided into equal parts. You will be asked to colour a fraction of the shape and then colour an equivalent fraction in another shape.



For example, you might colour $\frac{2}{4}$ of a circle divided into 3 parts, and then colour $\frac{1}{2}$ of a triangle divided into 2 parts. You'll see that the same amount is coloured!

Lowest Common Denominator (LCD) for Comparison

To compare fractions with different denominators, it's helpful to find the **Lowest Common Denominator (LCD)**. This is the smallest common multiple of the denominators. Once we have the LCD, we can rewrite the fractions as equivalent fractions with the same denominator, making them easy to compare.

For example, to compare $\frac{1}{2}$ and $\frac{1}{3}$, the LCD of 3 and 2 is 6. We can rewrite them as:

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

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

Now we can easily see that $\frac{3}{6} > \frac{2}{6}$

so $\frac{1}{2} > \frac{1}{3}$.

Your Turn!

1. Write two equivalent fractions for $\frac{1}{4}$.

2. Colour $\frac{2}{3}$ of a rectangle. Can you divide the rectangle differently to show another equivalent fraction? What is it?

3. Find the LCD of 4 and 6. Rewrite $\frac{1}{4}$ and $\frac{1}{6}$ using the LCD.

This lesson helps us understand that fractions can look different but have the same value, and that finding a common denominator helps us compare them.

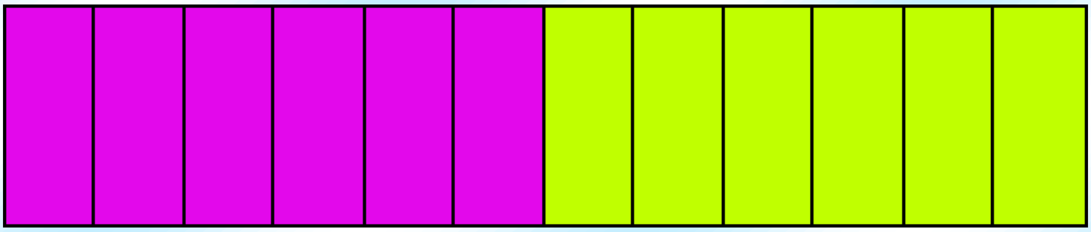
Lesson 2: Simplest Form of Fractions

INDICATOR: B4.1.3.1.3 Find the simplest form of given fractions by dividing through by the highest common factor (i.e. by cancelling through by factors)

Hello again, fraction simplifiers! Today, we're going to learn how to write fractions in their **simplest form**. This means the numerator and the denominator have no common factors other than 1.

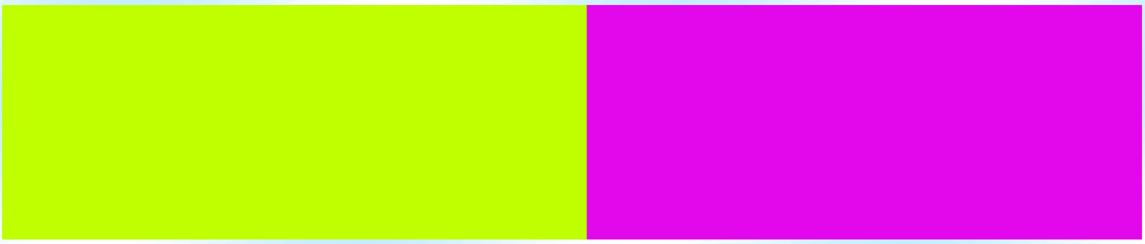
Using Pictorial Representations

Look at this example: $\frac{12}{6}$



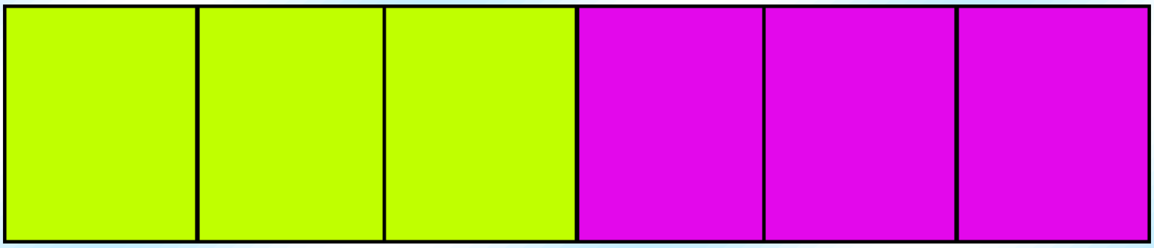
We can see that 6 out of 12 parts are shaded. Now, let's try to group these parts differently.

We can group them into halves. The 12 parts can be seen as 2 groups of 6. So, 6 shaded parts out of 12 is the same as 1 shaded group out of 2 groups, which is 21.



So,$\frac{12}{6}$ = $\frac{2}{1}$. We simplified $\frac{12}{6}$ to $\frac{2}{1}$.

Similarly, $\frac{12}{6}$ can also be seen as $\frac{6}{3}$:



So, $\frac{12}{6} = \frac{6}{3}$. And we can further simplify $\frac{6}{3}$ to $\frac{2}{1}$.

Dividing by the Highest Common Factor (HCF)

To find the simplest form, we divide both the numerator and the denominator by their **Highest Common Factor (HCF)**.

Example: Simplify $\frac{12}{6}$

1. Find the factors of 6: {1,2,3,6}
2. Find the factors of 12: {1,2,3,4,6,12}
3. The highest common factor (HCF) of 6 and 12 is 6.
4. Divide both the numerator and the denominator by 6:

   12÷6=2

   6÷6=1

So, the simplest form of $\frac{12}{6}$ is $\frac{2}{1}$

Example: Simplify $\frac{10}{8}$

1. Factors of 8: {1,2,4,8}
2. Factors of 10: {1,2,5,10}
3. The HCF of 8 and 10 is 2.
4. Divide both by 2:

   10 ÷ 2 = 5

8 ÷2 = 4

So, the simplest form of $\frac{10}{8}$ is $\frac{5}{4}$

Cancelling Through Factors

We can also express the numerator and denominator as products of their factors and then cancel out the common factors.

Example: Simplify $\frac{12}{6}$

$$\frac{\cancel{12}}{\cancel{6}} = \frac{\cancel{6}}{\cancel{3}} = \frac{2}{1}$$

We can cancel out a 2 and a 3 from both the top and the bottom:

Your Turn!

Simplify the following fractions:

1. $\frac{8}{4}$
2. $\frac{12}{9}$
3. $\frac{15}{10}$

This lesson helps us write fractions in their most basic form by dividing by the HCF.

Lesson 3: Improper Fractions

INDICATOR: B4.1.3.1.4 Recognise fractions that are greater than one (i.e. improper fractions), draw and label such fractions with their symbols

Hello, fraction explorers! Today, we're going to learn about **improper fractions** – fractions that are equal to or greater than one whole.

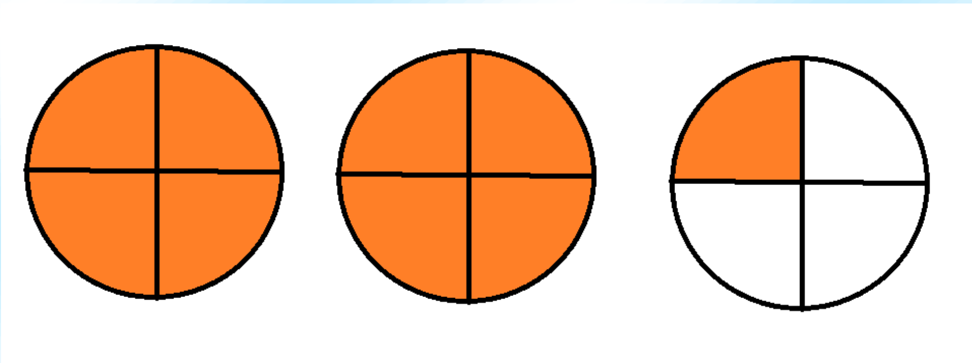
What are Improper Fractions?

In a proper fraction, the numerator (top number) is smaller than the denominator (bottom number), like $\frac{3}{4}$.

In an **improper fraction**, the numerator is greater than or equal to the denominator, like $\frac{4}{5}$ or $\frac{3}{3}$. An improper fraction represents one whole or more than one whole.

Pictorial Representations of Improper Fractions

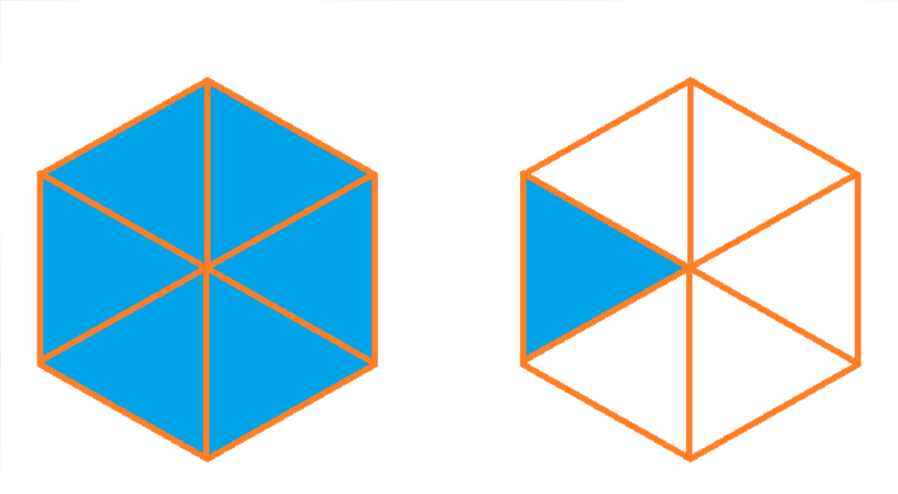
Let's look at $\frac{4}{9}$ (nine-fourths). This means we have 9 parts, and each whole is divided into 4 parts.



From the picture, we can see that $2\frac{1}{4}$ is equal to 2 whole circles and $\frac{1}{4}$ of another circle. This is called a **mixed fraction**: $2\frac{1}{4}$.

So, $\frac{9}{4} = 2\frac{1}{4}$

Let's look at $\frac{7}{6}$ (seven-sixths). This means we have 7 parts, and each whole is divided into 6 parts.



From the picture, we see that $\frac{7}{6}$ is equal to 1 whole hexagon and $\frac{1}{6}$ of another hexagon. This is the mixed fraction $1\frac{1}{6}$.

So, $\frac{7}{6}=1\frac{1}{6}$.

Changing Improper Fractions to Mixed Fractions

To change an improper fraction to a mixed fraction, we divide the numerator by the denominator. The quotient is the whole number, the remainder is the numerator of the fraction part, and the denominator stays the same.

Example: Change $\frac{9}{4}$ to a mixed fraction.

$9 \div 4 = 2$ with a remainder of 1. So, $\frac{9}{4}=2\frac{1}{4}$.

Example: Change $\frac{7}{6}$ to a mixed fraction.

$7 \div 6 = 1$ with a remainder of 1. So, $\frac{7}{6} = 1\frac{1}{6}$.

Changing Mixed Fractions to Improper Fractions

To change a mixed fraction to an improper fraction, we multiply the whole number by the denominator, add the numerator, and keep the same denominator.

Example: Change $2\frac{1}{4}$ to an improper fraction.

$(2\times4)+1=8+1=9$. The denominator is 4. So, $\mathbf{2\frac{1}{4}} = \frac{9}{4}$.

Example: Change $\mathbf{1\frac{1}{6}}$ to an improper fraction.

$(1\times6)+1=6+1=7$. The denominator is 6. So, $\mathbf{1\frac{1}{6}} = \frac{7}{6}$.

Your Turn!

1. Change the improper fraction $5\frac{3}{1}$ to a mixed fraction.
2. Change the mixed fraction $3\frac{1}{2}$ to an improper fraction.

INDICATOR: B4.1.3.2.1 Compare and order fractions with like denominators by using pictorial representations and finding equivalent fractions using the Lowest Common Denominator (LCD)

Hello, fraction comparers! Today, we'll learn how to tell which fraction is bigger or smaller and how to put them in order.

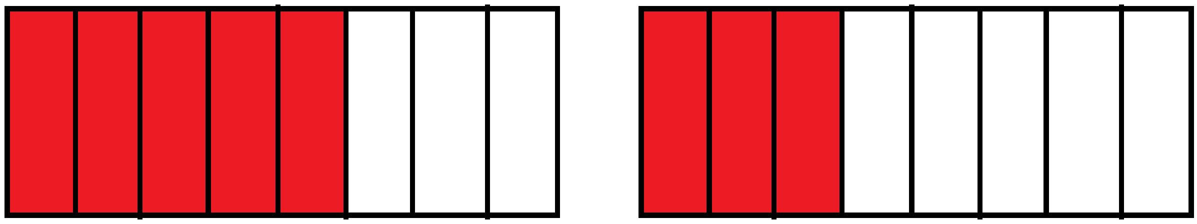
Comparing Fractions with Like Denominators

When fractions have the same denominator (the bottom number), it's easy to compare them. The fraction with the larger numerator (the top number) is the larger fraction.

Example: Compare $\frac{5}{8}$ and $\frac{3}{8}$

Imagine a chocolate bar divided into 8 equal pieces. Having 5 of these pieces represents $\frac{5}{8}$ of the bar, while having 3 pieces represents 83 of the bar. Clearly,

$\frac{5}{8}$ is more than $\frac{3}{8}$ because 5 pieces is more than 3 pieces.



So, $\frac{5}{8} > \frac{3}{8}$.

Ordering Fractions Using the LCD

To order fractions with different denominators, we can find the Lowest Common Denominator (LCD) and convert each fraction to an equivalent fraction with that denominator. Then, we can order them based on their numerators.

Example: Arrange 3/4, 2/3, and 5/6 from smallest to largest.

1. Find the LCD of 4, 3, and 6. The multiples of 4 are 4, 8, 12, ...; multiples of 3 are 3, 6, 9, 12, ...; multiples of 6 are 6, 12, ... The LCD is 12.
2. Convert each fraction to an equivalent fraction with a denominator of 12:
    - 3/4 = (3 x 3) / (4 x 3) = 9/12
    - 2/3 = (2 x 4) / (3 x 4) = 8/12
    - 5/6 = (5 x 2) / (6 x 2) = 10/12
3. Now we can order them based on their numerators: 8/12 < 9/12 < 10/12.
4. So, the original fractions in order from smallest to largest are: 2/3, 3/4, 5/6.

Your Turn!

1. Which is larger: 7/10 or 9/10? Why?
2. Use a fraction chart to compare 1/2 and 2/6. Which is larger?
3. Arrange the fractions 1/2, 3/8, and 5/16 from largest to smallest by finding the LCD.

Lesson 2: Where Fractions are Used

INDICATOR: B4.1.3.2.3 Provide examples of where fractions are used

Hello, real-world fraction finders! Today, we'll explore how we use fractions in our everyday lives.

Real-Life Contexts of Fractions

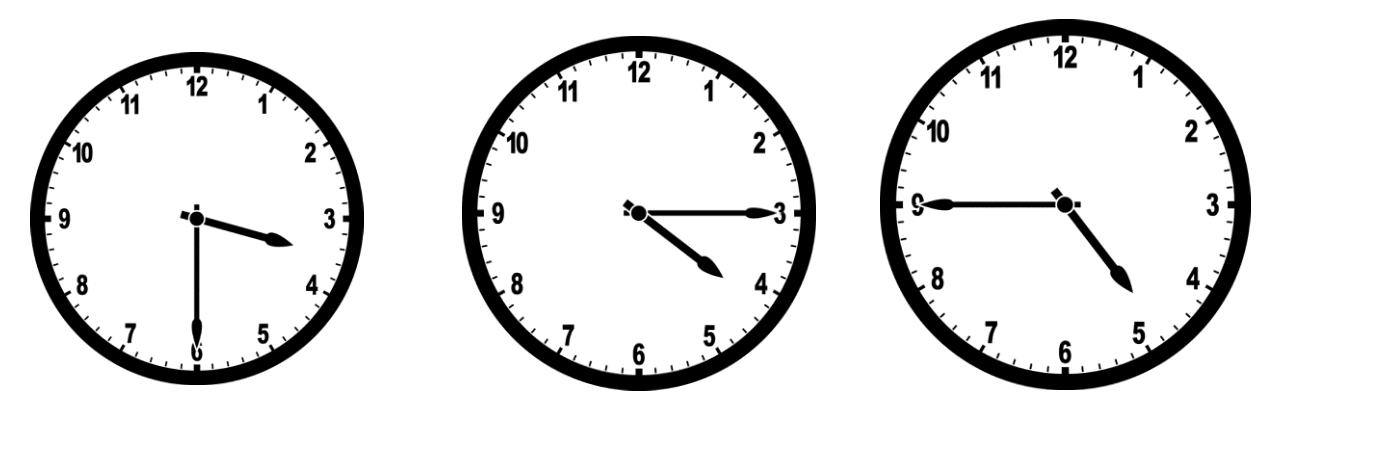
1. **Selling Liquids:** When someone sells oil, kerosene, or drinks, they often use fractions to describe the amounts, like half a liter (1/2 liter), a quarter of a gallon (1/4 gallon), etc. (Image: A picture of someone selling liquid, with containers labeled "1/2 liter", "1/4 gallon".)
2. **Sharing Food:** When we share a pizza or a birthday cake, we often cut it into fractions: half, a quarter, an eighth of the cake. (Image: A pizza cut into slices, with one slice labeled "1/8", and a cake with a piece labeled "1/4" being taken out.)
3. **Buying Packaged Items:** Sometimes, we buy things in fractions of a pack, like half a crate of drinks (1/2 crate) or a quarter of a dozen eggs (1/4 dozen). (Image: A crate of drinks with half of it visible, labeled "1/2 crate".)
4. **Buying Fabric:** When someone is sewing, they might buy half a meter (1/2 meter) or a quarter of a yard (1/4 yard) of cloth. (Image: A piece of fabric being measured with a ruler, showing a length labeled "1/2 meter".)

Let's act out some of these situations in groups! Your teacher will give you some scenarios to role-play.

Telling Time

We also use fractions when we tell time:

- Half past (e.g., half past 3 means 3:30, which is 3 and 1/2 hours).
- Quarter past (e.g., quarter past 4 means 4:15, which is 4 and 1/4 hours).
- Quarter to (e.g., quarter to 5 means 4:45, which is 4 and 3/4 of the way to 5).



Your teacher will draw some clock faces showing "half past" and "quarter past/to" times for you to read.

Example: A circle graph shows the ages of 40 pupils in Primary 4. If $\frac{1}{2}$ are 9 years old, $\frac{1}{4}$ are 10 years old, and $\frac{1}{4}$ are 8 years old:

- How many pupils are 9 years old? ($\frac{1}{2}$×40=20)
- How many pupils are 10 years old? ($\frac{1}{4}$×40=10)
- How many pupils are 8 years old? ($\frac{1}{4}$x40=10)

Your Turn!

Think of three other ways we use fractions in our daily lives. Share your ideas with the class!

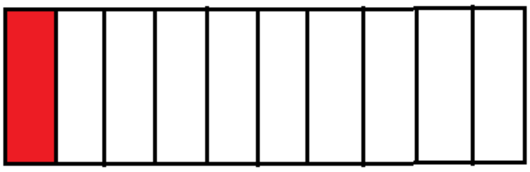
Sub-strand 4: Decimals

INDICATOR: B4.1.4.1.1 Describe and represent decimals (tenths and hundredths) concretely, pictorially, and symbolically

Hello, decimal discoverers! Today, we're going to learn about decimals, which are another way to write fractions with denominators of 10 or 100.

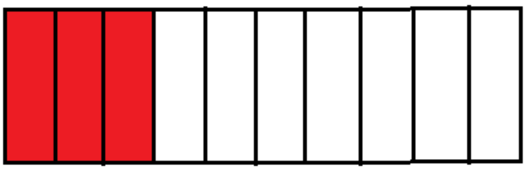
Tenths

Imagine one whole item divided into 10 equal parts. Each part is one-tenth, written as 1/10. We can also write one-tenth using a decimal as 0.1. The "0" is in the ones place, and the "1" is in the tenths place (the first place after the decimal point).



ones	.	tenths
0	.	1

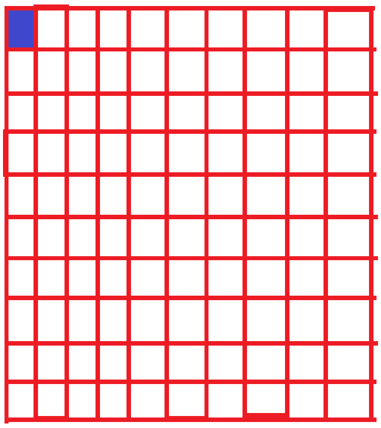
If we have 3 out of 10 parts shaded, that's 3/10, which we write as the decimal 0.3.



ones	.	tenths
0	.	3

Hundredths

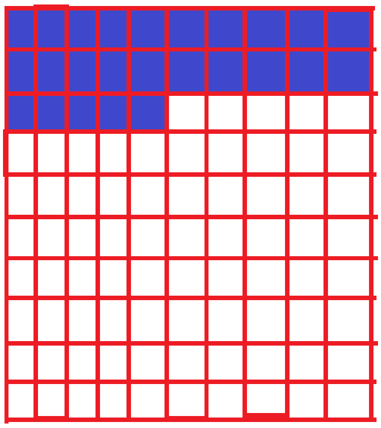
Now, imagine one whole item divided into 100 equal parts. Each part is one-hundredth, written as 1/100. As a decimal, one-hundredth is 0.01. The "0" is in the ones place, the first "0" after the decimal is in the tenths place, and the "1" is in the hundredths place (the second place after the decimal point).



1/100

ones		tenths	hundredths
0	.	0	1

If we have 25 out of 100 parts shaded, that's 25/100, which we write as the decimal 0.25.



25/100

ones		tenths	hundredths
0	.	2	5

Place Value Chart

Here's a place value chart to help us understand:

Ones .	Tenths (1/10s)	Hundredths (1/100s)
0 .	1	0 (represents 0.10 or one tenth)
0 .	0	1 (represents 0.01 or one hundredth)
1 .	2	5 (represents 1.25)

The decimal point (bullet) separates the whole numbers from the fractional part.

Converting Fractions to Tenths or Hundredths

We can convert some fractions to have a denominator of 10 or 100 to write them as decimals.

Example 1: 1/4

To get a denominator of 100, we can multiply both numerator and denominator by 25: (1 x 25) / (4 x 25) = 25/100 = 0.25.

Example 2: 1/8

As a decimal, 1 divided by 8 is 0.125. To the nearest tenth, this is approximately 0.1. To the nearest hundredth, this is approximately 0.13

Example 3: 1/2

1/2 = (1 x 5) / (2 x 5) = 5/10 = 0.5

Example 4: 3/5

3/5 = (3 x 2) / (5 x 2) = 6/10 = 0.6

Your Turn!

Convert the following fractions to decimals:

1. 7/10
2. 50/100
3. 3/4 (Hint: make the denominator 100)

4. 1frac15 (Hint: convert the fraction part to tenths)

This lesson introduces us to decimals as another way to represent parts of a whole, specifically tenths and hundredths.

Lesson 2: Rounding Decimals to the Nearest Tenth

INDICATOR: B4.1.4.1.2 Round decimals to the nearest tenth

Hello, rounding rangers! Today, we're going to learn how to round decimals to the nearest tenth. This means we want to have only one digit after the decimal point in our rounded number.

The Rule for Rounding Decimals

The rule for rounding decimals is very similar to rounding whole numbers. When rounding to the nearest tenth, we look at the digit in the hundredths place (the second digit after the decimal point).

- If the hundredths digit is 5 or more, we round the tenths digit up by one.
- If the hundredths digit is less than 5, we keep the tenths digit as it is.

Examples

Example 1: Round 0.38 to the nearest tenth.

1. The tenths digit is 3.
2. The hundredths digit is 8.
3. Since 8 is 5 or more, we round the tenths digit (3) up to 4.
4. So, 0.38 rounded to the nearest tenth is 0.4.

Example 2: Round 4.085 to the nearest tenth.

1. The tenths digit is 0.
2. The hundredths digit is 8.
3. Since 8 is 5 or more, we round the tenths digit (0) up to 1.

4. So, 4.085 rounded to the nearest tenth is 4.1.

Example 3: Round 56.584 to the nearest tenth.

1. The tenths digit is 5.
2. The hundredths digit is 8.
3. Since 8 is 5 or more, we round the tenths digit (5) up to 6.
4. So, 56.584 rounded to the nearest tenth is 56.6.

Rounding to the Nearest Hundredth (as mentioned in the indicator examples)

To round to the nearest hundredth, we look at the thousandths digit (the third digit after the decimal point).

- If the thousandths digit is 5 or more, we round the hundredths digit up by one.
- If the thousandths digit is less than 5, we keep the hundredths digit as it is.

Example 4: Round 18.096 to the nearest hundredth.

1. The hundredths digit is 9.
2. The thousandths digit is 6.
3. Since 6 is 5 or more, we round the hundredths digit (9) up. Rounding 9 up makes it 10, so we carry over to the tenths place. 18.09 becomes 18.10.
4. So, 18.096 rounded to the nearest hundredth is 18.10.

Example 5: Round 30.084 to the nearest hundredth.

1. The hundredths digit is 8.
2. The thousandths digit is 4.
3. Since 4 is less than 5, we keep the hundredths digit (8) as it is.
4. So, 30.084 rounded to the nearest hundredth is 30.08.

Practice Table

Let's fill in this table:

Fraction/Decimal	Round to Nearest	Result
0.38	Tenth	0.4
4.085	Tenth	4.1
56.584	Tenth	56.6
18.096	Hundredth	18.10
30.084	Hundredth	30.08

Your Turn!

Complete the table by rounding each number as indicated (the table above is now completed for reference).

INDICATOR: B4.1.4.1.3 Use models to explain the result of addition and subtraction of decimals (up to hundredths)

Hello, decimal dynamos! Today, we're going to learn how to add and subtract decimals using what we know about fractions and place value.

Adding Decimals

When we add decimals, it's like adding fractions with the same denominator. If the denominators are different (tenths and hundredths), we need to make them the same.

Example 1: Adding 0.64 and 0.39

Think of these decimals as fractions: 0.64= $\frac{64}{100}$ 0.39= $\frac{39}{100}$

Adding them is like adding these fractions: $\frac{64}{100} + \frac{39}{100}$

$= \frac{64+39}{100} = \frac{103}{100}$

Now, let's convert $\frac{103}{100}$ back to a decimal. $\frac{100}{100}$ is 1 whole, and $\frac{3}{100}$ is $0.03.$ So, $\frac{103}{100} = 1 + \frac{3}{100} = 1.03.$

Using Place Value:

A quicker way to add decimals is to line up the decimal points and then add the numbers as if they were whole numbers.

  0.64
+ 0.39

  1.03

Notice how the tenths are added to tenths, and hundredths to hundredths. If the sum in any place value column is 10 or more, we carry over to the next place value to the left.

Example 2: Adding 0.6 and 0.39

Here, one number is in tenths and the other in hundredths. To add them easily, we can think of 0.6 as 0.60 (sixty hundredths), because 0.6= $\frac{6}{10}$ =$\frac{60}{100}$ = 0.60.

Now we can add: 0.60+0.39

Using place value:

0.60
+ 0.39

0.99

Alternatively, as fractions:

$$\frac{6}{10} + \frac{39}{100} = \frac{60}{100} + \frac{39}{100} = \frac{60 + 39}{100} = \frac{99}{100} = 0.99$$

Subtracting Decimals

Subtracting decimals is similar to subtracting fractions with the same denominator. Again, we might need to make the denominators the same first.

Example 3: Subtracting 0.6 from 1.39

As fractions: $1.39 = \frac{139}{100}$ $0.6 = \frac{6}{10} = \frac{60}{100}$

Now we can subtract:

$\frac{139}{100} - \frac{60}{100} = \frac{139-60}{100} = \frac{79}{100} = 0.79$

Using Place Value:

Line up the decimal points and subtract as if they were whole numbers. We might need to add a zero as a placeholder.

1.39
- 0.60 **(Note: 0.6 is the same as 0.60)**

0.79

Your Turn!

Solve the following:

1. 0.25+0.50=? (Think of them as hundredths)
2. 0.7+0.15=? (Make 0.7 into hundredths)
3. 0.85−0.30=? (Hundredths minus hundredths)
4. 1.50−0.4=? (Make 0.4 into hundredths)

Sub-strand 5: Percent

INDICATOR: B4.1.5.1.1 Model or recognise percent (as a fraction related to hundredths) using concrete models, pictorial representations and number line.

Hello, percentage pioneers! Today, we're going to learn about **percent**. The word "percent" means "out of one hundred". So, a percent is really just a fraction with a denominator of 100. We use the symbol "%" to show percent.

Percent as Hundredths

If we say "50 percent", we mean 50 out of every 100, which can be written as the fraction $\frac{50}{100}$.

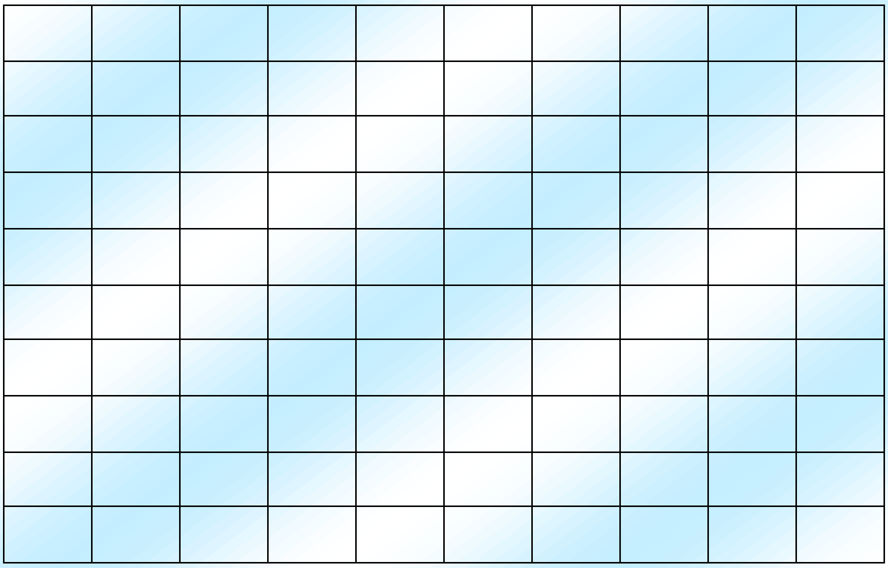
$$50\% = \frac{50}{100}$$

$$Similarly, 25\% \; means \; 25 \; out \; of \; 100, or \frac{25}{100}$$

$$25\% = \frac{25}{100}$$

Using Pictorial Representations

Imagine a square grid made up of 100 small squares.



If we shade 10 of these squares, we have shaded 10 out of 100, which is $\frac{10}{100}$. This is equal to 10 percent, or 10%.

If we shade 25 of these squares, we have shaded 25 out of 100, which is $\frac{25}{100}$. This is equal to 25 percent, or 25%.

If we shade all 100 squares, we have shaded 100 out of 100, which is 100/100, or 1 whole. This is equal to 100 percent, or 100%.

Converting Fractions to Percent

To convert a fraction to a percent, we often try to make the denominator 100.

Example 1: Convert 3/4 to a percent.

We need to find an equivalent fraction with a denominator of 100. $\frac{3}{4} = \frac{?}{100}$ To get from 4 to 100, we multiply by 25. So we multiply the numerator by 25 as well: $\frac{3\times25}{4\times25} = \frac{75}{100}$ Since percent means "out of one hundred", $\frac{75}{100}$ is equal to 75%.

Example 2: Convert 1/10 to a percent.

We need a denominator of 100. $\frac{1}{10} = \frac{?}{100}$ Multiply the numerator and denominator by 10: $\frac{1\times10}{10\times10} = \frac{10}{100}$ $So, \frac{1}{10}\ is\ equal\ to\ 10\%.$

Completing the Chart

Let's look at the chart provided in the indicator:

Fraction	**Decimal**	**Percent**
1/10	0.10	10%
43/100	0.43	43%
	0.50	
	0.35	
3/4		75%

Let's fill in the missing parts:

- $For\ 0.50: This\ is \frac{50}{100}, which\ is\ 50\%.$
- $For\ 0.35: This\ is \frac{35}{100}, which\ is\ 35\%.$

$For \frac{3}{4}: We\ already\ found\ this\ is \frac{75}{100}, or\ 75\%. The\ decimal\ form\ is\ 0.75.$

Here's the completed chart:

Fraction	Decimal	Percent
1/10	0.10	10%
43/100	0.43	43%
50/100 (or 1/2)	0.50	50%
35/100	0.35	35%
3/4	0.75	75%

Your Turn!

1. What percent is equal to 60/100?
2. Show 20% by shading squares on a 10x10 grid.
3. Convert the fraction 1/2 to a percent.

INDICATOR: B4.1.5.1.2 Compare and order a mixture of common, decimal and percent fractions (up to hundredths)

Hello, comparison champions! Today, we'll learn how to compare and put in order numbers that are given as fractions, decimals, and percents.

The Key: Express Them in One Form

To compare and order these different forms, the easiest way is to convert them all into the same form. We can choose to convert everything to either common fractions, decimals, or percents.

Example 1: Order 4/5, 0.78, and 85% from least to largest.

Method 1: Convert all to decimals

- 4/5: To convert to a decimal, we can divide 4 by 5, or make the denominator 10 or 100. $\frac{4}{5} = \frac{80}{100} = 0.80.$

- 0.78 is already a decimal.
- 85%: Percent means "out of one hundred", so $85\% = \frac{85}{100} = 0.85$.

Now we compare the decimals: 0.80, 0.78, and 0.85. Ordering them from least to largest: 0.78, 0.80, 0.85.

Now, we write them in their original forms: 0.78, 4/5, and 85%.

Method 2: Convert all to percents

- $\frac{4}{5}: We\ know\ \frac{4}{5} = \frac{80}{100}, and$ out of one hundred$means\ percent, so\ \frac{4}{5} =$ 80%.
- $0.78: To\ convert\ to\ a\ percent, we\ multiply\ by\ 100: 0.78 \times 100 =$ $78\%. Alternatively, 0.78 = \frac{78}{100} = 78\%$.
- 85% is already a percent.

Now we compare the percents: 80%, 78%, and 85%. Ordering them from least to largest: 78%, 80%, 85%.

Now, we write them in their original forms: $0.78, \frac{4}{5}, and\ 85\%$.

Both methods give us the same order!

Example 2: Order 3/4, 0.6, and 70% from largest to smallest.

Let's convert all to decimals:

- $\frac{3}{4} = \frac{75}{100} = 0.75$
- 0.6 is already a decimal.
- $70\% = \frac{70}{100} = 0.70$

Now we compare: 0.75, 0.6, 0.70. Ordering from largest to smallest: 0.75, 0.70, 0.6.

Now, we write them in their original forms: 3/4, 70%, 0.6.

Your Turn!

Order the following from least to largest:

1. $\frac{1}{2}, 0.4, 60\%$

2. $0.25, 30\%, \frac{1}{5}$

Remember to choose one form (fraction, decimal, or percent) to convert all the numbers to before comparing.

Strand 2: Algebra

Sub-strand 1: Patterns and Relationships

INDICATOR: B4.2.1.1.1 Describe the pattern found in a given table or chart

Hello, pattern! Today, we're going to become detectives and find hidden patterns in tables and charts.

Patterns in a Hundred Chart

Let's look at a hundred chart.

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Skip Counting by 2s:

If we colour each number as we skip count by 2s (2, 4, 6, 8, ...), what pattern do we see?

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

You should notice that all the coloured numbers are in the columns ending in 2, 4, 6, 8, and 0. They are all even numbers. The pattern looks like vertical stripes of coloured numbers.

Skip Counting by 3s:

Now, let's imagine colouring numbers as we skip count by 3s (3, 6, 9, 12, ...). What pattern do you see?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The pattern for multiples of 3 is a bit more diagonal.

What changes as the numbers we skip count by increase?

When we skip count by larger numbers, the pattern of coloured squares on the hundred chart becomes less dense, with more uncoloured numbers in between. The direction of the diagonal patterns also changes.

Patterns in a Multiplication Chart

Let's look at a multiplication chart (up to 10 x 10).

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

What patterns can you find?

- **Multiples of a number form a line:** For example, the multiples of 5 (5, 10, 15, 20, ...) form a diagonal if you follow them across the rows or columns.
- **Symmetry:** Notice the chart is symmetrical. The numbers above the diagonal from the top-left to bottom-right are mirrored below it. For example, $3 \times 4 = 12$ and $4 \times 3 = 12$.

Your Turn!

1. Describe the pattern you would see if you coloured the multiples of 5 on a hundred chart.
2. Find and describe one other pattern in the multiplication chart.

This lesson helps us develop our ability to observe and describe patterns in numbers presented in tables and charts.

Lesson 2: Determining Missing Elements

INDICATOR: B4.2.1.1.2 Determine the missing element(s) in a given table or chart

Hello, missing number masters! Today, we'll use our pattern-detecting skills to find missing elements in tables and charts.

Finding Missing Numbers in a Sequence

Look at this sequence: 2, 4, ____, 8, 10. What number is missing?

You can see the pattern is adding 2 each time. So the missing number is 4+2=6.

Missing Numbers in a Chart

Here's a chart with some missing numbers. Can you find them and explain your reasoning?

			4		6		8		
11		13			16				20
	22		24				28		
				35		37			40
	42			45	46			49	
51			54			57		59	
		63		65			68		70
	72		74			77	78		
		83			86			89	
91									

For example, if the numbers 7, 8, ____, 10 are in a row, the missing number is likely 9 because the pattern is counting by ones.

Missing Elements in a Mapping Table

Consider this table showing the relationship between the number of tables and the number of chairs:

Number of Tables	Number of Chairs
1	4
2	8
3	12
4	?
5	20
?	24

What are the missing numbers?

Let's look for a pattern. When the number of tables increases by 1, what happens to the number of chairs? From 1 table to 2 tables, chairs go from 4 to 8 (+4). From 2 tables to 3 tables, chairs go from 8 to 12 (+4).

It looks like for each table, there are 4 chairs. So the rule is: Number of Chairs = Number of Tables × 4.

Using this rule: For 4 tables, the number of chairs is $4 \times 4 = 16$. To find the number of tables for 24 chairs, we can ask: What number multiplied by 4 equals 24? The answer is 6.

So the completed table is:

Number of Tables	Number of Chairs
1	4
2	8
3	12
4	16
5	20
6	24

Your Turn!

Find the missing numbers in the following table:

Input	Output
1	3
2	5
3	?
?	9
5	11

What is the rule for this table?

This lesson helps us use patterns to predict and find missing information in tables and charts.

Lesson 3: Identifying Errors in Tables and Charts

INDICATOR: B4.2.1.1.3 Identify the error(s) in a given table or chart

Hello, error examiners! Today, we're going to sharpen our pattern-detecting skills to find mistakes in tables and charts.

Spotting Mistakes in a Sequence

Look at this sequence: 3, 6, 9, 13, 15. Is there an error?

The pattern seems to be adding 3 each time. 3+3=6 (Correct) 6+3=9 (Correct) 9+3=12, but the sequence shows 13 (Error!) 13+2=15 (The pattern breaks here too)

The error is that 13 should be 12. If it were 12, the next number should be 12+3=15, which matches. So the error is likely the number 13.

Finding Errors in a Mapping Table

Let's look at the table from the indicator again:

Number of Tables	Number of Chairs
1	4
2	8
3	12
4	18
5	20
6	24

We found earlier that the pattern seems to be Number of Chairs = Number of Tables × 4. Let's check each row:

- 1 table × 4 = 4 chairs (Correct)
- 2 tables × 4 = 8 chairs (Correct)
- 3 tables × 4 = 12 chairs (Correct)
- 4 tables × 4 = 16 chairs, but the table shows 18 (Error!)
- 5 tables × 4 = 20 chairs (Correct)
- 6 tables × 4 = 24 chairs (Correct)

The error is in the row with 4 tables; it should have 16 chairs instead of 18.

Your Turn!

Find the error in the following table:

Input	Output
1	5
2	7
3	9
4	10
5	13

What should the output be for the input of 4, based on the pattern you see?

INDICATOR: B4.2.1.2.1 Create a concrete representation of a given pattern displayed in a table or chart

Hello, pattern builders! Today, we're going to take patterns we see in tables and charts and build them using objects.

From Table to Cubes

Look at this table:

Figure Number	Number of Cubes
1	3
2	6
3	9
4	?
5	?
6	?
7	?
8	?

What pattern do you see in the number of cubes? It looks like we are adding 3 cubes each time the figure number increases by 1.

- Figure 1 has 3 cubes. (You would build a tower of 3 cubes)
- Figure 2 has 6 cubes. (You would build a tower of 6 cubes)
- Figure 3 has 9 cubes. (You would build a tower of 9 cubes)

Now, let's complete the table and build the concrete representations:

Figure Number	**Number of Cubes**	**Concrete Representation (using linking cubes)**
1	**3**	**A tower of 3 cubes**
2	**6**	**A tower of 6 cubes**
3	**9**	**A tower of 9 cubes**
4	**12**	**A tower of 12 cubes**
5	**15**	**A tower of 15 cubes**
6	**18**	**A tower of 18 cubes**
7	**21**	**A tower of 21 cubes**
8	**24**	**A tower of 24 cubes**

For Figure 1, you would have a tower of 3 linked cubes. For Figure 2, you would have a tower of 6 linked cubes. For Figure 3, you would have a tower of 9 linked cubes. And so on.

Your Turn!

Here's another table. Complete it and then use counters to create a concrete representation for the first three figure numbers.

Figure Number	**Number of Counters**	**Concrete Representation (using counters)**
1	2	
2	4	
3	6	
4	?	
5	?	

This activity helps us see the connection between numbers in a table and physical objects arranged in a pattern.

Lesson 2: Creating Tables or Charts from Concrete Representations

INDICATOR: B4.2.1.2.2 Create a table or chart from a given concrete representation of a pattern.

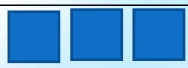
Hello, design data collectors! Today, we'll look at patterns made of shapes and record them in tables or charts.

From Geometric Design to Table

Look at this series of geometric designs made of squares:

#1: (1 square) **#2:** (2 squares in a row) **#3:** (3 squares in a row) **#4:** (4 squares in a row)

We can create a table to show the relationship between the Design Number and the Number of Squares:

Design #	**# of Squares**
1	
2	
3	
4	

What would the 10th step look like, and how many squares would it have? Following the pattern, the 10th step would be 10 squares in a row.

What about the 12th step? The 12th step would have 12 squares in a row.

What about the 20th step? The 20th step would have 20 squares in a row.

Your Turn!

Look at this pattern made with circles:

Step 1: ◯ (1 circle)

Step 2: ◯◯ ◯ (3 circles)

Step 3: ◯◯◯ ◯◯ ◯ (6 circles)

1. Draw the next step (Step 4). How many circles will it have?
2. Create a table showing the Step Number and the Number of Circles for the first four steps.
3. What pattern do you see in the number of circles?

INDICATOR: B4.2.1.3.1 Translate the information in a given problem into a table or chart

Hello, problem translators! Today, we'll take word problems and organize the information into tables or charts to help us understand the patterns.

Example 1: A Growing Pattern

Problem: Kofi is building a pattern with pencils. The first figure has 2 pencils. The second figure has 4 pencils. The third figure has 6 sticks. If this pattern continues, how many pencils swill the fourth and fifth figures have?

Let's create a table to represent this:

Figure Number	**Number of pencils**
1	2
2	4
3	6
4	?
5	?

What pattern do you see in the number of pencils? It looks like we add 2 pencils each time the figure number increases by 1.

We can extend the pattern: For Figure 4, we would have 6+2=8 pencils. For Figure 5, we would have 8+2=10 pencils.

Completed table:

Figure Number	**Number of Pencils**
1	2
2	4
3	6
4	8
5	10

We can also represent this with manipulatives. Figure 1: || Figure 2: |||| Figure 3: |||||| And so on.

Figure Number	**Number of Pencils**
1	
2	
3	
4	
5	

Example 2: Another Pattern

Problem: Ama is saving money. On the first day, she saves GH₵ 5. On the second day, she saves GH₵ 10. On the third day, she saves GH₵ 15. If she continues this, how much will she have saved by the end of the sixth day?

Let's make a table:

Day	Amount Saved (GH₵)
1	5
2	10
3	15
4	?
5	?
6	?

What's the pattern here? It looks like Ama saves GH₵ 5 each day.

Extending the pattern: Day 4: GH₵ 15+5=20 Day 5: GH₵ 20+5=25 Day 6: GH₵ 25+5=30

Completed table:

Day	Amount Saved (GH₵)
1	5
2	10
3	15
4	20
5	25
6	30

By the end of the sixth day, Ama will have saved GH₵ 30.

Your Turn!

A plant grows 3 centimeters each week. If it starts at a height of 2 centimeters, what will its height be after 4 weeks? Create a table to solve this.

This lesson shows us how to organize information from a problem into a table to help us see and extend patterns.

Lesson 2: Identifying and Extending Patterns to Solve Problems

INDICATOR: B4.2.1.3.2 Identify and extend the patterns in a table or chart to solve a given problem.

Hello, pattern solvers! Today, we'll work with tables that have related patterns and see how they are alike and different.

Example 1: Comparing Two Patterns

Look at these two tables:

Pattern A

Input	Output
1	2
2	4
3	6
4	8
5	10

Pattern B

Input	Output
1	5
2	10
3	15
4	20
5	25

Let's extend each table by three more numbers:

Extended Pattern A

Input	Output
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16

The rule for Pattern A seems to be Output = Input × 2 (we add 2 each time).

Extended Pattern B

Input	Output
1	5
2	10
3	15
4	20
5	25
6	30
7	35
8	40

The rule for Pattern B seems to be Output = Input × 5 (we add 5 each time).

How are the two patterns alike? Both patterns involve multiplication (or repeated addition). As the input increases by 1, the output also increases by a constant amount.

How are they different? Pattern A increases by 2 each time, while Pattern B increases by 5 each time. The starting values for an input of 1 are also different (2 in A, 5 in B).

Example 2: Another Pair of Patterns

Pattern A

Step	Value
1	2
2	4
3	6
4	8
5	10

Pattern B

Step	Value
1	1
2	6
3	11
4	16
5	21

Extend each by three more steps and describe how they are alike and different.

Extended Pattern A

Step	Value
1	2
2	4
3	6
4	8
5	10

6	12
7	14
8	16

Pattern A rule: Add 2 each time.

Extended Pattern B

Step	Value
1	1
2	6
3	11
4	16
5	21
6	26
7	31
8	36

Pattern B rule: Add 5 each time.

Alike: Both patterns increase by a constant amount each step. Different: Pattern A increases by 2, and Pattern B increases by 5. They also start at different values.

Your Turn!

Create your own pair of patterns in tables. Extend them and then challenge a classmate to describe how they are alike and how they are different.

Sub-strand 2: Unknowns, Expressions and Equations

INDICATOR: B4.2.2.1.1 Write a given problem as an equation in which a symbol is used to represent an unknown number

Hello, unknown finders! Today, we're going to learn how to turn word problems into math equations using symbols for the unknown.

What is the Purpose of a Symbol?

Look at this equation: 15−□=8. What do you think the □ represents?

The □ is a symbol that stands for a number we don't know yet – the unknown. Our job is often to figure out what that unknown number is.

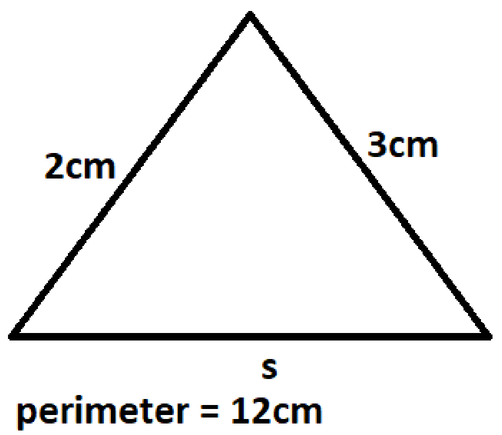
Writing Equations from Word Problems

Let's try turning some word problems into equations with an unknown (we can use any symbol like □,?,x, etc.).

Problem 1: The perimeter of a triangle is 12 cm. One side is 3 cm and another side is 4 cm. What is the length of the third side?

Let the length of the third side be represented by s. The equation for the perimeter would be: $3 + 4 + s = 12$

Here, s is the unknown number we need to find (though we're not solving it yet, just writing the equation).



Problem 2: Mansa has 25 stickers. 3 are Cocoa stickers and 18 are Cashew stickers. How many of the third type does she have?

Let the number of the third type of sticker be t. The equation would be: $3+18+t=25$

Here, t is the unknown number of the third type of sticker.

Problem 3: Kojo's age and his sister's age add up to 18. If Kojo is 12, how old is his sister?

Let Kojo's sister's age be a. The equation would be: $12+a=18$

Here, a is the unknown age of Kojo's sister.

Your Turn!

Write an equation with a symbol for the unknown for each of these problems:

1. Ama had some mangoes. She gave 5 to her friend and now has 12 left. How many mangoes did she start with? (Use the symbol m)

2. A box contains 3 red balls and some blue balls. There are a total of 10 balls in the box. How many blue balls are there? (Use the symbol b)

This lesson helps us translate real-world situations into mathematical equations with unknown numbers.

Lesson 2: Solving One-Step Equations Using Manipulatives

INDICATOR: B4.2.2.2.1 Solve a given one-step equation using manipulatives

Hello, equation solvers! Today, we're going to use objects to help us find the unknown numbers in equations.

Using a Pan Balance

A pan balance is a great tool for understanding equations. Both sides of a balanced scale must have equal weight. In an equation, both sides must have equal value.

Example 1: Solve $7+\square=12$ using a pan balance.

Imagine a pan balance. On one side, we have 7 objects and a box (representing the unknown). On the other side, we have 12 objects. To make the scale balance, the weight on both sides must be the same.

To find what's in the box, we need to remove the 7 objects from the side with the box. To keep the balance, we must also remove 7 objects from the other side.

If we remove 7 objects from the side with 12 objects, we are left with $12-7=5$ objects.

So, the box must contain 5 objects to make the equation true: $7+5=12$. Therefore, $\square=5$.

Example 2: Solve $19-\square=11$ using a pan balance.

Imagine one side of the balance has 19 objects, and we are taking away the amount in the box. The other side has 11 objects, and the scale is balanced.

To find what's in the box, we need to isolate the box. We know that if we start with 19 and take away the amount in the box, we are left with 11. So, the amount taken away (in the box) must be the difference between 19 and 11.

$19-11=8$.

So, $\square=8$. Let's check: $19-8=11$. It's correct!

Your Turn!

Use counters or drawings of a pan balance to solve these equations:

1. $5+?=9$
2. $?-3=6$

Think about what you need to do to both sides to find the value of the unknown.

Strand 3: GEOMETRY AND MEASUREMENT

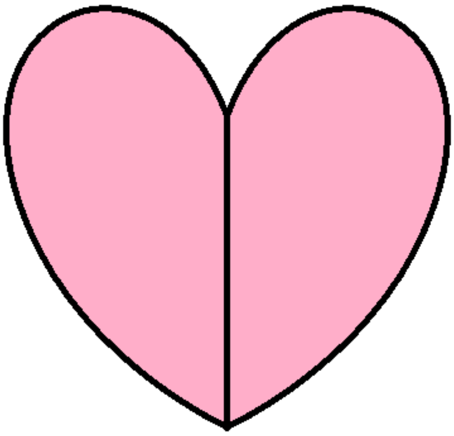
Sub-strand 1: 2D and 3D Shapes

INDICATOR: B4.3.1.1.1 Complete drawings of shapes to make them symmetrical

Hello, symmetry seekers! Today, we're going to learn about making shapes symmetrical by completing their missing halves.

What is Symmetry?

A shape has symmetry if one half is a mirror image of the other half. The line that divides the shape into two identical halves is called the **line of symmetry**.

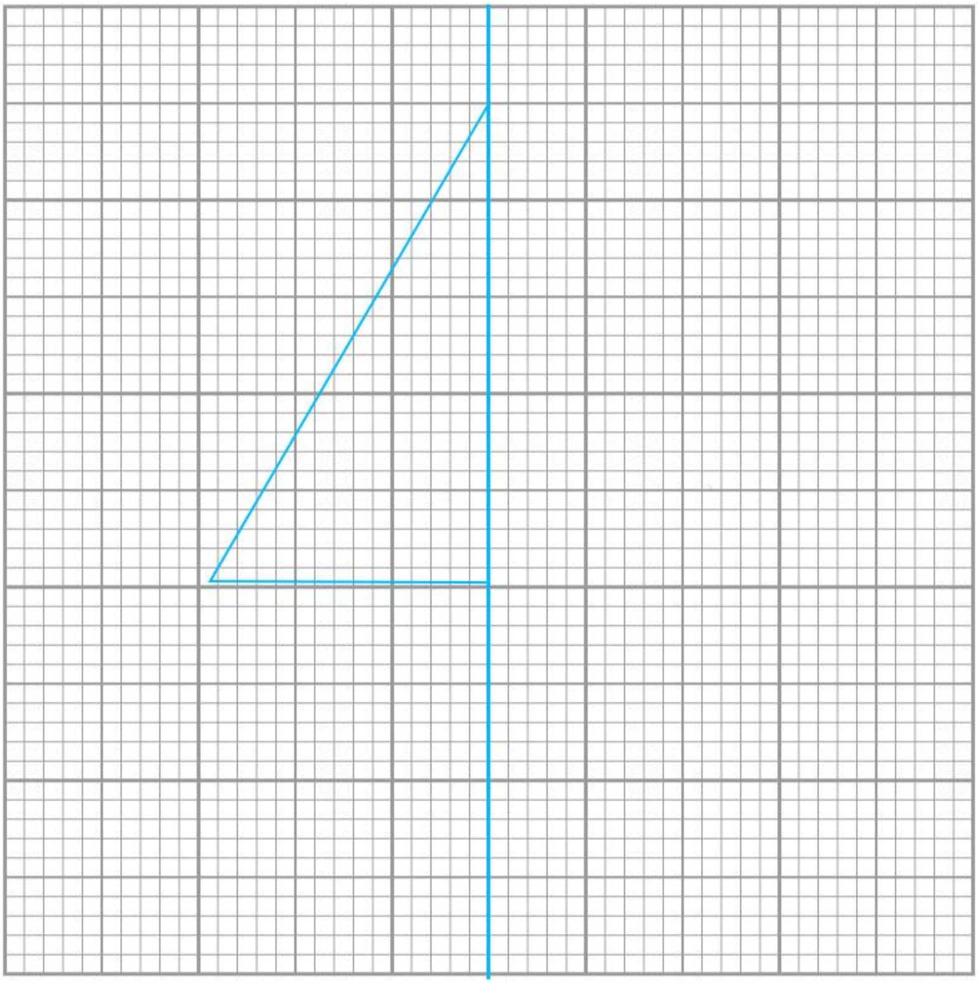


Completing Shapes on a Graph Sheet

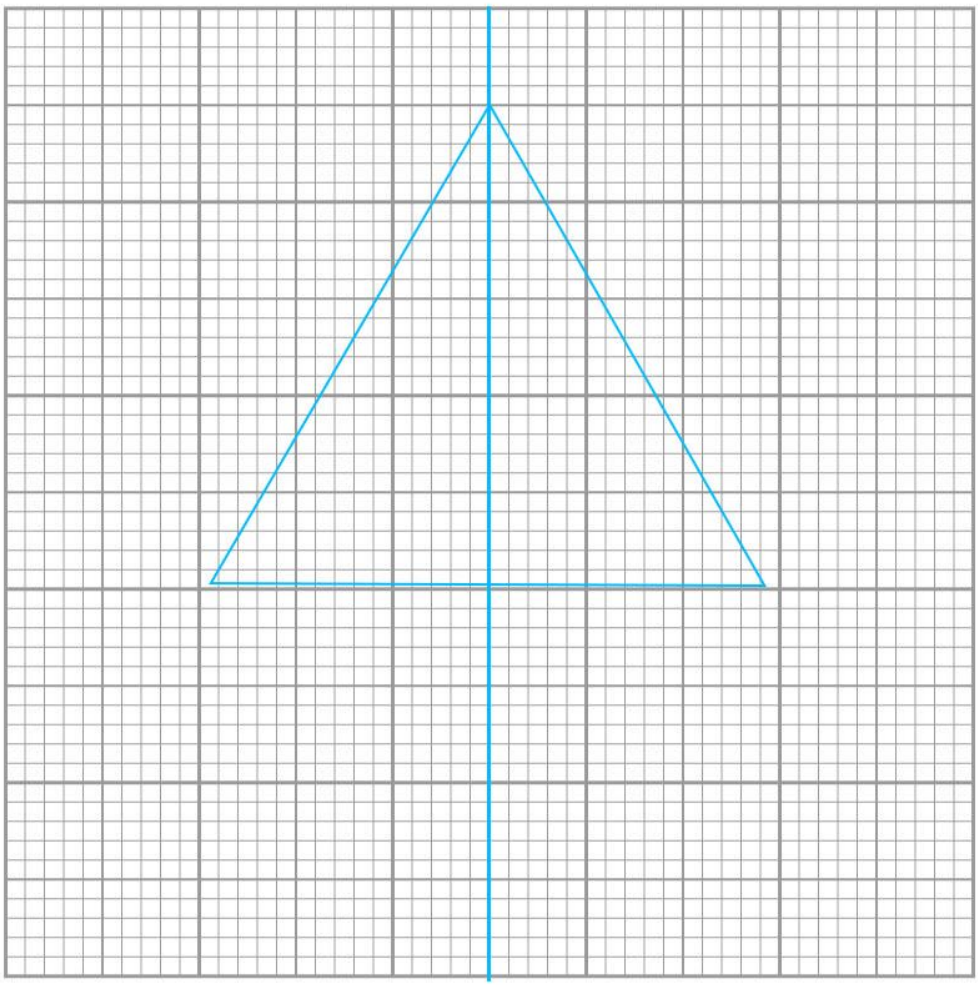
Imagine you have a shape drawn on a graph sheet, but only half of it is shown. There's a line of symmetry marked. Your task is to draw the other half to make the whole shape symmetrical.

Example:

Here's half of a shape and a marked line of symmetry:



To complete the shape, you need to mirror each point of the half-drawn shape across the line of symmetry. For every square you move to the left of the line for a point, you move the same number of squares to the right for the mirrored point. Then, connect these new points to complete the shape.



Your Turn!

Your teacher will give you a graph sheet with incomplete 2D shapes and a line of symmetry. Complete each drawing to make a symmetrical picture.

This activity helps us understand how each part of a symmetrical shape has a matching part on the other side of the line of symmetry.

Lesson 2: Identifying Lines of Symmetry

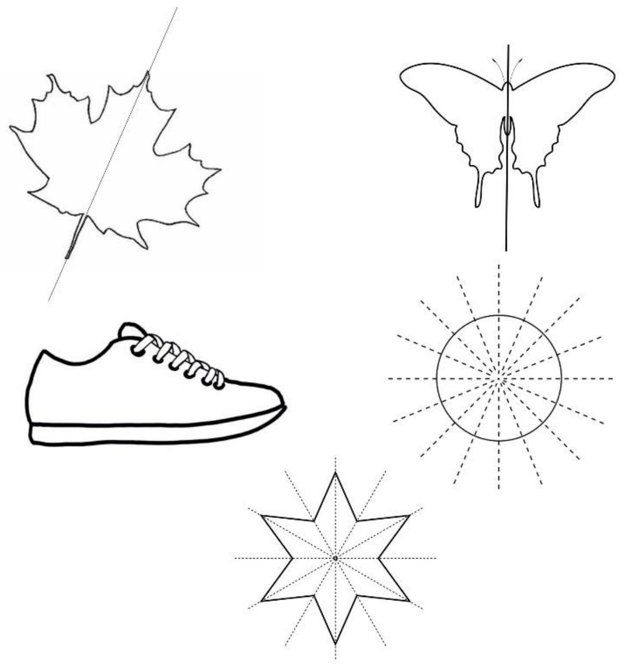
INDICATOR: B4.3.1.1.2 Identify the lines of symmetry of regular and irregular 2D shapes (triangles and quadrilateral)

Hello again, symmetry experts! Today, we're going to find the lines of symmetry in different 2D shapes.

Sorting Symmetrical and Non-Symmetrical Objects

You will be given worksheets with pictures of different objects. Some will be symmetrical, and some will not. Your task is to sort them into two groups and explain why each object is symmetrical or not by showing the line(s) of symmetry if they have any.

Example:



- **Symmetrical:** Butterfly (one line of symmetry down the middle), Leaf (usually one line), Circle (many lines), Star (multiple lines).
- **Non-Symmetrical:** Shoe.

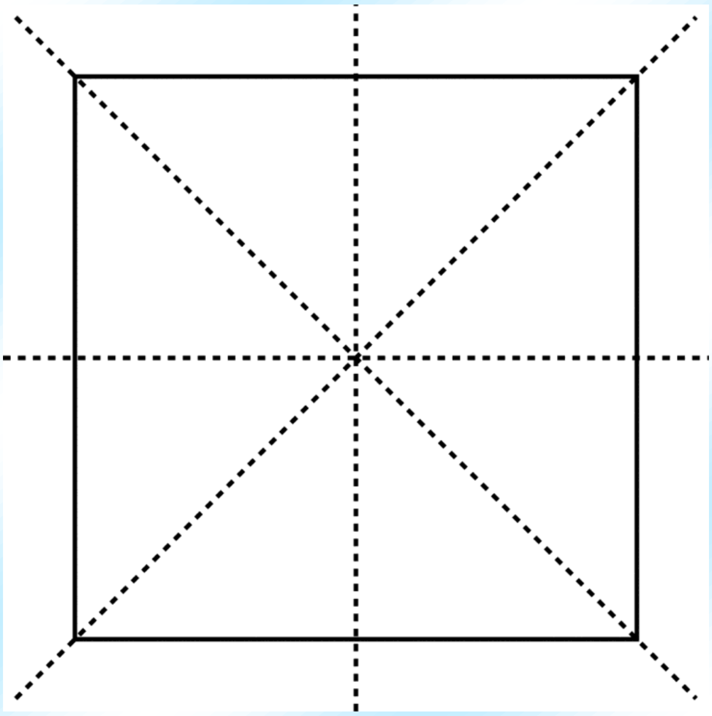
For the symmetrical shapes, you would draw the line(s) of symmetry.

Investigating Lines of Symmetry by Folding

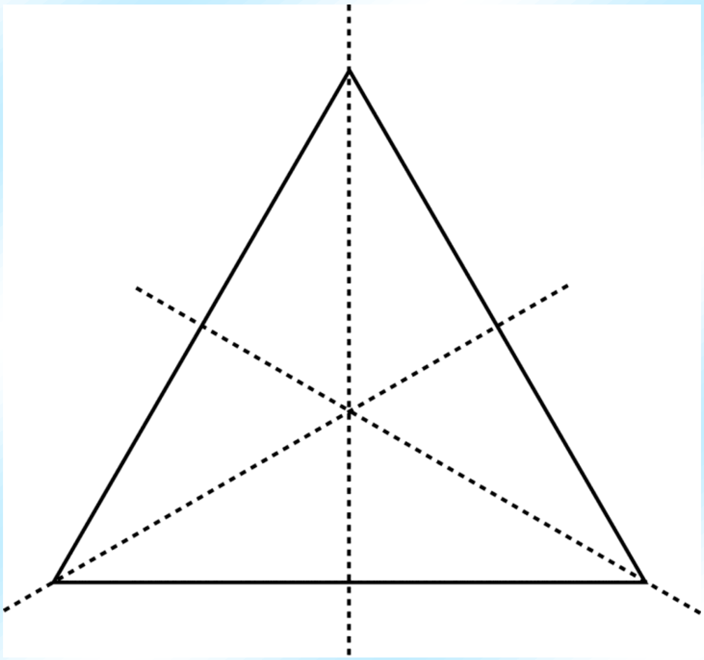
Your teacher will give you cut-out 2D shapes. You can fold these shapes to see if one half matches exactly with the other half. The fold line is a line of symmetry. By folding in different ways, you can find all the lines of symmetry for a shape.

Example:

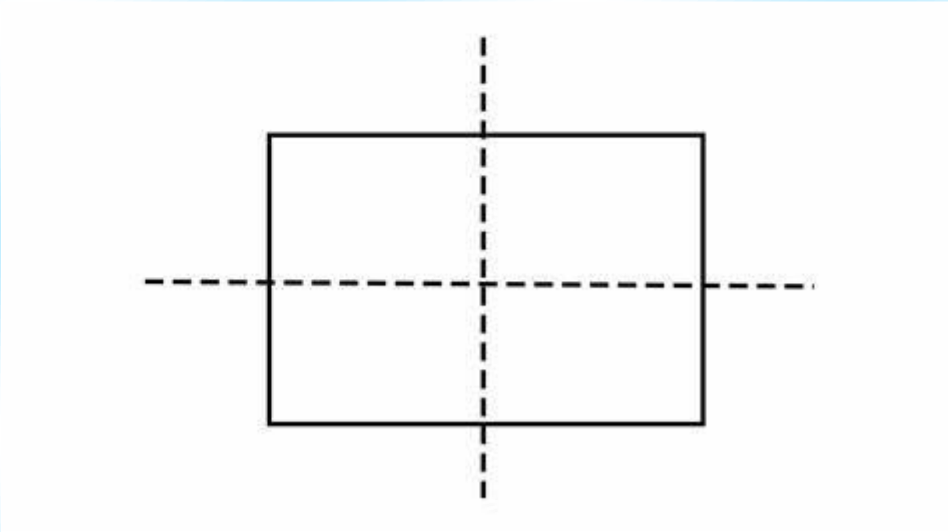
- A square can be folded in four ways to match perfectly (horizontally, vertically, and along both diagonals), so it has 4 lines of symmetry.



- An equilateral triangle can be folded in three ways (from each vertex to the midpoint of the opposite side), so it has 3 lines of symmetry.



- A rectangle can be folded in two ways (horizontally and vertically through the middle), so it has 2 lines of symmetry.



Drawing Lines of Symmetry

You will also be given 2D shapes to copy and then draw their lines of symmetry.

Your Turn!

1. Take the cut-out shapes provided and find how many lines of symmetry each one has by folding.

2. Draw a scalene triangle and see if it has any lines of symmetry. Explain your findings.

3. Draw a rhombus and draw its lines of symmetry. How many does it have?

Sub-strand 2: Position / Transformation

INDICATOR: B4.3.2.1.1 Tell the position and motion of objects in space using the cardinal points north, south, east and west

Hello, space navigators! Today, we're going to learn how to describe where things are using the directions north, south, east, and west – these are called **cardinal points**.

Understanding Cardinal Points

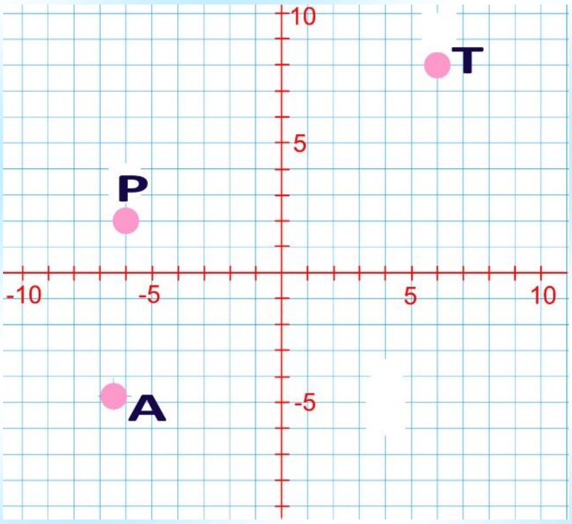
Imagine a compass rose:

- **North (N)** is towards the top.
- **South (S)** is towards the bottom.
- **East (E)** is to the right.
- **West (W)** is to the left.

We can use these directions to say where one object is in relation to another.

Example 1:

Look at this simple map with some points labeled:



- Point P is to the **west** of point T.
- Point A is to the **south** of point P.
- Point T is to the **east** of point P.
- Point P is to the **north** of point A.

We can also combine these directions if an object is not directly to the north, south, east, or west. For example, if something is a bit to the northwest, it's between north and west.

Describing Motion

We can also use cardinal points to describe how something is moving.

- "The bird flew **north**."
- "The car drove **east** along the road."
- "They walked **south** towards the river."
- "The ship sailed **west** across the ocean."

Using a Grid

Sometimes, we use a grid to help us describe positions more precisely.

(Imagine a grid where P is at a location and T is at a location to the east and slightly north of P.)

We can say: "Point P is to the **west** of point T and slightly to the **south**." And: "Point T is to the **east** of point P and slightly to the **north**."

The example also mentions point A being to the north of P. If we add point A above P on our imaginary grid:

(Now imagine point A above P.)

We can say: "Point P is to the **south** of point A."

Your Turn!

Imagine a classroom. The door is at the south side, the windows are on the east side, and your desk is in the middle.

1. What direction are the windows from your desk?
2. What direction is the door from your desk?
3. If a friend is standing at the north side of the room, what direction are they from you?

Sub-strand 3: Measurement - (Perimeter and Area)

INDICATOR: B4.3.3.1.1 Estimate perimeter using referents for centimetre or metre

Hello, perimeter predictors! Today, we're going to learn how to estimate the distance around objects using what we know about centimetres and metres.

Using Referents to Estimate

Do you remember some things that are about 1 centimetre long? (e.g., the width of your fingernail) And about 1 metre long? (e.g., the length of your arm span)

We can use these mental "rulers" to guess the perimeter of objects. The **perimeter** is the total distance around the outside of a shape.

Example: Let's estimate the perimeter of your exercise book.

1. Think about the length of one of the shorter sides. How many fingernail widths do you think it is? Let's say about 15 cm.

2. Now think about the longer side. How many fingernail widths? Maybe about 20 cm.

3. Since a book is usually rectangular, it has two shorter sides and two longer sides.

4. So, our estimated perimeter would be around 15 cm+20 cm+15 cm+20 cm=70 cm.

Now, let's actually measure your exercise book with a ruler and calculate the real perimeter. How close was your estimate?

We can do the same for larger objects using metres as our referent. For example, let's estimate the perimeter of a floor tile. Maybe one side is about 30 cm (a bit less than half a metre). If it's a square tile, then all sides are about 30 cm. So the estimated perimeter would be
30 cm+30 cm+30 cm+30 cm=120 cm, or 1.2 metres.

Your Turn!

1. Choose three objects in the classroom (e.g., your math set case, a floor tile, your desk).
2. For each object, first estimate its perimeter using your referents (cm or m).
3. Then, measure the sides with a ruler or tape measure and calculate the actual perimeter.
4. Compare your estimates to the actual measurements. How accurate were you?

This activity helps us develop a sense of the size of centimetres and metres and how to use them to estimate perimeter.

Lesson 2: Measuring and Recording Perimeter

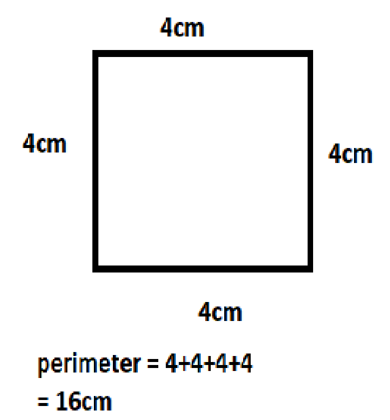
INDICATOR: B4.3.3.1.2 Measure and record perimeter for regular and irregular shapes in cm and m.

Hello, perimeter measurers! Today, we're going to practice measuring and recording the perimeter of different shapes.

Perimeter of Regular Shapes

Regular shapes have all sides of equal length. To find the perimeter, we just need to measure one side and multiply by the number of sides.

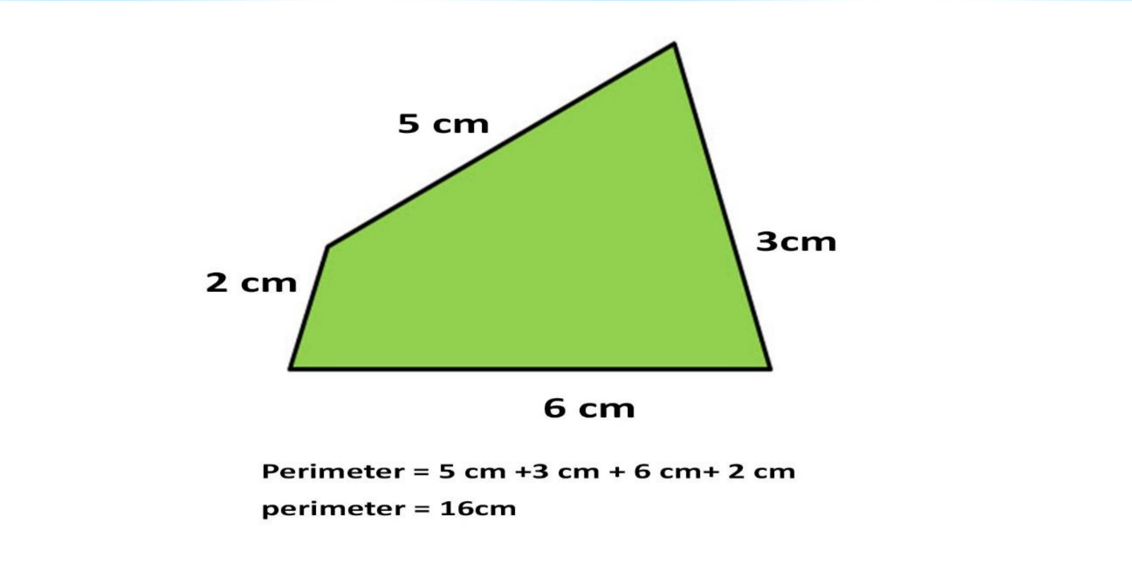
Example: A square has sides of 4 cm each. Perimeter = $4\text{ cm}+4\text{ cm}+4\text{ cm}+4\text{ cm}=4\times4\text{ cm}=16\text{ cm}$.



Your Task: Use your ruler to measure all the sides of the regular shapes your teacher gives you. Then, add up the lengths of all the sides to find the perimeter. Record your measurements and the total perimeter in centimetres (cm) or metres (m), depending on the size of the shape.

Perimeter of Irregular Shapes

Irregular shapes have sides of different lengths. To find the perimeter, we need to measure each side and then add them all together.



Example: An irregular shape has sides of 5 cm, 3 cm, 6 cm, and 2 cm. Perimeter = 5 cm+3 cm+6 cm+2 cm=16 cm.

Your teacher will give you some cut-out irregular shapes with their side lengths labeled. Calculate the perimeter of each by adding the lengths of all the sides. Record your answers.

Your Turn!

1. Measure the sides of a regular pentagon (5 equal sides) and find its perimeter.

2. You are given an irregular shape with sides measuring 7 m, 4 m, 9 m, and 5 m. What is its perimeter?

This lesson helps us practice accurately measuring and calculating the perimeter of both regular and irregular shapes.

Lesson 3: Developing and Applying Formulas for Perimeter

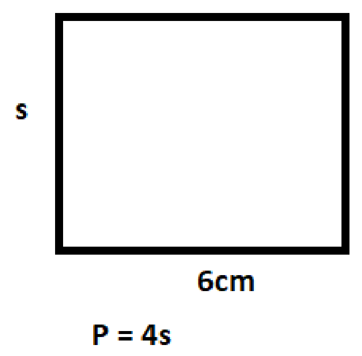
INDICATOR: B4.3.3.1.3 Develop and apply a formula for determining perimeter of square and rectangle

Hello, formula finders! Today, we're going to discover shortcuts (formulas) to find the perimeter of squares and rectangles.

Perimeter of a Square

A square has 4 equal sides. Let's say the length of one side is s. To find the perimeter, we add the lengths of all four sides: Perimeter = s+s+s+s We can write this in a shorter way using multiplication: **Perimeter of a Square (P) = 4×s**

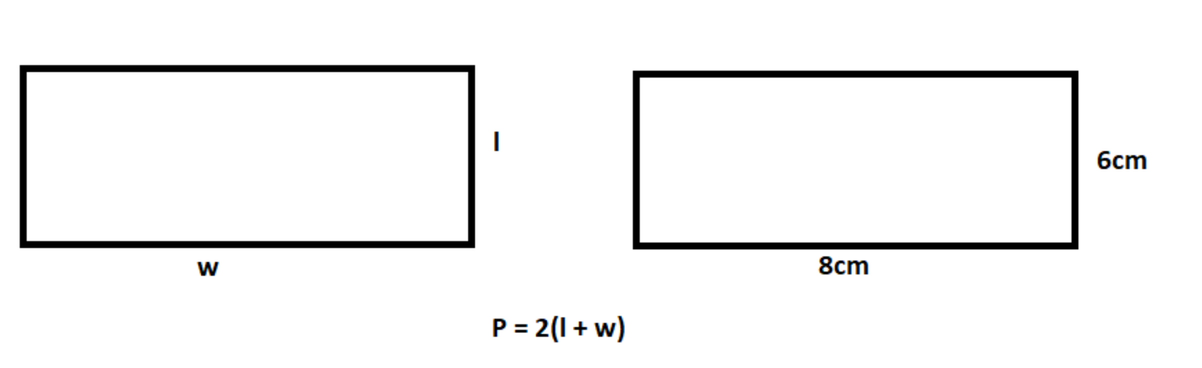
Example: A square has a side length of 6 cm. Perimeter = 4×6 cm=24 cm.



Perimeter of a Rectangle

A rectangle has two pairs of equal sides: length (l) and width (w). To find the perimeter, we add the lengths of all four sides: Perimeter = l+w+l+w We can group the like terms: Perimeter = (l+l)+(w+w) Perimeter = 2×l+2×w So, the formula for the perimeter of a rectangle is: **Perimeter of a Rectangle (P) = 2×(l+w)** (We add the length and width, then multiply by 2) **OR P = 2l+2w**

Example: A rectangle has a length of 8 cm and a width of 3 cm. Perimeter = 2×(8 cm+3 cm)=2×11 cm=22 cm. Alternatively, Perimeter = (2×8 cm)+(2×3 cm)=16 cm+6 cm=22 cm.



Your Turn!

1. Find the perimeter of a square with a side length of 9 m using the formula.
2. Find the perimeter of a rectangle with a length of 11 cm and a width of 5 cm using the formula.

This lesson helps us use formulas as efficient ways to calculate the perimeter of squares and rectangles.

Lesson 4: Constructing Rectangles with a Given Perimeter

INDICATOR: B4.3.3.1.4 Construct different rectangles for a given perimeter (cm, m) to demonstrate that many shapes are possible for a perimeter.

Hello, rectangle designers! Today, we're going to explore how we can draw different rectangles that all have the same perimeter.

Many Rectangles, Same Perimeter

Let's say we want to draw rectangles with a perimeter of 20 cm. We know the formula for the perimeter of a rectangle is $P=2\times(l+w)$. So, we need $2\times(l+w)=20$ cm, which means $l+w=10$ cm.

We need to find different pairs of whole numbers for the length (l) and width (w) that add up to 10 cm.

- Possibility 1: Length = 9 cm, Width = 1 cm. Perimeter = $2\times(9\text{ cm}+1\text{ cm})=2\times10\text{ cm}=20\text{ cm}$.
- Possibility 2: Length = 8 cm, Width = 2 cm. Perimeter = $2\times(8\text{ cm}+2\text{ cm})=2\times10\text{ cm}=20\text{ cm}$.
- Possibility 3: Length = 7 cm, Width = 3 cm. Perimeter = $2\times(7\text{ cm}+3\text{ cm})=2\times10\text{ cm}=20\text{ cm}$.

- Possibility 4: Length = 6 cm, Width = 4 cm. Perimeter = 2×(6 cm+4 cm)=2×10 cm=20 cm.
- Possibility 5: Length = 5 cm, Width = 5 cm. (This is a square, which is also a special type of rectangle!) Perimeter = 2×(5 cm+5 cm)=2×10 cm=20 cm.

As you can see, we can have different shapes (different lengths and widths) that all have the same perimeter.

Your Turn!

Draw three different rectangles that each have a perimeter of 36 cm. Label the length and width of each rectangle. What are the different combinations of length and width you found?

Sub-strand 3: Measurement - Time

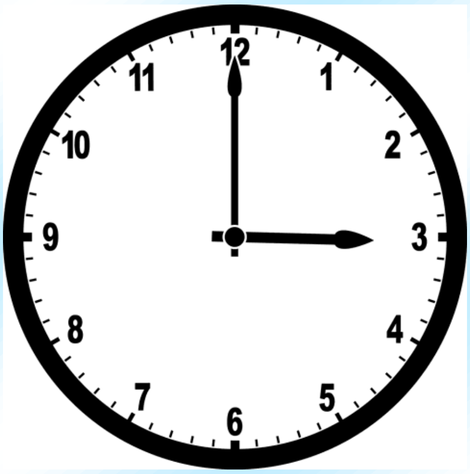
INDICATOR: B4.3.3.3.1 Tell the time in hours and minutes in analogue and digital watches including 24-hour clocks

Hello, time tellers! Today, we're going to practice reading time on both analogue (clock with hands) and digital watches.

Telling Time on an Analogue Clock

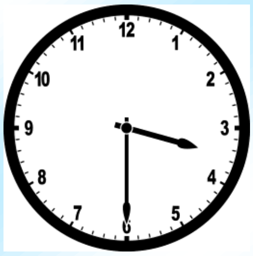
Remember the analogue clock has two main hands: the **hour hand** (shorter) and the **minute hand** (longer).

- When the minute hand points to 12, the hour hand tells us the hour exactly (e.g., if the hour hand is on 3, it's 3 o'clock).



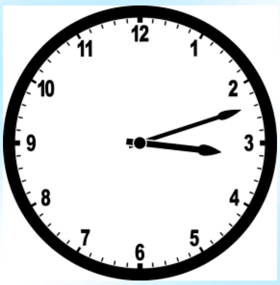
- The minute hand moves around the clock face. There are 60 minutes in one full circle. Each number on the clock (1 to 12) represents 5 minutes.
    - If the minute hand points to 3, it's 3×5=15 minutes past the hour (quarter past).

    - If the minute hand points to 6, it's 6×5=30 minutes past the hour (half past).



    - If the minute hand points to 9, it's 9×5=45 minutes past the hour (quarter to the next hour).

- For other times, we look at where the minute hand is and count by 5s, adding any extra minutes. For example, if the hour hand is just past 3 and the minute hand is pointing a little after the 2, that could be around 3:12.



Telling Time on a Digital Clock

A digital clock shows the time using numbers, usually with a colon separating the hours and minutes (e.g., 03:15).

- The numbers to the left of the colon show the hour.
- The numbers to the right show the minutes past that hour.

So, 03:15 on a digital clock means 3 hours and 15 minutes.

24-Hour Clock

Sometimes, we use a 24-hour clock, which is common in some parts of the world and in schedules (like for transportation). In a 24-hour clock:

- 1:00 PM becomes 13:00
- 2:00 PM becomes 14:00
- ...and so on, until...
- 11:00 PM becomes 23:00
- 12:00 AM (midnight) is 00:00
- 1:00 AM is 01:00

So, if you see 15:30, that means 3:30 PM.

Your Turn!

1. Draw the face of an analogue clock and show the time 4:20.
2. What time is shown on a digital clock that reads 09:45?
3. If a time is 17:00 on a 24-hour clock, what time is it on a regular 12-hour clock?

This lesson helps us practice telling time using both analogue and digital clocks, including the 24-hour format.

Lesson 2: Measuring Time in Minutes and Seconds

INDICATOR: B4.3.3.3.2 Use clock to measure time to complete simple events in minutes and seconds

Hello, time trackers! Today, we're going to use clocks to measure how long it takes to do simple activities.

Minutes and Seconds

Remember that:

- 60 seconds = 1 minute
- 60 minutes = 1 hour

We use seconds for very short amounts of time, minutes for longer activities, and hours for even longer events.

Measuring with an Analogue Clock

We can use the second hand (the thin, fast-moving hand) on an analogue clock to measure time in seconds. One full circle of the second hand is 60 seconds, or 1 minute. The minute hand moves forward one small mark each time a minute passes.

Example: Let's see how long it takes to walk from the classroom door to the teacher's table and back. We can start timing when someone begins walking and stop when they return. We would look at the minute and second hands to see the duration. It might take, for instance, 30 seconds.

Measuring with a Digital Watch

A digital watch often has a stopwatch function that can measure time in minutes and seconds (and sometimes even fractions of a second).

Example: We can use a digital stopwatch to see how long it takes to write your name. Start the stopwatch when you begin writing and stop when you finish. It might take, say, 15 seconds.

Estimating Time for Activities

Think about how long everyday activities take:

- Brushing your teeth: usually a few minutes.
- Eating breakfast: maybe 15-20 minutes.
- Cooking rice: could be around 30-45 minutes.

Your Turn!

1. Use a clock (analogue or digital with a second hand/stopwatch) to measure how long it takes you to:
   - Hop on one foot 10 times.
   - Say the alphabet.
2. Estimate how long you spend on these activities each day:
   - Bathing
   - Doing your homework

This lesson helps us get a better sense of how long a minute and a second are and how to measure the duration of simple events.

Lesson 3: Stating and Recording Dates

INDICATOR: B4.3.3.3.3 State dates of events and record calendar dates in a variety of formats

Hello, date keepers! Today, we're going to learn how to say and write dates in different ways.

Different Date Formats

There are many ways to write the same date. Here are some examples for the twenty-eighth of August in the year 2018:

1. Tuesday, 28th August 2018
2. 28th August, 2018
3. 28-Aug-18 (Here, Aug is a short form for August, and 18 is the short form for 2018)

4. 28/08/2018 (Sometimes the month is written as a number. August is the 8th month.)

5. 28.08.18 (Using dots instead of slashes)

All of these mean the same day!

Important Dates

Let's look at some important dates in Ghana:

- Independence Day of Ghana: 6th March
- Republic Day: 1st July
- Founders' Day: 4th August
- Farmers' Day: First Friday in December
- Workers' Day: 1st May

We can write these dates in different formats too. For example, Independence Day can be:

- 6th March
- March 6th
- 06-Mar
- 06/03

Your Birthdays

We can also record our birthdays. For example, if your birthday is on the 15th of June, 2010, you could write it as:

- 15th June, 2010
- June 15, 2010
- 15-Jun-10
- 15/06/2010

We can even put these dates on a timeline to see how they are ordered in the year.

Your Turn!

1. Write today's date in three different formats.

2. Look at a calendar and write down the date for your next birthday in two different formats.

3. If your friend's birthday is on the 10th of November, 2026, write this date in one format.

Strand 4: Data

Sub-strand 1: Data Collection, Organization, Presentation, Interpretation and Analysis

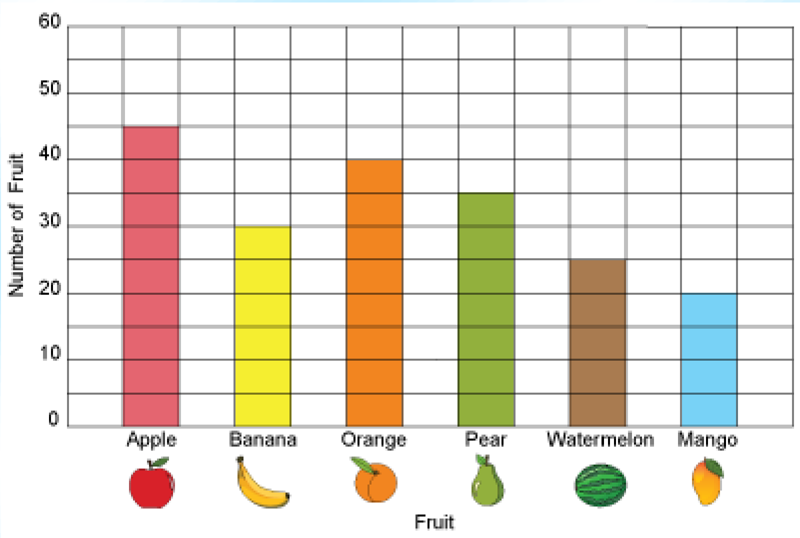
INDICATOR: B4.4.1.1.1 Use an understanding of one-to-one correspondence to read and interpret graphs

Hello, data detectives! Today, we're going to learn how to read and understand information presented in graphs where each picture or symbol represents one piece of data (one-to-one correspondence).

Reading a Favourite Fruits Graph

Look at this bar graph showing the favourite fruits of children in a P4 class.

Let's answer some questions based on this graph:



1. **How many pupils said they like Pawpaw?** Count the number of boxes above "Pawpaw". If there are 6 boxes, then 6 pupils like Pawpaw.

2. **What is the most favourite fruit of the class?** Look for the fruit with the tallest bar (the most boxes). If Banana has the most boxes (e.g., 10), then Banana is the most favourite.

3. **How many pupils are in the class?** To find the total number of pupils, you need to add up the number of boxes for each fruit. If Pawpaw has 6, Mango 8, Banana 10, and Orange 4, then the total is 6+8+10+4=28 pupils.

Your Turn!

Your teacher will give you a graph that uses one-to-one correspondence. Work with a partner to answer questions about the data shown in the graph.

This lesson helps us understand how to extract information from simple bar graphs where each unit on the graph directly represents one item of data.

Lesson 2: Displaying Data Using Many-to-One Correspondence

INDICATOR: B4.4.1.1.2 Use an understanding of many-to-one correspondence to display or construct graphs

Hello, graph creators! Sometimes, when we have a lot of data, using one symbol for each item can make our graphs very large. Instead, we can use **many-to-one correspondence**, where one symbol represents more than one piece of data.

Using a Key

Let's say we collected data on the illnesses P4 pupils had last academic year:

Illness	**Number of pupils visiting hospital**
Diarrhoea	10
Fever	16
Toothache	4
Headache	6
Stomach-ache	8
Cold	14

If we use one ♣ to represent 2 pupils, how many ♣ symbols would we need for each illness in our graph?

- Diarrhoea (10 pupils): 10÷2=5 symbols (♣♣♣♣♣)

- Fever (16 pupils): 16÷2=8 symbols (♣♣♣♣♣♣♣♣)
- Toothache (4 pupils): 4÷2=2 symbols (♣♣)
- Headache (6 pupils): 6÷2=3 symbols (♣♣♣)
- Stomach-ache (8 pupils): 8÷2=4 symbols (♣♣♣♣)
- Cold (14 pupils): 14÷2=7 symbols (♣♣♣♣♣♣♣)

Your Turn!

You have a table showing the number of books read by students:

Student	Number of Books
Kwame	8
Ama	12
Kofi	6
Abena	10

If you use one book icon B to represent 2 books, how many icons would you use for each student in a bar graph? Create the bar graph.

This lesson teaches us how to display data efficiently using many-to-one correspondence and a key.

Lesson 3: Reading and Interpreting Graphs (Many-to-One Correspondence)

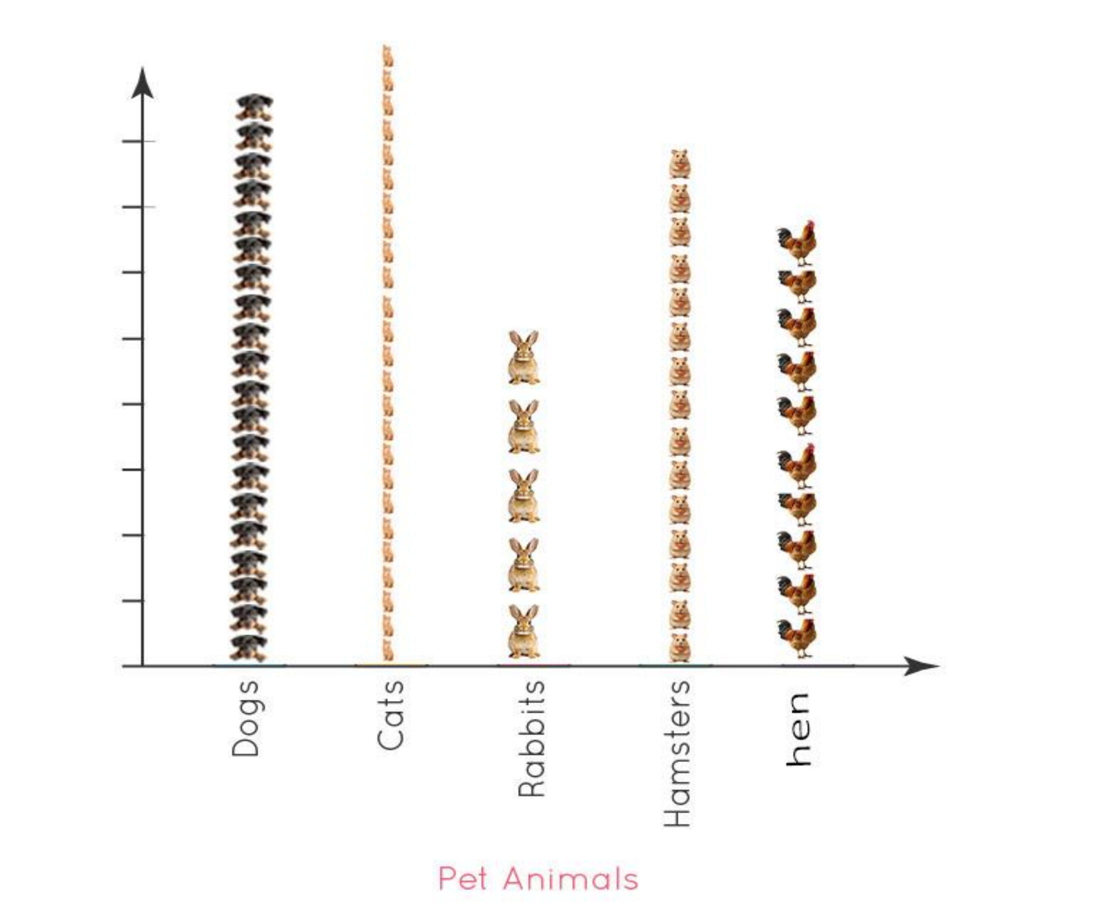
INDICATOR: B4.4.1.1.3 Compare graphs in which the same data has been displayed and explain how they are the same and different

Hello, graph analysts! Today, we're going to look at different graphs that show the same information but might be displayed in slightly different ways, including using many-to-one correspondence.

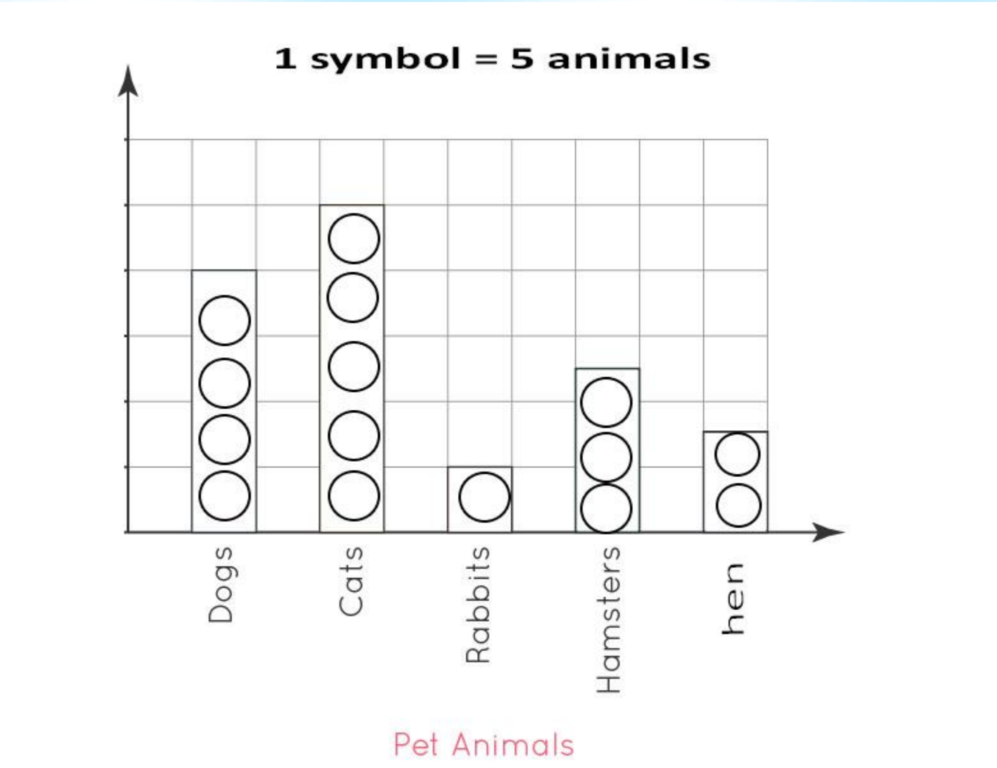
Comparing Animal Farm Graphs

Imagine we have two bar graphs showing the number of animals at Mr. Wilmot's farm.

Graph 1: One-to-One Correspondence



Graph 2: Many-to-One Correspondence



How are these graphs the same?

- Both graphs show the same data about the number of goats, sheep, chickens, and ducks on Mr. Wilmot's farm.
- They both have the same categories of animals on the horizontal axis.
- They both help us compare the quantities of different animals.

How are they different?

- Graph 1 uses one symbol for each animal, so you can directly count the symbols to find the exact number of each animal.
- Graph 2 uses one symbol to represent multiple animals (in this case, 5). To find the exact number, you need to multiply the number of symbols by the value in the key.
- Graph 2 is more compact, especially if there are large numbers of animals.

Your Turn!

Your teacher will give you two graphs showing the same data (e.g., favourite colours of students), where one uses one-to-one and the other uses many-to-one correspondence. Work with a partner to explain how the two graphs are the same and how they are different. Also, discuss which graph might be more useful in different situations.