Adventure 1
#Challenge

EPISODE 1

#HypnotronicLollipop Challenge

You will learn to read, write, order, round and perform operations with **natural numbers of up to ten digits**. You will also learn to **classify angles** according to their measurements and position.

EPISODE 2

The house on Mortis street

You will learn to establish and apply the relationship between **exponentiation**, **roots** and **logarithms**. You will draw **triangles**, classify them and find their heights. Finally, you will learn some techniques for collecting information and identifying **quantitative** and **qualitative variables**.

EPISODE 3

Buuuut

You will learn to recognize **divisors** and **multiples** of a number and the rules of **divisibility**. You will also be able to apply the least common multiple and the greatest common divisor to solve problems. And finally, you will learn how to establish relationships between the interior angles of a **quadrilateral**.

GET READY

Superpowers from previous grades

Before you start your adventure...

To start, remember some of the superpowers you have already gained in other grades and search for the meaning of the **useful words**.

✦✧ **Superpower: Classifying polygons**

Polygons can be classified by the measurements of their sides and angles.

Concave polygon
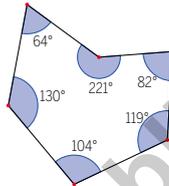
At least one of its interior angles is greater than 180°.

Convex polygon
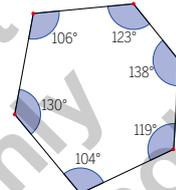
All of its interior angles are less than 180°.

Regular polygon
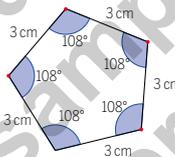
All of its sides have the same length and its interior angles have the same measurement.

Irregular polygon
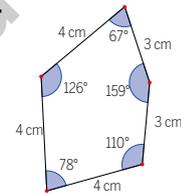
Not all of its angles and sides are the same.

>>ACTIVATE your superpowers

✦✧ **Superpower: Measuring angles with a protractor**

To measure an angle, place the center of the protractor on the vertex of an angle. Then, align one of the sides of the angle with 0° and measure from there to the other side.

72°
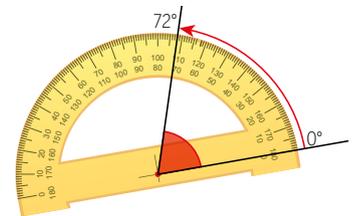
✦✧ **Superpower: Dividing**

Dividing consists of splitting into equal parts or groups.

Dividend

$846 \mid 3 \rightarrow$ Divisor

$2 \times 3 = 6 \leftarrow -6 \quad \overline{282}$

$\overline{24}$

$8 \times 3 = 24 \leftarrow -24$

$\overline{06} \rightarrow$ Quotient

$2 \times 3 = 6 \leftarrow -6$

$\overline{0} \rightarrow$ Remainder

Useful words

☐ Subscriber
☐ Attribute
☐ Systematic
☐ Promotion

ELENA SHOWS JAVIER THE CONDITIONS
FOR RECORDING A VIDEO FOR THE #SMILECHALLENGE.

Help me unlock
my cellular phone.

Put in your pattern
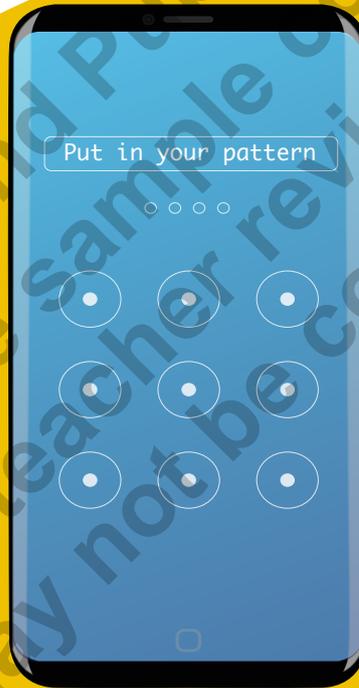
I remember that
your unlock pattern formed
some triangles.

Conditions for the video

1. On the first day, the video must have exactly two views, and each successive day the number of views must be twice the amount of views from the previous day.

2. After the twentieth day it must have at least one million three thousand eight hundred and ninety-five views.

EPISODE
1

#Hypnotronic Lollipop Challenge

Elena invites Javier to participate in a new Mongolongotron challenge.

The lollipop challenge was a success. 2 312 569 864 videos were uploaded. Come on Javier, help me with this new challenge.

I am not going to participate in another challenge. Look, I lost a tooth in the lollipop challenge.
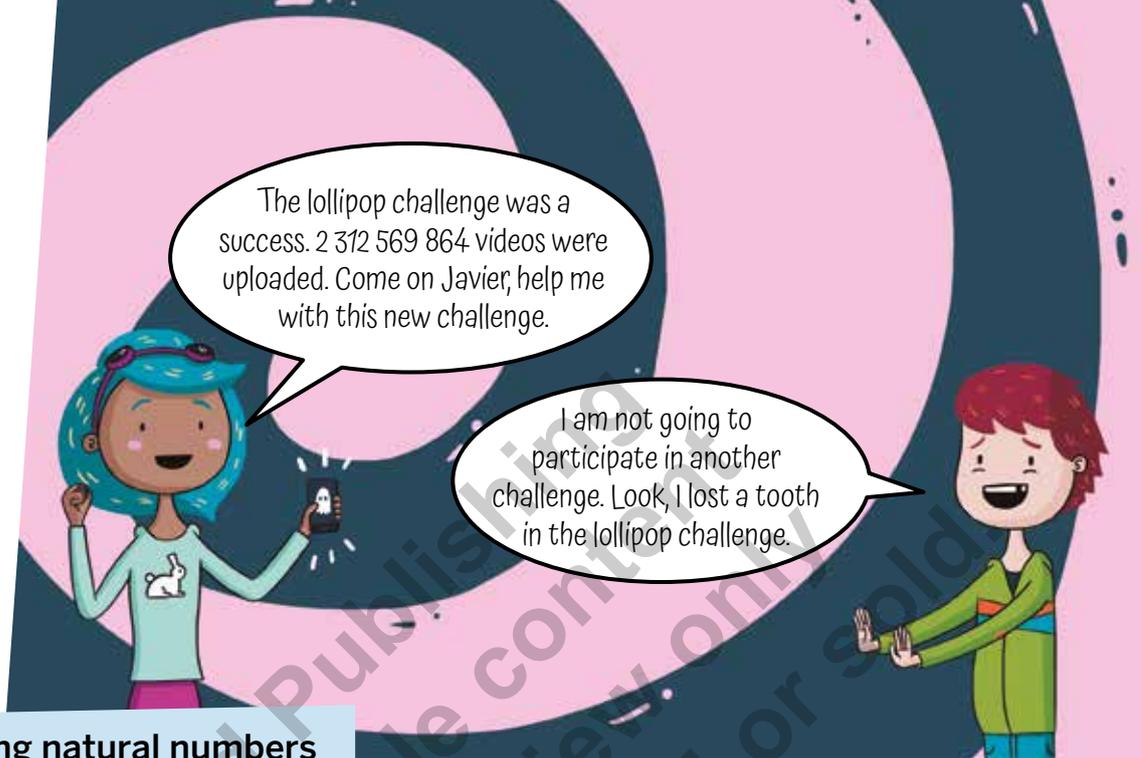
Reading and writing natural numbers

To **read** or **write** any natural number, remember that each one of the digits is located in the ones, tens or hundreds place value and that these three places form a **period**. Two periods would consist of six digits .

>>Reading and writing natural numbers

GET SUPERPOWERS

SUPERPOWER 1

Let's use the place-value chart to see the total number of videos that were uploaded for the lollipop challenge.

The milliards period			The millions period			The thousands period			The ones period		
HMi	TMi	Mi	HM	TM	M	HTh	TTh	Th	H	T	O
		2	3	1	2	5	6	9	8	6	4

1 We first read the milliards period: **two thousand.**

3 After that you read the thousands period: **five hundred and sixty-nine thousand.**

2 You then read the millions period: **three hundred and twelve million.**

4 And lastly, the ones period is read as: **eight hundred and sixty-four.**

The amount of videos uploaded reads as: **two thousand three hundred and twelve million five hundred and sixty-nine thousand eight hundred and sixty-four.**

SUPERPOWER 2

Mongolongotron has a lot of **subscribers**. But on the Internet, Javier discovers an interesting fact shown in the article to the right, which he writes out as numbers.

The millions period			The thousands period			The ones period		
HM	TM	M	HTh	TTh	Th	H	T	O
	4	8	0	6	1	7	0	0

Criteria for comparing natural numbers

To determine **which of the two numbers is greater**, we can compare the amount of digits of each one. When we do this, it could be that:

- The two numbers have a different amount of digits. In this case, the number with the greater amount of digits is the greater number.

- The two numbers have the same amount of digits. If this is the case, we compare the digits that are in the same place value from left to right until finding the position in which they are different. In this case, the larger digit belongs to the greater number.

SUPERPOWER 3

Elena invites Javier to participate in the #DanceLikeAGhostChallenge, for which 1 250 004 videos have already been uploaded.

Come on, 1 250 004 videos is greater than the 1 206 703 videos for the #CocoChallenge.

How do you know?

Look at how Elena does it:

The millions period			The thousands period			The ones period		
HM	TM	M	HTh	TTh	Th	H	T	O
		1	2	0	6	7	0	3

The millions period			The thousands period			The ones period		
HM	TM	M	HTh	TTh	Th	H	T	O
		1	2	5	0	0	0	4

1 = 1
2 = 2
0 < 5

Since the first digit in which the numbers differ is in the ten-thousands place and is less in the number 1 206 703 than it is in 1 250 004, Elena concludes that 1 206 703 < 1 250 004.

From this we can see that fewer videos were uploaded for the #CocoChallenge than for the #DanceLikeAGhostChallenge.

1. Javier and Elena discover that there are YouTubers with a lot more subscribers than Mongolongotron.

According to the table, would it be correct to say that Joselina455 has fewer subscribers than each one of the other two YouTubers? Explain your answer.

YOUTUBER	SUBSCRIBERS
Joselina455	35 270 199
LALAm	35 208 564
MatyLand	Thirty-five million two hundred seventy-four thousand and eight

2. Using words, write the number of subscribers LALAm has.

3. Write down two situations where you can use numbers with up to ten digits. Share your ideas with the class.

Rounding

Rounding is a useful process for giving an approximate quantity to a specific place value. To round a number, follow these three rules:

- **Highlight** the digit located in the place value you want to round.
- **Increase it by 1** if the next digit is 5 or greater than 5, and put a 0 in the rest of the places to the right.
- **Leave it as it is** if the next digit is less than 5 and put a 0 in the rest of the places to the right.

SUPERPOWER 4

Javier rounds the amount of subscribers Joselina455 has to the nearest hundred thousand by following these steps.

Step 1. He highlights the digit in the place value he wants to round to.

Step 2. He looks at the digit to the right of the highlighted value.

The millions period			The thousands period			The ones period		
HM	TM	M	HTh	TTh	Th	H	T	O
	3	5	**2**	7	0	1	9	9

Step 3. He increases the highlighted digit by 1 and writes zeros for every other digit to the right.

The millions period			The thousands period			The ones period		
HM	TM	M	HTh	TTh	Th	H	T	O
	3	5	3	0	0	0	0	0

Joselina455 has close to 35 300 000 subscribers.

SUPERPOWER 5

Elena uses a number line to round 1 206 703 to the nearest hundred thousand. She first writes the numbers 1 200 000 and 1 300 000, which are the possible values she can round to. She sees that the number she wants to round to is closer to the first than to the second.
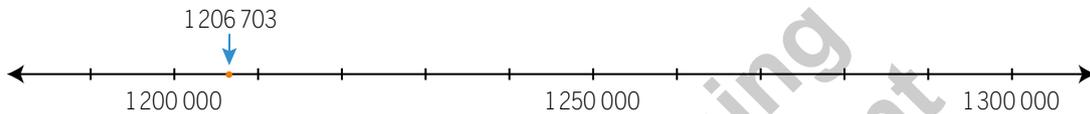
This way, the number 1 206 703, which is the total number of videos for the #CocoChallenge, can be rounded to 1 200 000.

SUPERPOWER 6

Elena found two places on a map where they could record the #DanceLikeAGhostChallenge. Javier suggests to Elena that they should estimate the distance of the two sections of each route and add them up to decide which is the shorter route of the two. To facilitate their calculations, they round each length to the nearest hundred.

The distance to A is approximately, 1100 m + 900 m = 2000 m.

The distance to B is approximately, 1500 m + 700 m = 2200 m.

Elena and Javier decide to go to point *A* because Point *B* is approximately 200 meters further.

Estimation

By finding an **estimated** value of an operation or measurement, you obtain a value that is approximate to the exact value or measurement.

>>Estimation

4. Estimate the distance traveled by Elena and Javier to arrive at point *B* by rounding the total distance of both segments of the route to the nearest thousand. Between this estimate and the one from Superpower 6, which is the closest value to the exact distance? Why? _____

_____

5. Work with a classmate to solve the following problem. If Mongolongotron has two million subscribers, approximately how many more subscribers does LALAm have?

_____

_____

6. Draw a purple check ✔ next to the situations in which an exact amount is needed and a green check ✔ next to situations in which an estimate could be used. Justify your answer for each one.

a. Calculating the amount of money you must take to the supermarket to buy some food without having too much or too little money. ☐

b. Establishing the total amount of recycled waste collected by some schools of a city to determine the winner of a prize. ☐

c. Determining the number of people who visited a museum in one year. ☐

d. Administering a dose of medicine to treat a disease. ☐

GET SUPERPOWERS

SUPERPOWER 7

Mongolongotron will receive a trophy if he reaches two million videos uploaded for one challenge. He could achieve it with the #DanceLikeAGhostChallenge, which already has 1 250 004 videos.

Elena and Javier calculate how many videos are necessary for the YouTuber to win the trophy.

Let's calculate how many videos are needed to reach 2 000 000 with 1 250 004 videos already uploaded.
$1250004 + ? = 2000000$

To find it out, all we need to do is subtract:
$2000000 - 1250004$
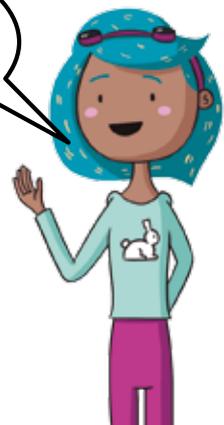
- Elena and Javier can use a **fact family** to determine the number of videos needed to reach 2 000 000 in the #DanceLikeAGhostChallenge in order for Mongolongotron to win the trophy.

$2\,000\,000 - 1\,250\,004 = 749\,996$

$2\,000\,000 - 749\,996 = 1\,250\,004$

$1\,250\,004 + 749\,996 = 2\,000\,000$

$749\,996 + 1\,250\,004 = 2\,000\,000$

2 000 000

1 250 004   749 996
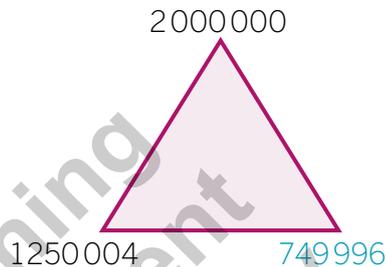
Mongolongotron needs 749 996 more videos to win the trophy.

- MatyLand lost 74 296 followers on Twitter due to an inappropriate comment on one of her videos and now has 901 528 followers.

$\blacklozenge - 74\,296 = 901\,528$ $901\,528 + 74\,296 = \blacklozenge$

From her initial amount of followers, MatyLand lost the ones who decided to unsubscribe.

Javier does the operation: 901 528 + 74 296. He calculates that before people started unsubscribing, MatyLand had 975 824 followers.

Before the inappropriate comment, MatyLand had 975 824 subscribers.

Addition and subtraction of natural numbers

Addition and subtraction are inverse operations. The terms used in addition or subtraction are related to each other through a **fact family**.

A **fact family** consists of four operations of addition and subtraction using three given numbers. A fact family makes it easy to see the relationship between these two operations.

SUPERPOWER 8

The video for one challenge has 6 225 555 views, while another one has 3 875 657 views.

The difference of 6 225 555 – 3 875 657 indicates how many more views the first video has.

6 225 555

2 349 898   =   3 875 657
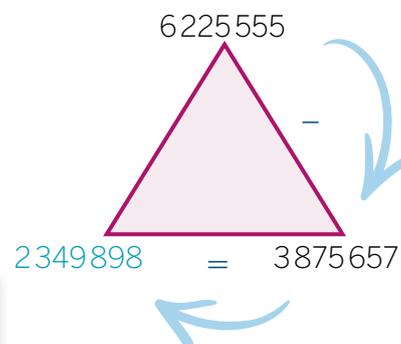
The first video has 2 349 898 more views than the second video.

SUPERPOWER 9

Elena and Javier throw darts for a new challenge by Mongolongotron. Javier throws a few darts, adds the points he got according to the color of the section he hit, and subtracts 15 points for each dart that didn't hit the dartboard.

> In the end I got 284 points, but I do not know how many points were subtracted due to missed throws.

Elena helps Javier calculate the number of throws that didn't hit the dartboard.

> I first find the difference between the total number of points that he got on the dartboard and the final amount: $359 - 284 = 75$

> I then divide the difference by 15, because that is the amount of points subtracted for each throw that didn't hit the dartboard.

Points per color	Total amount of darts per color	Total amount of points per color
12	6	$12 \times 6 = 72$
14	7	$14 \times 7 = 98$
16	4	$16 \times 4 = 64$
17	3	$17 \times 3 = 51$
18	2	$18 \times 2 = 36$
19	2	$19 \times 2 = 38$
Total	24	359
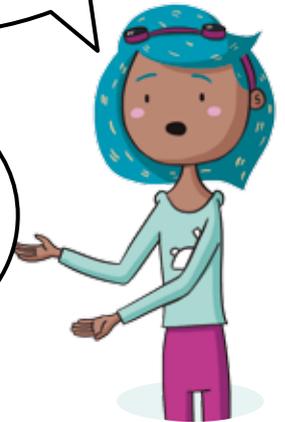
To continue with her analysis, Elena uses the relationship between multiplication and division to find the number of throws that didn't hit the dartboard. She writes the fact family as follows:

$$15 \times ? = 75 \longrightarrow 75 \div ? = 15 \longrightarrow 75 \div 15 = ? \longrightarrow 5 \times 15 = 75$$

She wondered what number she must multiply by 15 to get 75.

She wrote the other equations that form part of the **fact family** to find the one that would give her the answer.

Elena concluded that Javier didn't hit the dartboard five times.

Multiplication and division of natural numbers

Multiplication and **division** are inverse operations, and therefore it is possible to make a **fact family** with them.

7. Elena and Javier want to buy some masks for the dance. To do this, they look at prices in a store. Which of the two packs should they buy and why? Get together with a classmate and compare your answers.

_____

_____

_____

34 000
5 masks

50 800
8 masks
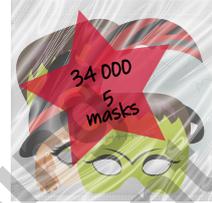
8. For Elena's turn at throwing darts, she threw 30. Complete the table to see the total points that she scored, and if the rules were the same as they were in Superpower 9.

Points per color	Total amount of darts per color	Total amount of points per color
12	5	
14	3	
16	6	
17	2	
18	8	
19	1	
Total		

a. How many throws didn't hit the dartboard?

_____

b. How many points did Elena get in the end?

_____

c. Which of the two, Javier or Elena, got the most points and by how many points did they beat the other?

_____

_____

9. Elena and Javier are watching the men's 10 000 meter race on TV.

a. Fill in the missing information in the table, which was not mentioned in the broadcast.

Men's 10 000 meter final 400 m each lap					
Position	Runner	Laps run	Laps remaining	Distance run (m)	Distance remaining (m)
1	Miguel Casas	16			3600
10	Julio Mora			5600	4400
25	Alberto Nuñez		13		

b. To train, Julio Mora runs the same distance every weekday, Monday to Friday, and on the weekends he runs 3000 m. If he runs 75 000 m in a month, what distance does he run every weekday? Write an explanation for your answer and share it with the class.

_____

_____

SUPERPOWER 10

Elena and Javier go into the theme park in their town and are able to identify some types of angles on some of the structures.

How interesting, ∡PTS and ∡QTR are vertically opposite angles.

Mega-twist

And ∡PTS and ∡STQ are adjacent, since they share a side and form a flat angle.

Javier also recognizes that on the Mega-twist, the ∡RTP and ∡STQ are **obtuse**, while the ∡QTR and ∡PTS are **acute**. Elena and Javier are applying the classifications of angles they know.

Angle classification

According to position

>>Angle classification

- Two angles are **consecutive** if they share the same vertex and one side.
- Two angles are **adjacent** if they have one common side and a common vertex, and the other two sides are opposite rays.
- **Vertically opposite angles** are the angles opposite each other when two lines cross. "Vertical" in this case means they share the same vertex.

According to measurement

- An angle is **acute** if it is less than 90º.
- An angle is **right** if it is 90º.
- An angle is **obtuse** if it is greater than 90º but less than 180º.
- An angle is **flat** if it is 180º.

Acute angle	Right angle	Obtuse angle	Flat angle
50º	90º	135º	180º
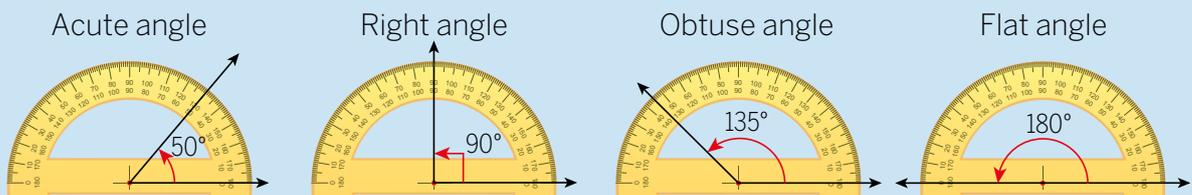
10. Javier and Elena take a picture of the ferris wheel in the park. Use the letters they wrote on the picture to find some of the angles that can be classified according to their position or measurement. Share your answers with your classmates.

Use the protractor to check your answers.

_____

_____

_____

11. Write some of the characteristics of ∡BVA.

_____

_____

12. How can you classify the pair of angles ∡EVR and ∡RVO?

_____

_____
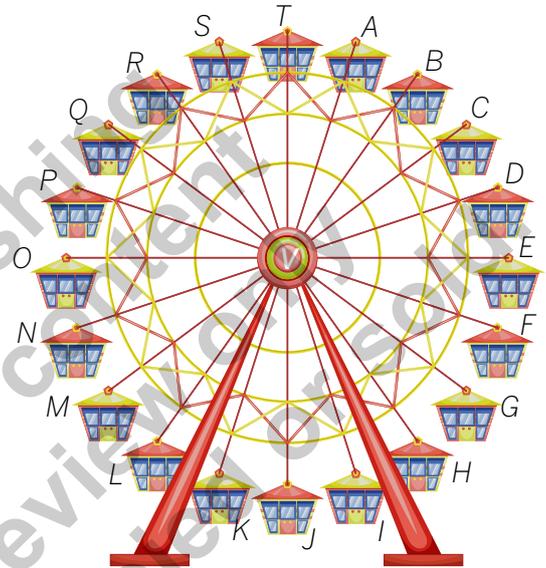
13. Work with two classmates to solve the following problem.

> Angles can also be classified according to their sum:
> * **complementary** if their sum is 90º.
> * **supplementary** if their sum is 180º.

Using the ferris wheel, find a pair of complementary angles and a pair of supplementary angles. _____

14. Draw the hands of the clock to show the time at which Javier and Elena do certain activities and indicate the type of angle they form. Use your protractor to help you with this task.
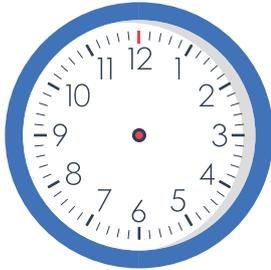
At 6:00 a. m. they leave for school.	At 3:00 p. m. they leave school.	At 5:00 p. m. they begin their dance class.
Angle type: _____	Angle type: _____	Angle type: _____