

What time is it really?

Imagine you have been studying in London for two months. It is 1.00 pm. You are thinking about calling your best friend who lives in New York, but right now it is only 5.00 am there. Why are the times different?

Due to the rotation of the Earth, when it is daytime in one part of the planet, it is nighttime in the opposite part. Time zones were created to match the time with the Sun's light. Since Earth is a sphere (360°) and it takes 24 hours to complete one rotation, it moves 15° every hour. This is why we have divided the planet into 24 time zones. 24 zones x 15° = 360°.

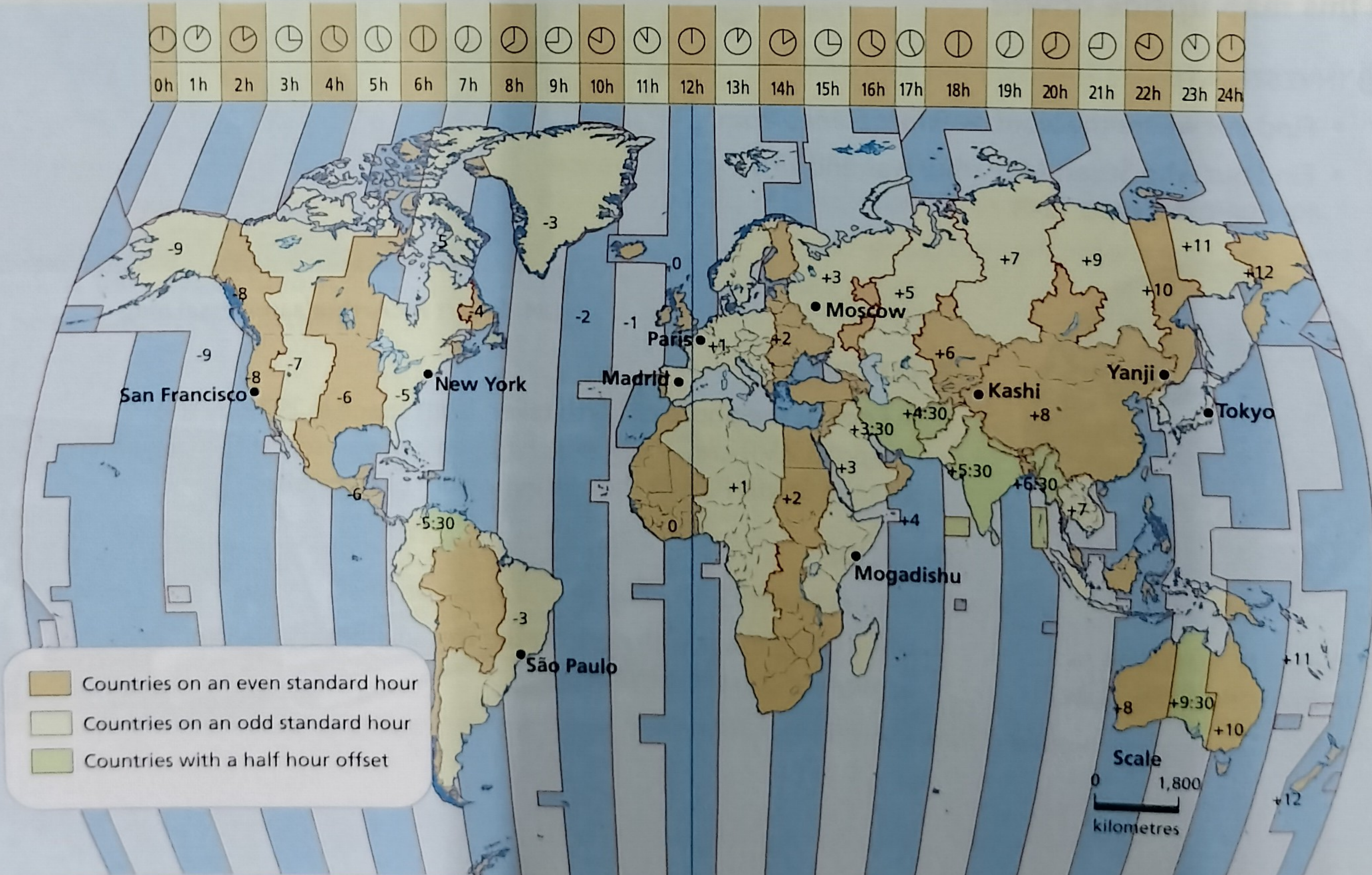
Each time zone is a strip that goes from pole to pole and shares the same time. (25) The Prime Meridian, or Greenwich Meridian, is the base time zone. For every 15° we move east or west, the time changes one hour.

If we move east of the Prime Meridian, we have to set our clocks forward the same number of hours as the number of time zones we cross.

If we move west of the Prime Meridian, we have to set our clocks back the same number of hours as the number of time zones we cross.

Sometimes time zones are adjusted for political reasons. Countries can decide whether to apply time zones or not.

25. Time zones



26 Calculate.

- When it is 2.00 pm in Madrid, what time is it in São Paulo? And in Moscow?
- How many time zones would you cross if you travelled from San Francisco to Paris? Would you have to set your watch forward or back when you arrived?

27 Look at the map.

- Find China. If the sun rises in Kashi at 5.00 am, what time is sunrise in Yanji?
- How many time zones are there in the USA? How might this affect its population?

28 UNDERSTAND OTHERS. At what time in London would it be appropriate for you to call your friend in New York? Remember it should be a sociable hour in both cities when you call.

29 Have you ever heard the term jet lag? Find out what it means. Is it related to time zones? Why or why not?

30 What would happen if there were no time zones? Give examples.



## 4. Maps: reality in miniature

### What is the scale of a map?

Maps are always much smaller than the territory they represent. To show how much reality has been reduced in size, a scale is used. Scale is the ratio between the size of a territory in reality and the size it occupies on the map. The scale on a map can be either numerical or graphic.

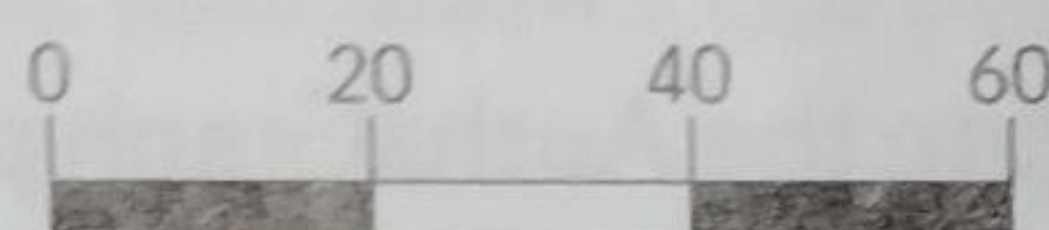
- A numerical scale is expressed as a fraction. The numerator (the number on the top of the fraction) represents a unit of measurement on the map, for example 1 cm. The denominator (the number on the bottom of the fraction) indicates its size in reality. This scale means that 1 cm on the map is equivalent to 200,000 cm in reality:

$$\frac{1}{200,000} \quad \begin{array}{l} \longrightarrow \text{Distance on the map} \\ \longrightarrow \text{Distance in reality} \end{array}$$

The numerical scale can be written in three ways:

$$\frac{1}{200,000} \quad 1/200,000 \quad 1:200,000$$

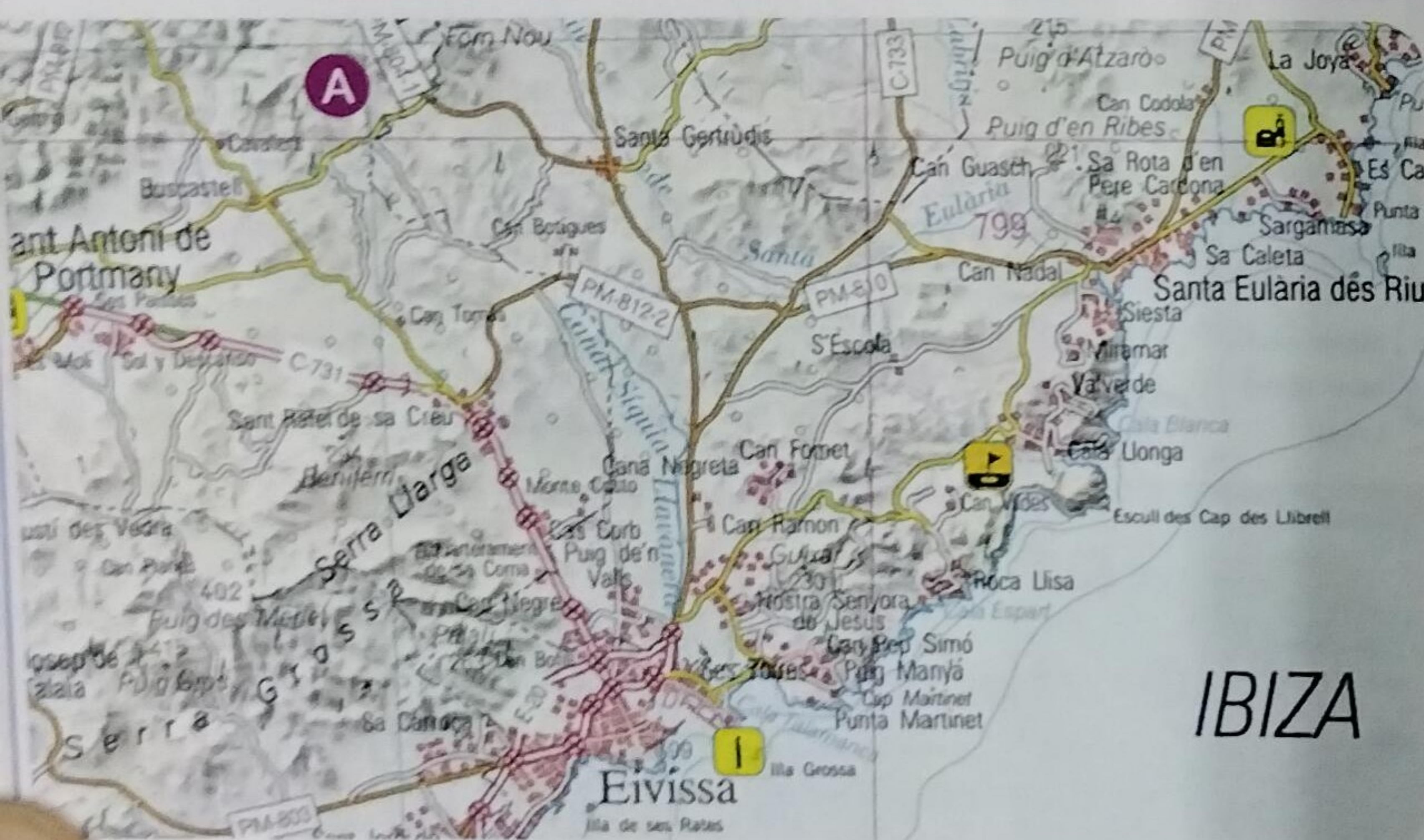
- A graphic scale is expressed by a straight line divided into equal segments, usually of 1 cm. Figures are usually expressed in kilometres and indicate the actual size of each segment. This scale shows that 1 cm on the map is equivalent to 20 km in reality.



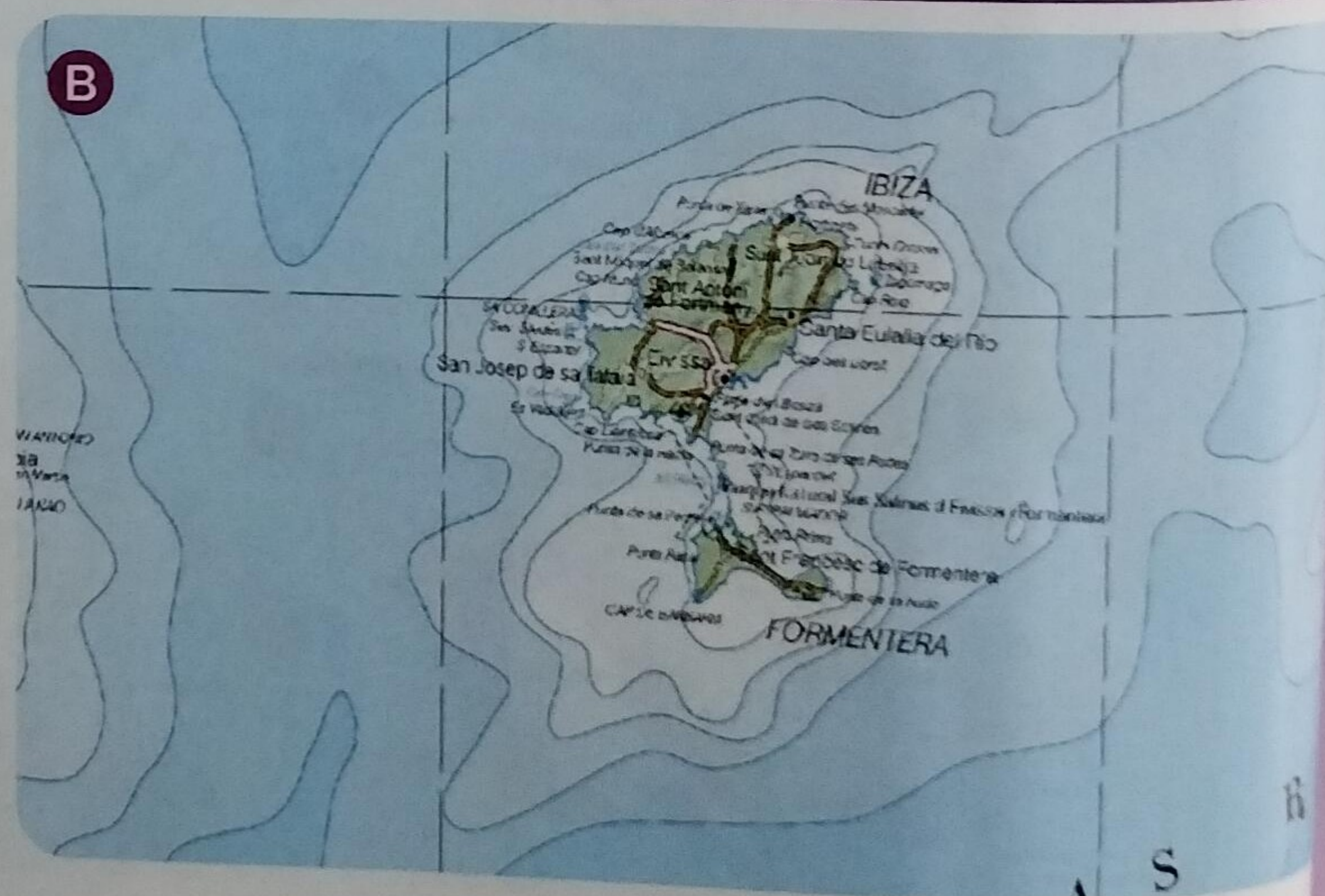
### Small and large scale maps

A territory on a map can be represented with different scales depending on the level of detail required. (12) For example:

Map A has a scale of 1:200,000. This means the distance in real life is reduced 200,000 times.



Map B has a scale 1:1,250,000. This means the distance in real life is reduced 1,250,000 times.



12. Ibiza (A and B) on two maps of different scales

### KEY QUESTIONS

- Explain what the scale on a map is for.
- Scales are also often used on floor plans. Imagine you are going to redecorate your bedroom with new furniture. Would a plan to scale be useful? Why?

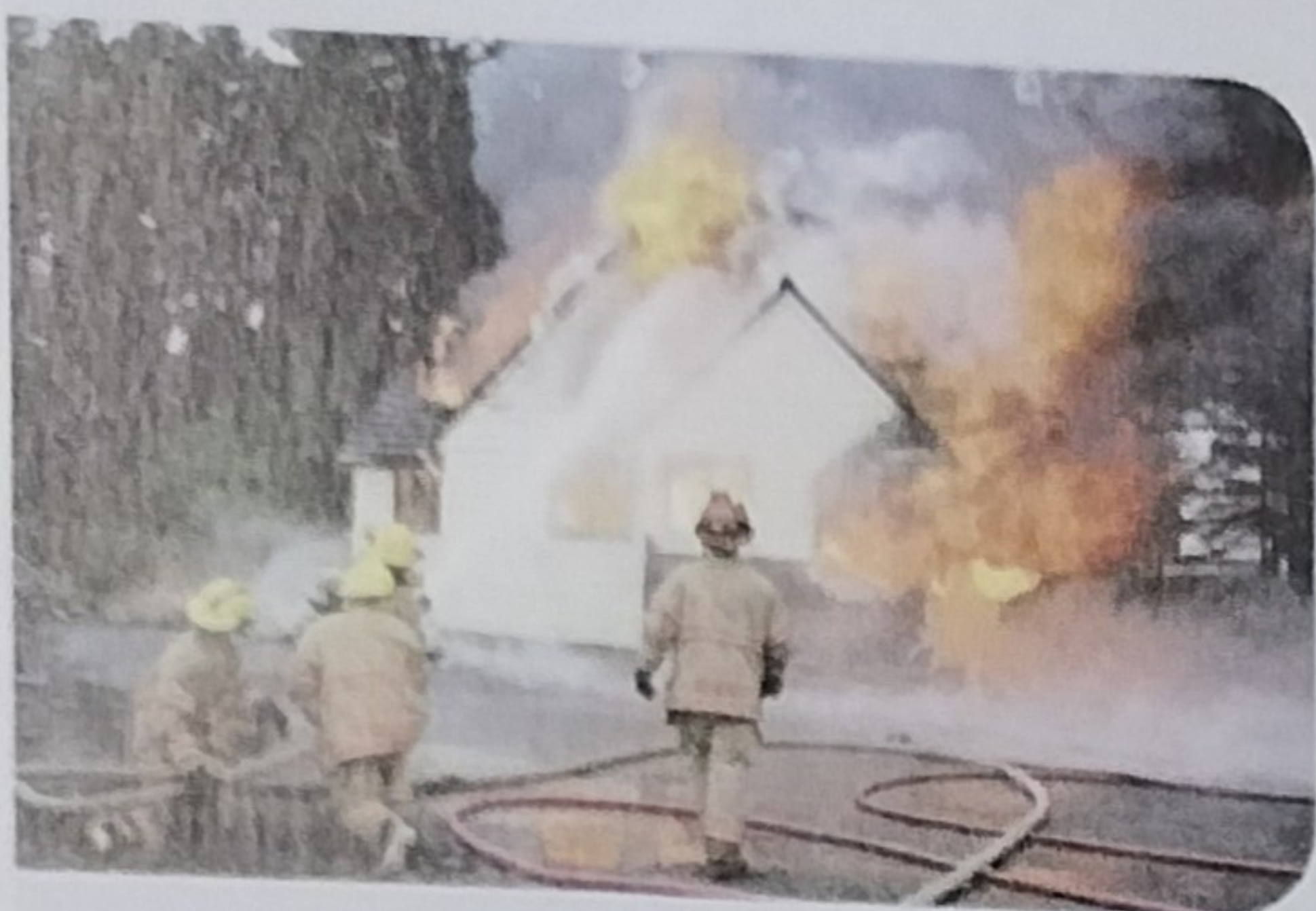
### WORK WITH THE IMAGES

- Look at the two maps of Ibiza. Which map has less detail? Look at the scale. How many times has reality been reduced in size on the map with less detail? And on the other map?
- Reach a conclusion. Which maps have greater detail: those with large or small scales?





Is investing in space research profitable? Should we take care of our own planet before we invest in exploring outer space? Or can space research help us to better care for the Earth? Perhaps space research contributes to making our daily lives easier. Space research influences our lives much more than we think.

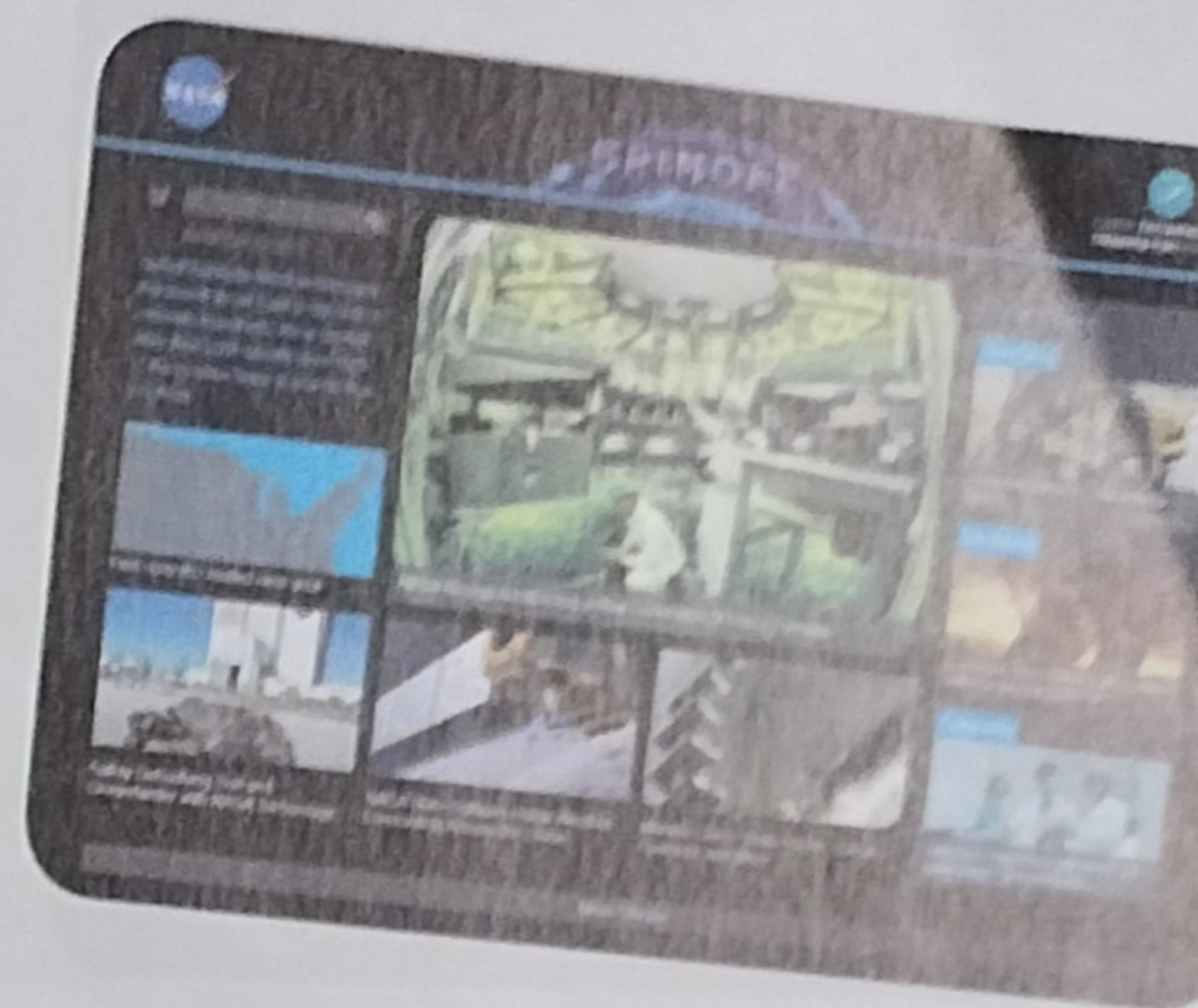


26. Firefighters wear fireproof suits.

Space exploration and research provide information about our universe, but they also advance the development of technologies. Many of these technologies can be used in medicine, microelectronics and public services. (26) Make a catalogue of objects related to the applications of space technology to raise awareness of their importance to our daily lives.

### STARTING POINT

1. You can find interesting information on the website [spinoff.nasa.gov/](https://spinoff.nasa.gov/).



### PREPARE YOUR PROJECT

2. Find out about everyday objects that originated from technology related to space research. Make a list.
3. Decide what your catalogue will be like.
  - Will it be on paper or in digital format?
  - Will it have illustrations? If so, will you use photos, drawings, etc.?
  - How will you organise the objects: chronologically, by categories, etc.?
4. Choose the objects you are going to include in your catalogue. Look for information about the objects and make index cards for each one.
5. Don't forget to include conclusions about the impact of space research on our lives.
6. Design your catalogue. Be creative! Try to make it as attractive and unique as possible.

### SHARE YOUR PROJECT

7. Share your catalogue with your classmates.
  - If your catalogue is in digital format, show it in class and offer a brief explanation if necessary.
  - If your catalogue is on paper, allow the rest of the class to read it.
8. Afterwards, discuss as a class what you have learnt and how happy you are with the work you have done.



# 2

## How the Earth's relief affects populations



▲ Fault line along the Mid-Atlantic Ridge in Iceland

### LEARNING SITUATION



When we look at mountains, rocks or the ground, we might believe that they have always been that way and always will be. However, this is not the case. Relief is constantly changing. In general, these changes are so slow that they are undetectable in a person's lifetime. But some changes can be sudden, like when there is an earthquake or a volcanic eruption.

Earthquakes modify the landscape, but they also cause great damage to infrastructures, buildings and people. A country's level of development and its ability to prevent or reduce the effects of an earthquake are closely related. A seism causes more damage in a poor country than a rich country.

### LET'S GET STARTED

- Look at the figures for the earthquakes in Haiti and Japan. Which earthquake was stronger? Which caused the most damage? What do you think the differences are due to? Explain your answer.
- What is the relationship between a country's level of prosperity and its ability to face a natural disaster like an earthquake? Think of examples of other recent disasters and form conclusions.



on 21st January 2010

MAGNITUDE 7.1

60 SECONDS

6,000 people killed

0,000 people injured

MILLION

lost their homes

### Figures for Haiti

Population: 11,402,533

Life expectancy: 63 years

GDP per capita: 1,728 dollars

% of the population living in extreme poverty: 54 %

Unemployment rate: 70 %

Illiteracy rate: 49 %

### Figures for Japan

Population: 125,836,021

Life expectancy: 84 years

GDP per capita: 41,419 dollars

% of the population living in extreme poverty: 16 %

Unemployment rate: 2 %

Illiteracy rate: 1 %

## JAPAN

Earthquake on 11th March 2011

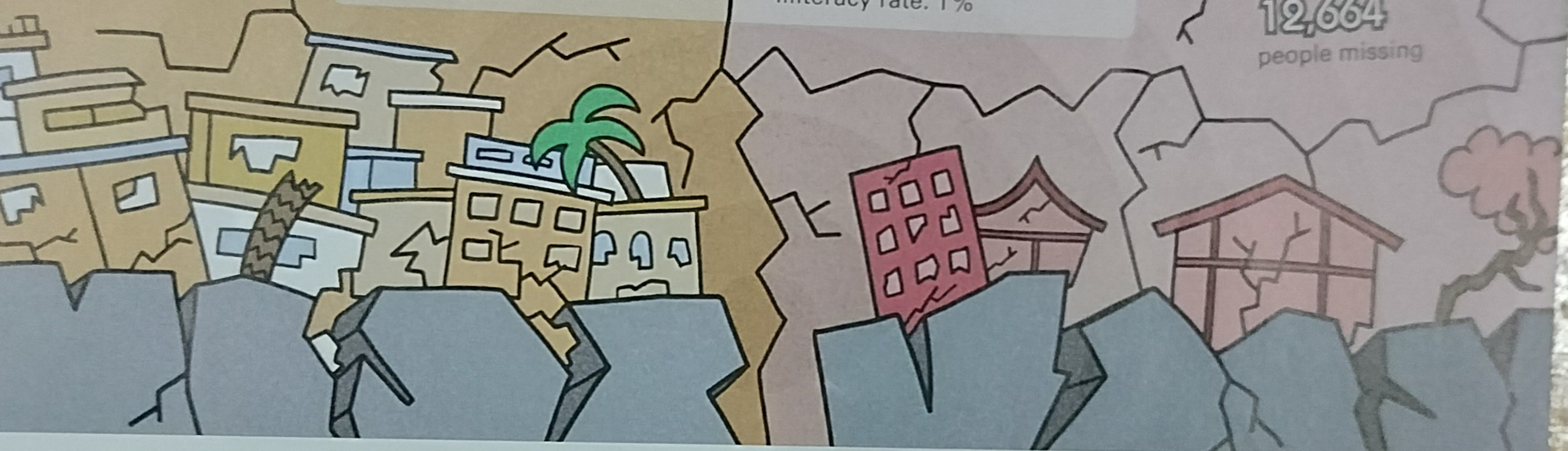
MAGNITUDE 9.0

Duration: 3 MINUTES

15,893 people killed

6,152 people injured

12,664 people missing



### IN THIS UNIT...

- You will learn about the main types of landforms on our planet.
- You will discover how the Earth's relief is formed.
- You will understand how the forces of nature and the actions of living things transform the Earth's relief.
- You will take action. You will propose a plan of action to follow if an earthquake happens.

CHALLENGE

10 REDUCED INEQUALITIES



Do natural disasters affect everyone in the same way?

The effects of natural disasters clearly demonstrate the close relationship between poverty and vulnerability. **Create an earthquake protocol** for your school that can help to reduce the damage caused by this type of natural disaster.