

# ELECTROMAGNETIC WAVES

**SENT INTO SPACE CLASSTRONAUTS PROGRAMME**

LAUNCH YOUR SCHOOL INTO  
SPACE



# ELECTROMAGNETIC WAVES

## Task

In groups, write down anything you can think of that you know about...



Waves



# ELECTROMAGNETIC WAVES

Today we will be learning...

what electromagnetic waves are, their uses and their dangers

By the end of the lesson you should be able to...

- State the different regions of the electromagnetic spectrum
- Describe some of the uses and dangers of EM waves
- Explain how an EM wave is produced

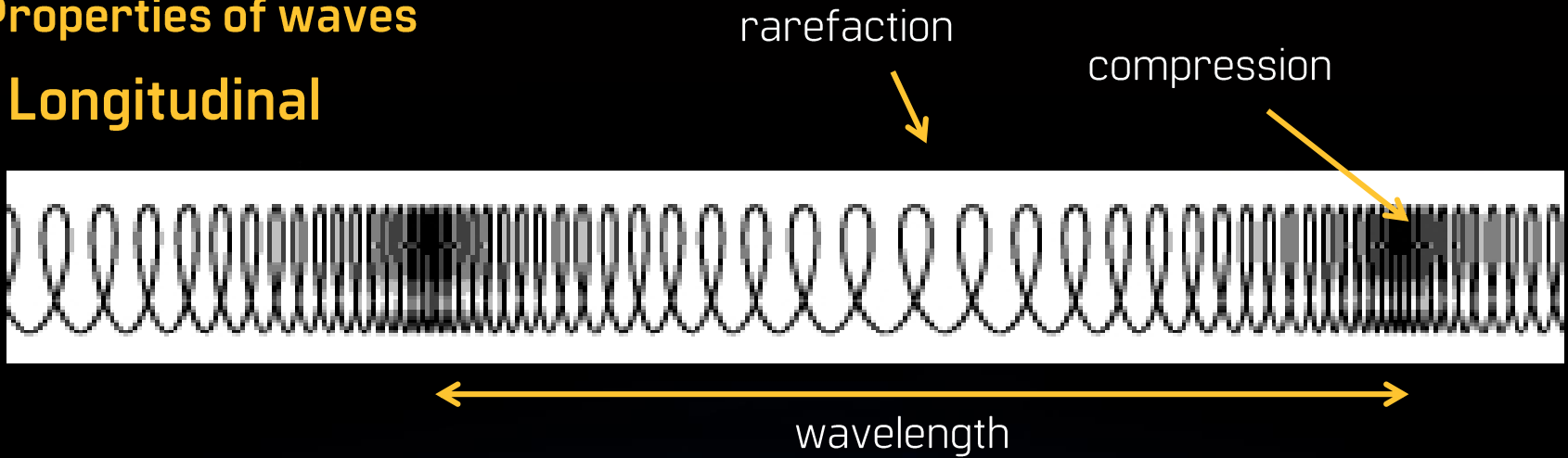




# ELECTROMAGNETIC WAVES

## Properties of waves

### Longitudinal



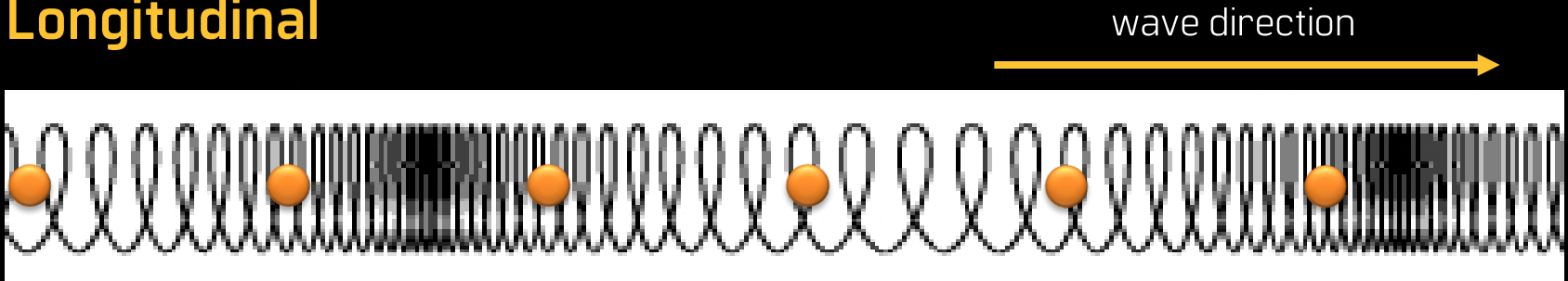
### Transverse



# ELECTROMAGNETIC WAVES

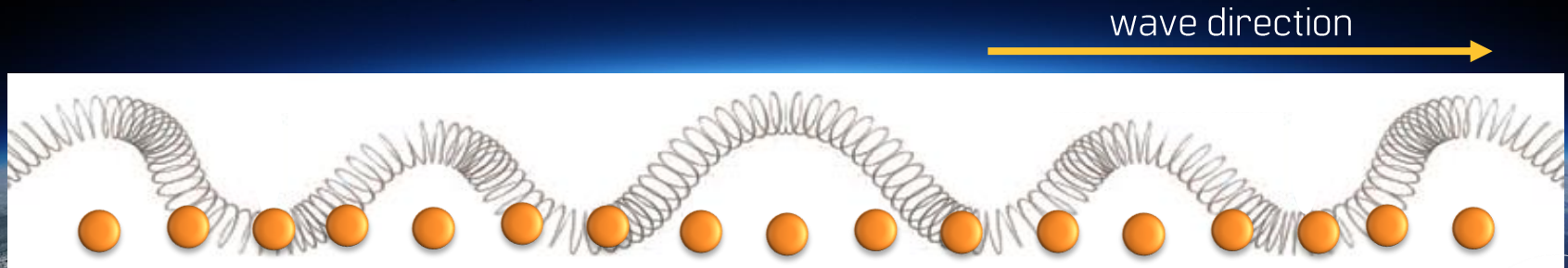
## Describing waves

### Longitudinal



### Transverse

Particle movement is **perpendicular** to the direction of motion of the wave



# ELECTROMAGNETIC WAVES

When an electrically charged particle (e.g. proton, electron) oscillates, it produces an electromagnetic wave. The faster the oscillation, the shorter the wave.

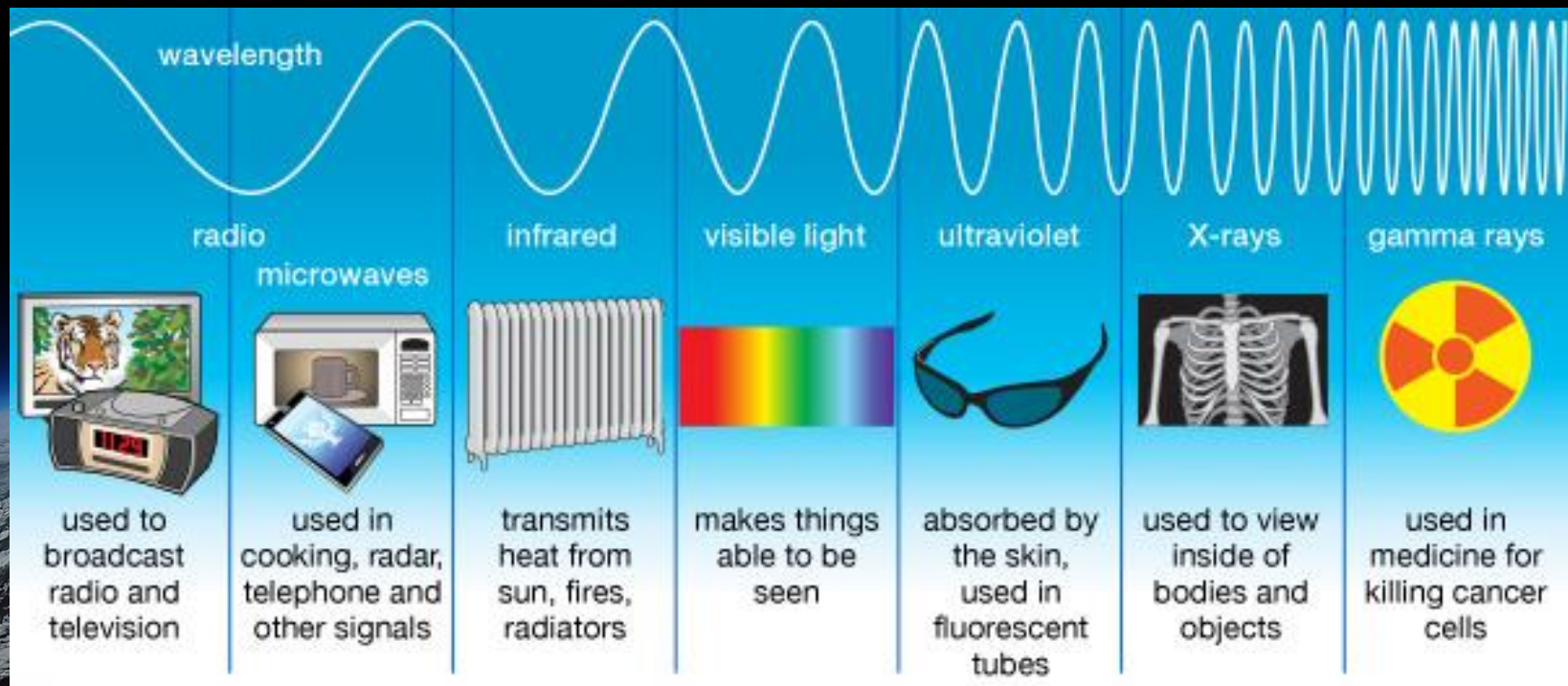


# ELECTROMAGNETIC WAVES

There are 7 types of **electromagnetic waves**. The only way in which they are different is their **wavelength**.

long wavelength  
low frequency  
low energy

short wavelength  
high frequency  
high energy





# ELECTROMAGNETIC WAVES

## What is a wave?

A wave is a disturbance or oscillation that travels through matter or space.

Waves are a method of **energy transfer** between particles or objects. One particle emits a wave of energy, and another absorbs it, increasing its own energy.





# ELECTROMAGNETIC WAVES

## Sound

How are sound waves produced?

How do they travel?

How can they vary?

## Light

How are light waves produced?

How do they travel?

How can they vary?



# ELECTROMAGNETIC WAVES

There are 7 types of **electromagnetic waves**. The only way in which they are different is their **wavelength**.

long wavelength  
low frequency  
low energy

short wavelength  
high frequency  
high energy



## Task

Stick the electromagnetic spectrum diagram in your book and come up with a story or mnemonic to help you remember the order of them.

# ELECTROMAGNETIC WAVES

## Quick quiz

Close your book, write 'higher' on one side of a mini-whiteboard (or piece of paper) and 'lower' on the other.

Hold up your board saying whether the EM wave on the left is **higher or lower wavelength** than the one on the right.





# ELECTROMAGNETIC WAVES

## Quick quiz

Close your book, write 'higher' on one side of a mini-whiteboard (or piece of paper) and 'lower' on the other.

Hold up your board saying whether the EM wave on the left is **higher or lower wavelength** than the one on the right.



UV

higher or  
lower than...

Visible

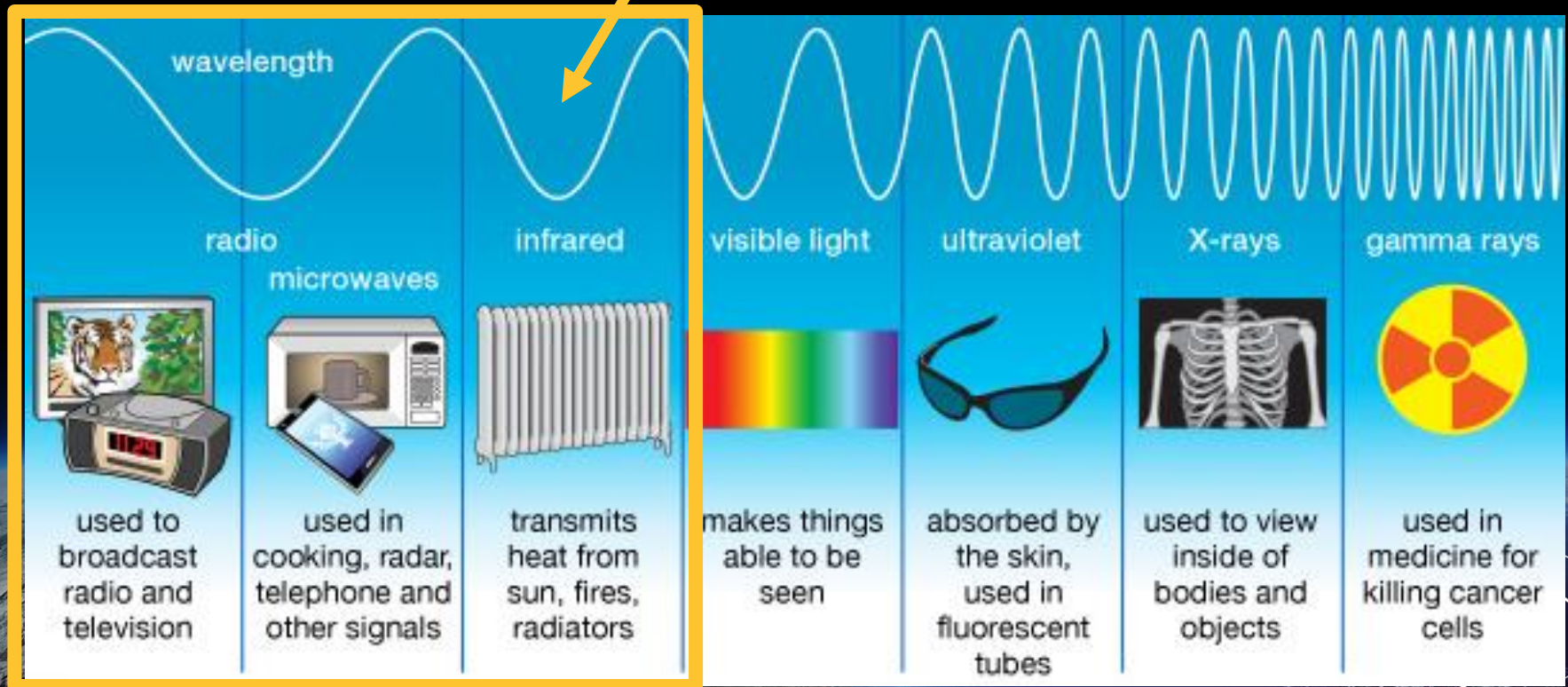


# ELECTROMAGNETIC WAVES

long wavelength  
low frequency  
low energy

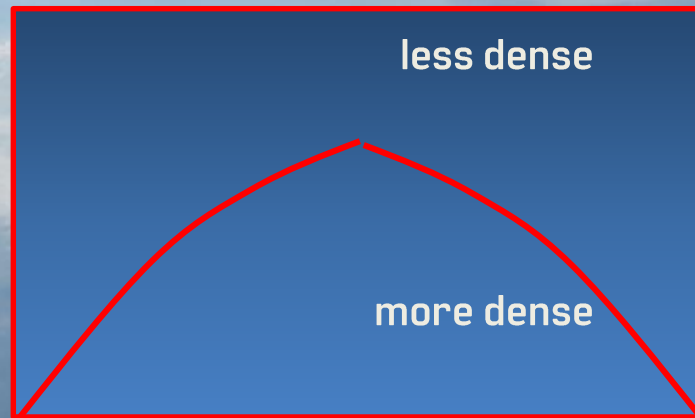
These waves can all be used for  
**communication**

short wavelength  
high frequency  
high energy



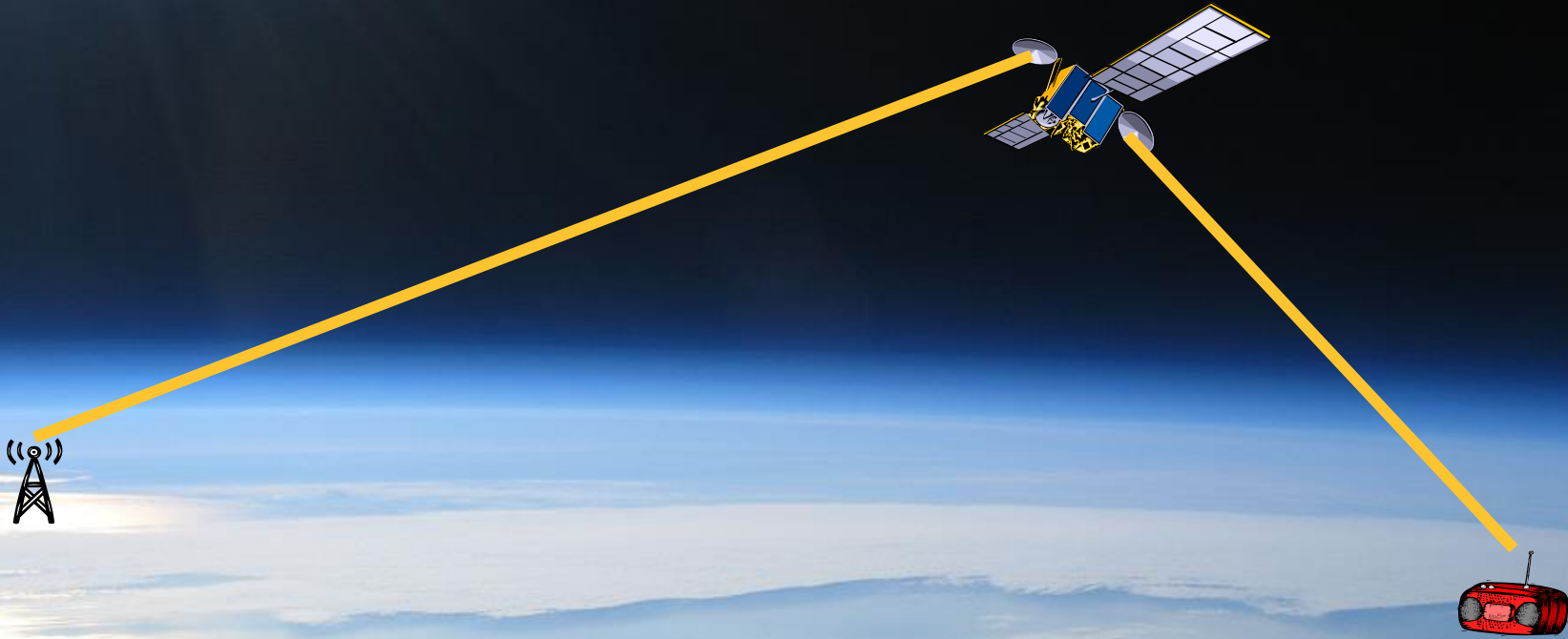
# LONG RADIO WAVES

Long wave (10m+) **radio waves** **refract** and **reflect** from the **ionosphere**, which is a layer in the atmosphere.





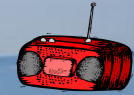
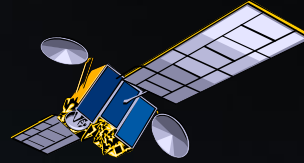
# SHORT RADIO/MICRO WAVES



Short wave radio and microwaves (10m – 10cm) **pass through the atmosphere**, so have to be transmitted to satellites, then **re-transmitted** to Earth.



# Infrared waves



Infrared waves and short microwaves (less than 10cm) signal strength reduced due to **absorption and scattering** by rain, dust and other atmospheric effects.

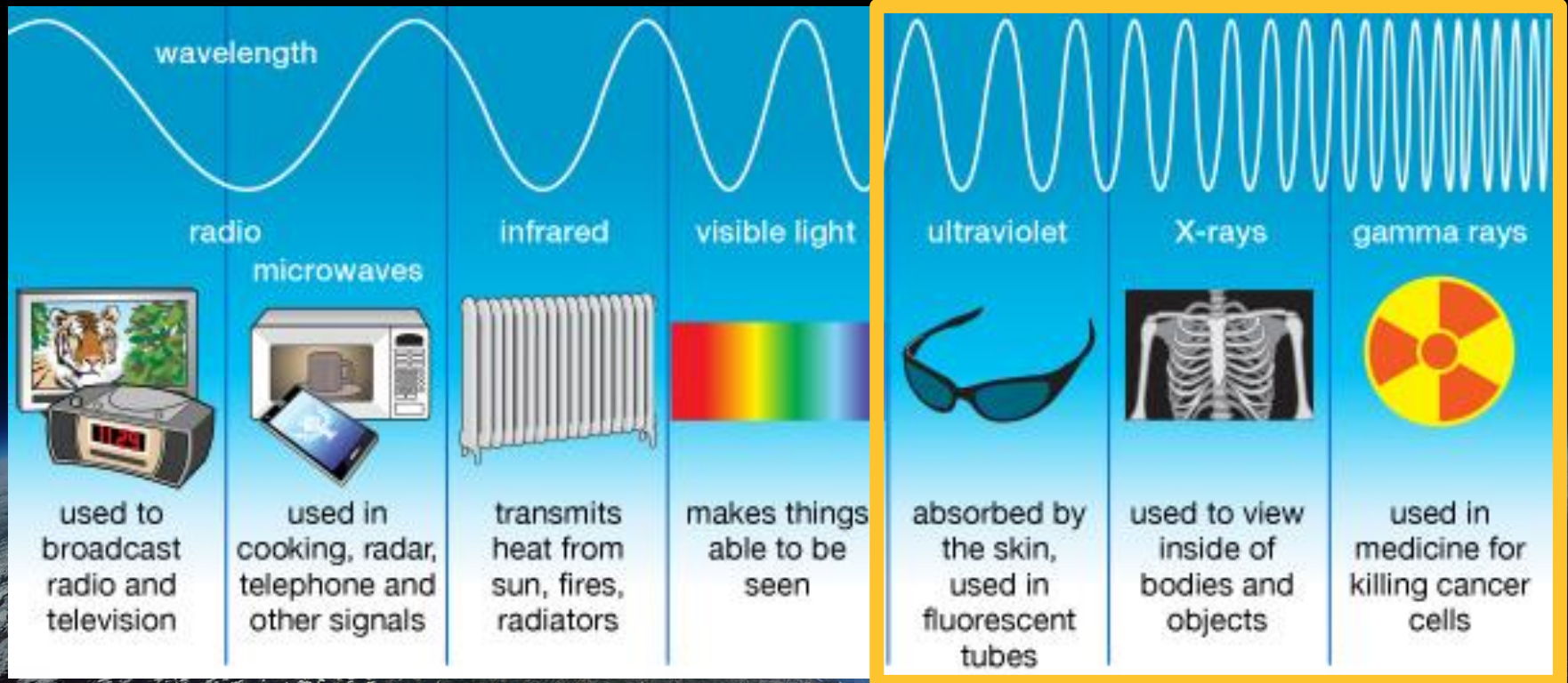


# ELECTROMAGNETIC WAVES

These waves are all **ionising**, meaning they can damage your body's cells

long wavelength  
low frequency  
low energy

short wavelength  
high frequency  
high energy





# OUR CLASSTRONAUTS PROGRAMME



This presentation is produced by Sent Into Space and supports the Classtronauts school space launch programme. The ultimate STEM project, launching a balloon into space is a great idea if you're wondering how to engage your pupils with the science curriculum. We'll visit your school and fly a craft into space right from your playground. Our presenter gives a mission briefing explaining the science behind high altitude flight, answering questions from the pupils before launching an item of your choosing into space. It's the perfect activity for Space Week.

## INSPIRE A GENERATION OF ASTRONAUTS

We deliver a complete end-to-end service; from project management, launch day and post-launch support.

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Our website includes a full set of lesson plans, worksheets and presentations for topics across the science and maths curriculum. These free science resources for KS2, KS3 and KS4 are available for download as PDFs, powerpoint presentations and word documents for easy printing.



# GET IN TOUCH



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Get in touch to discuss your Classtronauts project further:

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