Types of Wave

Monday, 16 June 2025

Answer the following questions:

1. Name two energy stores
   Chemical, thermal, gravitational potential, elastic potential and kinetic
2. Name two ways energy can be transferred?
   By heating, electric currents, mechanically and waves
3. Light travel in straight lines. **True or False**
   True
4. State the type of energy store is found in a spring
   Elastic potential energy
5. State the type of energy store is found at the top of a rollercoaster
   Gravitational potential energy

Stretch: What are the energy stores and transfers when a ball is rolling down a hill? **When a ball rolls down a hill the energy in the gravitational potential store is transferred mechanically into the kinetic store with some energy transferred to the thermal store by heating.**

Do Now

Types of Wave

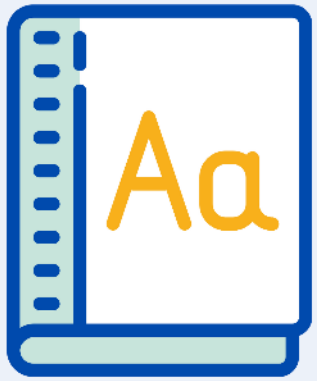
P3.3.2

Science Mastery

Following this lesson, students will be able to:

- Describe the differences between transverse and longitudinal waves
- Give an example of a transverse and a longitudinal wave
- Compare the direction of oscillations in transverse and longitudinal waves

Key Words:



longitudinal **transverse**

compression **rarefaction** **oscillation**

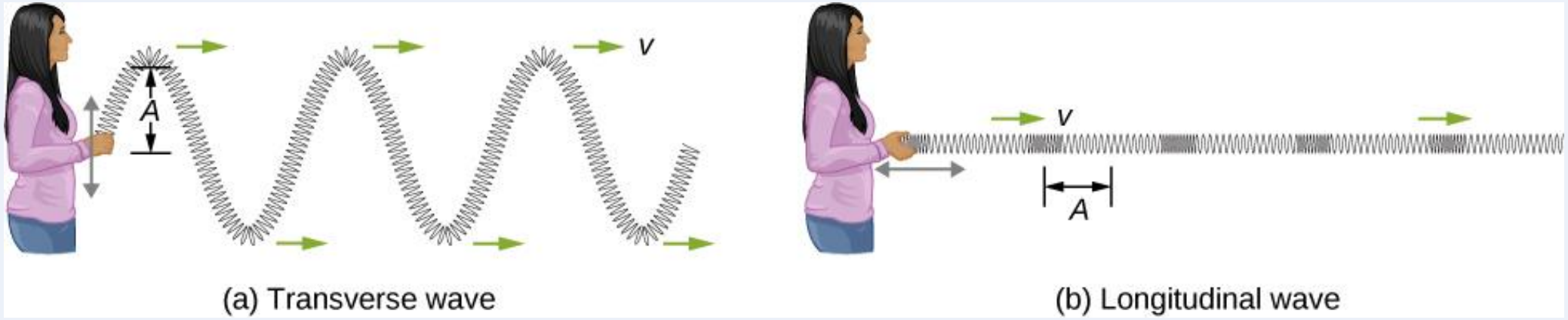
Lesson Objectives

Waves

All waves transfer **energy** without transferring matter. Waves are caused by **oscillations** (vibrating).

There are two types of wave – **longitudinal** and **transverse.**

Oscillations can move two directions. Either parallel to the direction of energy (longitudinal) or perpendicular to the direction of energy (transverse)

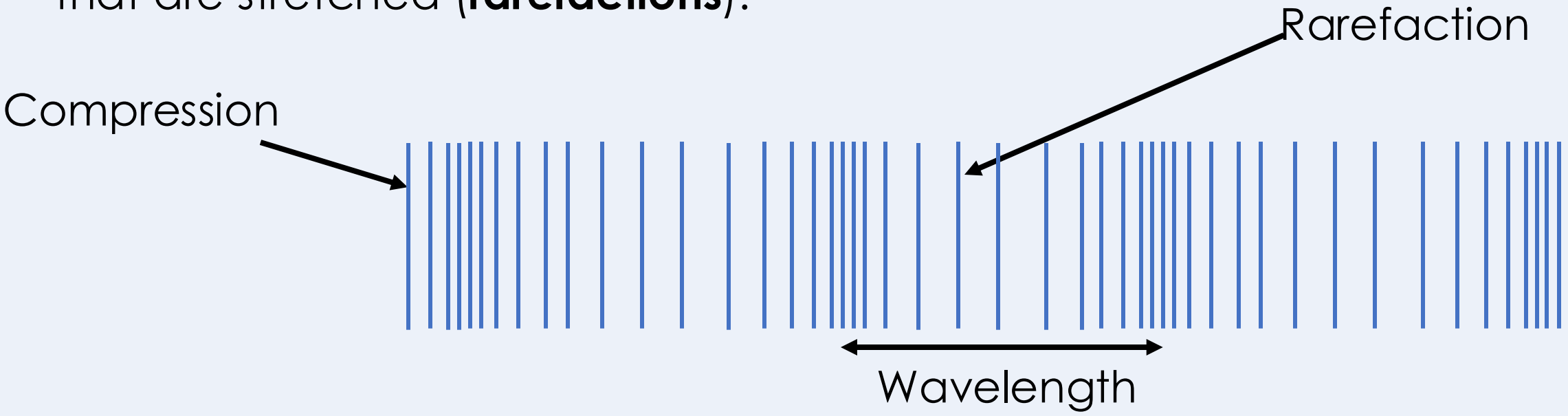


Longitudinal waves

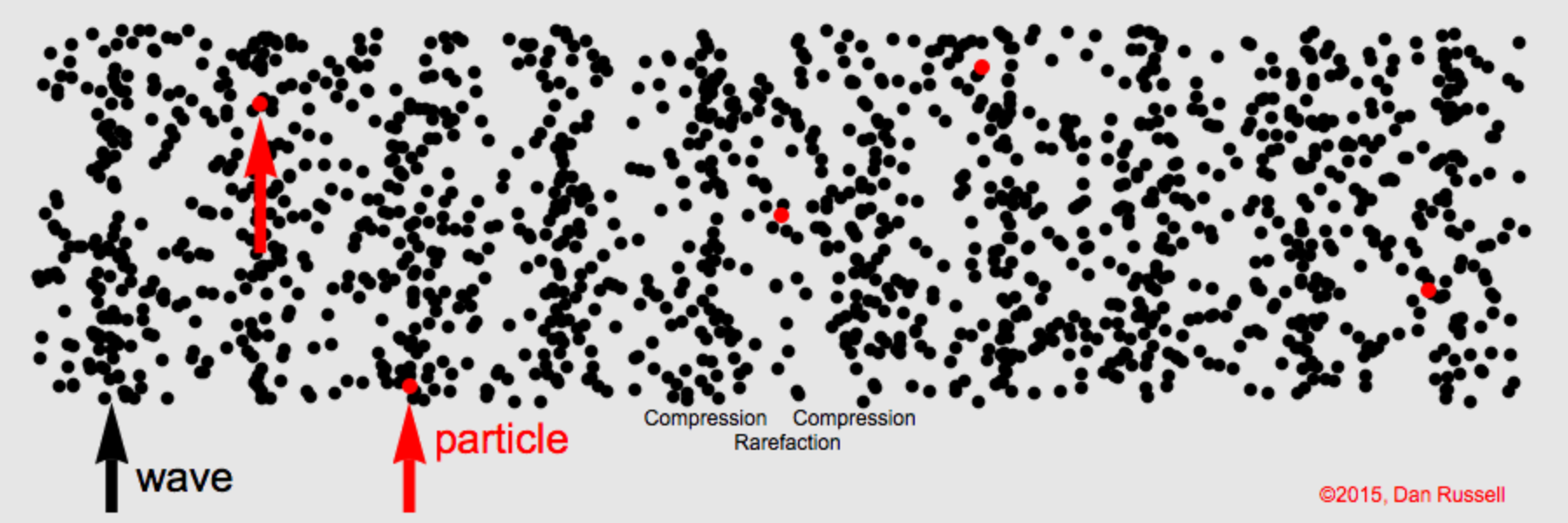
In longitudinal waves the oscillations are **parallel** to the direction the wave is moving (energy transfer)

An example of a longitudinal wave is a **sound wave**. Sound travels through a medium like air to be heard.

Parts of the wave that are squashed (**compressions**) and parts that are stretched (**rarefactions**).



Longitudinal wave



Agree, Build, Challenge

What would happen if someone tried to shout in space?

1 Minute
Write your opinion to this statement.

I think that if someone tried to shout in space:

The sound **would** be heard from far away

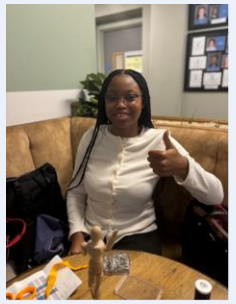
The sound **would not** be heard from far away

Stretch: Explain your answer

Talk Task

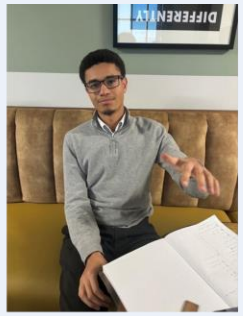
Agree, Build, Challenge

What would happen if someone tried to shout in space?



Agree

Build



Challenge

Agree	Build	Challenge
I support the idea that…. because….	Building on that idea, I think….	I disagree with that statement because….
I agree with (name) because…	I agree, I would like to add….	It could be argued that….
I like (name's) point because…	Linking to that point, I think….	To challenge (Name's) point…. On the other hand……

No sound would travel because there would be nothing to oscillate. Space is a vacuum – it contains no air particles, and longitudinal waves need particles to oscillate to be able to transfer energy.

Talk Task

MWB: Quick Check

1. What do waves transfer?

Energy not matter

2. Name the two types of waves?

Longitudinal and transverse

3. Describe the meaning of a longitudinal wave

In longitudinal waves the oscillations are parallel to the direction the wave is moving (energy transfer

4. Give an example of a longitudinal wave

Sound wave

Check for understanding

IP: GCSE Quick check

5 marks → 3.5 minutes

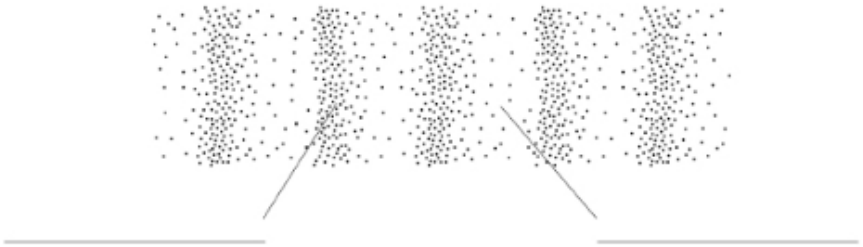
Silent solo

Activity

Sound waves are longitudinal waves.

(a) **Figure 1** shows a sound wave.

Figure 1



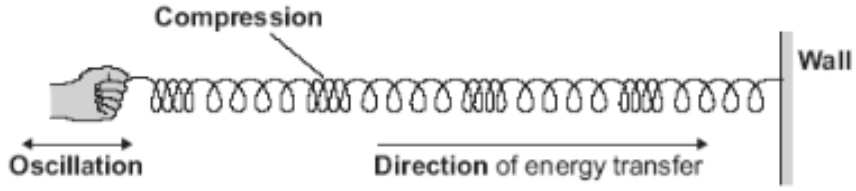
Complete the labels on **Figure 1**.

Choose answers from the box.

compression	extension	rarefaction
reflection	resistance	

(2)

(a) The diagram shows a longitudinal wave being produced in a stretched spring.



(i) Use the bold words from the diagram to complete the following sentence. Put only **one** word in each space.

A longitudinal wave is one in which the _____ causing the wave is parallel to the _____ of energy transfer.

(2)

(ii) Name the type of energy that is transferred by longitudinal waves.

_____

(1)

Mark in green pen

(a) compression

this order only

1

rarefaction

1

(a) (i) oscillation

1

direction

1

correct order only

(ii) sound

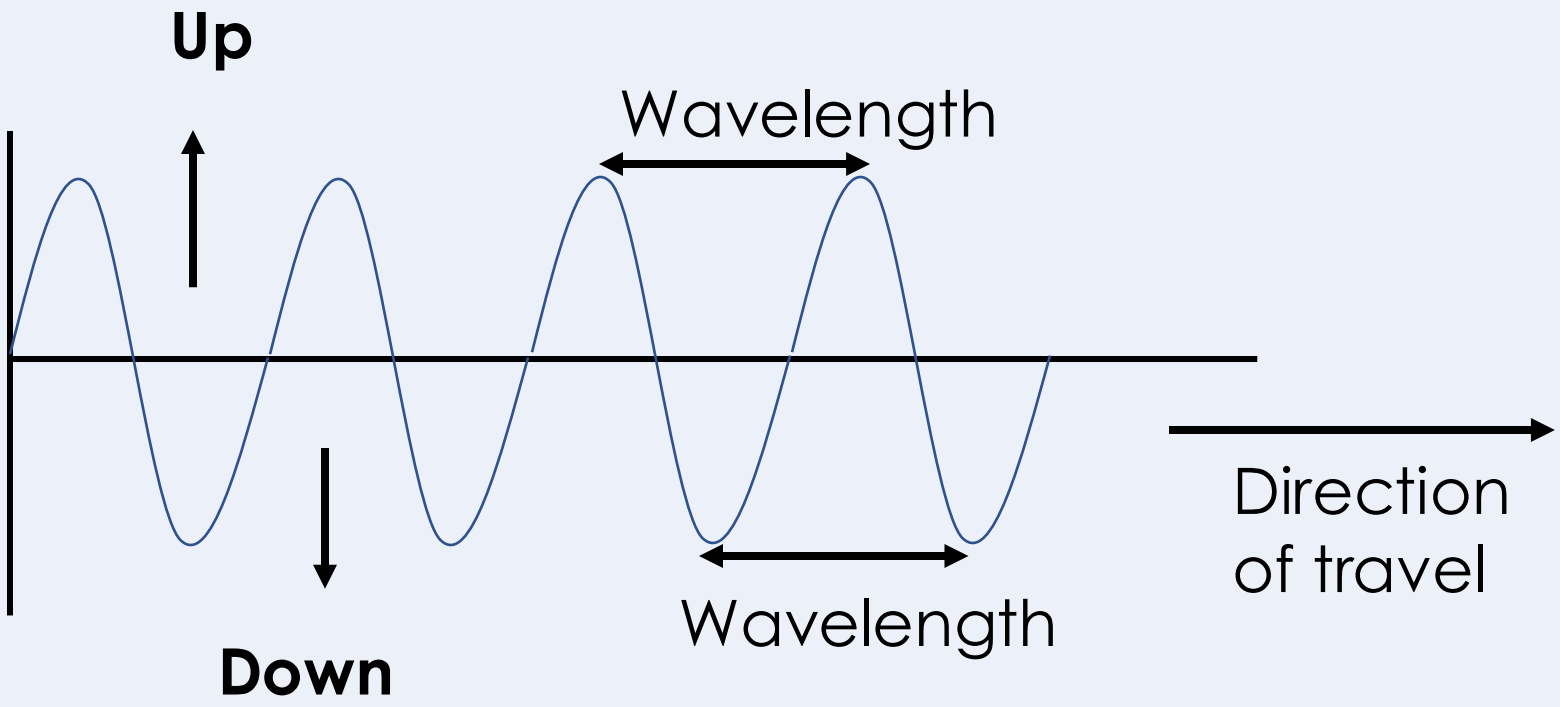
1

Activity

Transverse waves

In transverse waves the oscillations are **perpendicular** (at 90°) to the direction the wave is moving (energy transfer).

Examples of transverse waves are **light** waves and **water** waves.
Transverse waves can travel through a vacuum



Let’s do a Mexican wave and see what you notice

MWB: Quick Check

1. Describe the meaning of a transverse wave

In transverse waves the oscillations are perpendicular (at 90o) to the direction the wave is moving (energy transfer).

2. Give an example of a transverse wave

Light and water waves

3. Outline a similarity between both types of waves

They both transfer energy and they both have oscillations

4. Outline a difference between both types of waves

The oscillations in transverse waves are perpendicular to the direction of energy transfer whereas the oscillations in longitudinal waves are parallel to the direction of energy transfer.

Check for understanding

GCSE exam question

Example question:

Compare transverse and longitudinal waves (4 marks)

Sentence starters:

- A similarity between transverse and longitudinal waves is…
- A difference between transverse and longitudinal waves is…

Keywords:

Transfer, energy, oscillations, parallel, perpendicular, vibrations, sound, light

If completed, stretch worksheet will be provided

Writing like a scientist

GCSE Exam question

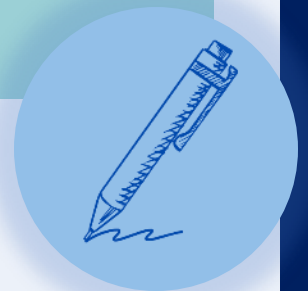
Example question:

Compare transverse and longitudinal waves (4 marks)

- A similarity between **transverse** and **longitudinal** waves is that they both transfer **energy.**
- Another similarity between **transverse** and **longitudinal** waves is that they both involve vibrations or oscillations.
- A difference between transverse and longitudinal waves is that the **oscillations** in **transverse** waves are **perpendicular** to the direction of energy transfer whereas the oscillations in **longitudinal** waves are **parallel** to the direction of energy transfer.
- Also, an example of **transverse** waves is **light** waves, but a **sound** is an example of **longitudinal** waves.

To 'compare', your answer should:

- Give **similarities.**
- Write **paired statements** that **show differences relating to the same feature**.
- Use the term '**whereas**' to link your statements.



Writing like a scientist

Answer the questions below.

1. What is a wave?

- [x] A. A wave is a way of transferring information or energy
- [ ] B. A wave is a way of transferring matter or energy
- [ ] C. A wave is a way of transferring information or energy through space

2. Which describes a transverse wave?

- [ ] A. The direction of vibrations is in the opposite direction to the direction of energy transfer
- [ ] B. The direction of vibrations is parallel to the direction of energy transfer
- [x] C. The direction of vibrations is perpendicular to the direction of energy transfer

3. Which describes how sound is produced in a guitar?

- [x] A. Vibrations in the guitar cause the air to vibrate, causing a sound wave
- [ ] B. Vibrations in the air cause the guitar to vibrate, causing a sound wave
- [ ] C. Vibrations in the guitar carry sound particles through the air

Exit ticket

Feedback

Lesson P3.3.2	
What was good about this lesson?	What can we do to improve this lesson?

Send us your feedback by clicking this link. Thank you!