

# 14.3 Boundary Behavior of Waves and Polarization

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_ Total: 9 marks

KEY WORDS polarization 偏振 • wave 波 • transverse 横波 • longitudinal 纵波

## Objective

Build the skills to answer exam questions on **boundary behaviour of waves and polarization**.

You must be able to:

- describe **reflection**, **transmission**, and **inversion** of a wave at a boundary
- describe **polarization** 偏振 and state which waves can be polarized
- explain why only transverse waves can be polarized

## 1 Worked examples

Study these first. Each one shows the method for a question type used later.

### ■ At a boundary

A wave reaching a boundary is partly **reflected** and partly **transmitted**. Reflecting off a **denser** medium (a fixed end) **inverts** the pulse; off a less dense medium (a free end) it does not.

### ■ Polarization

Polarization restricts the vibration to a single plane. Only **transverse** waves can be polarized, because their vibration is perpendicular to travel and so has a plane to restrict.

### ■ Why not sound

Sound is longitudinal — its vibration is along the direction of travel, so there is no plane to polarize.

## 2 Practice

2.1 State what happens to a wave pulse reflecting off a fixed (denser) end. [1]

2.2 State the two things that happen to a wave meeting a boundary between two media.[2]

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2.3 State which type of wave can be polarized. [1]

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## 3 Exam-style questions

3.1 A pulse reflecting from a fixed end is [1]

|   |   |
|---|---|
| A | B |
| C | D |

- A unchanged
- B inverted
- C absorbed completely
- D doubled in size

3.2 Only \_\_\_\_\_ waves can be polarized. [1]

|   |   |
|---|---|
| A | B |
| C | D |

- A longitudinal
- B transverse
- C sound
- D all

3.3 Light is passed through a polarizing filter.

(a) State what the filter does to the light. [1]

(b) Explain why sound cannot be polarized. [2]