

Total: 10 marks

Objective

You must be able to:

- define **frequency** 频率, **period** 周期, and **wavelength** 波长 of a periodic wave
- apply the **wave equation** 波速公式 $v = f\lambda$
- relate the wave speed to the properties of the medium

1 Worked examples

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

■ Definitions

- **Frequency** f — cycles per second (Hz).
- **Period** $T = \frac{1}{f}$ — time for one cycle.
- **Wavelength** λ — length of one full wave.

- The wave equation

$v = f\lambda$. The wave **speed** is set by the medium, so if f rises, λ falls to keep v fixed.

- Example

$f = 50 \text{ Hz}$ and $\lambda = 2.0 \text{ m}$ give $v = 100 \text{ m s}^{-1}$.

2 Practice

2.1 A wave has frequency 20 Hz and wavelength 1.5 m. Find its speed. [2]

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2.2 A wave has a period of 0.25 s. Find its frequency. [1]

2.3 State the wave equation. [1]

3 Exam-style questions

3.1 The wave equation is [1]

A	B
C	D

A $v = f/\lambda$

B $v = f\lambda$

C $v = \lambda/f$

D $f = v\lambda$

3.2 If the frequency of a wave doubles at constant speed, the wavelength [1]

A	B	A doubles
C	D	B halves
		C stays the same
		D quadruples

3.3 A sound wave travels at 340 m s^{-1} with a frequency of 170 Hz .

(a) Find the wavelength. [2]

(b) Find the period. [2]