Exam workout

waves

1 Describe: transverse vs longitudinal

Model answer

In a transverse wave, the oscillations are perpendicular to the direction of energy transfer. ✓

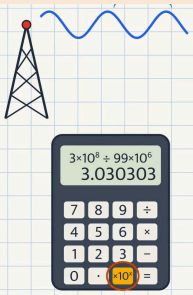
In a longitudinal wave, the oscillations are parallel to the direction of energy transfer. ✓ *2 marks*



- Transverse: the **oscillations are perpendicular to the direction of energy transfer**.
- Longitudinal: the **oscillations are parallel to the direction of energy transfer**. Use both phrases in full sentences.

2 Calculate: v = f λ with standard form

A radio station broadcasts at 99 MHz. Radio waves travel at 3 × 10⁸ m/s. Calculate the wavelength.



Knowns	$v = 3 \times 10^8$ m/s, $f = 99$ MHz
Convert	$f = 99$ MHz $= 99 \times 10^6$ Hz
Equation	$\lambda = v \div f$
Substitute	$\lambda = 3 \times 10^8 \div 99 \times 10^6$
Answer	$\lambda \approx 3.03$ m

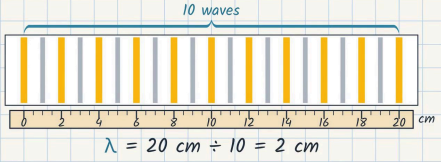
- **Convert first**: 99 MHz = 99 × 10^6 Hz. Rearrange: λ = v ÷ f.
- Use the calculator's **standard form key**: 3 × 10^8 ÷ 99 × 10^6 ≈ **3.03 m**.

3 Practical: measure across many waves

Model answer

Measure the length of ten waves with a ruler, then divide by ten. ✓

This reduces the error in measuring one small wave. ✓



λ = 20 cm ÷ 10 = 2 cm

- Measure the length of **ten waves** with a ruler, then **divide by ten** (20 cm ÷ 10 = 2 cm).
- This **reduces the error** compared with measuring one small wave.

4 Spectrum and Higher: refraction

1. *infrared* ✓
2. *they all travel at the same speed in a vacuum* ✓
   or: they're all transverse (also scores)

2 marks



- Between microwaves and visible light: **infrared**. All EM waves **travel at the same speed in a vacuum** (and are all transverse).
- Higher: light **slows down in glass**, one side of the wave front slows first, so the wave **changes direction**.

Exam tip

Describe waves with oscillations and the direction of energy transfer, convert units before you calculate, and measure across many waves.

Check yourself

- 1 A wave on a string has a frequency of 25 Hz and a speed of 10 m/s. What is its wavelength?

Answers: 1. λ = v ÷ f = 10 ÷ 25 = 0.4 m