OCR
Oxford Cambridge and RSA

Gateway Science Physics A

J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 25

25 (a) A crowd makes a Mexican wave.

A Mexican wave **starts** with people lifting and lowering their arms.

The Mexican wave **continues** by people, next to them, lifting and lowering their arms.

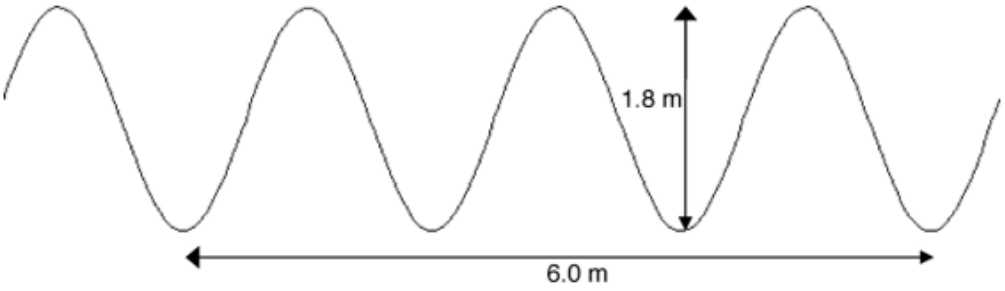
Why is a Mexican wave an example of a transverse wave?

The people (particles) move perpendicular to the wave's direction of travel.

[1]

(b) In the classroom a teacher demonstrates waves using a rope.

Look at the diagram of the wave



(i) The frequency of the wave is 2 Hz.

What does this statement mean?

Two full waves pass a given point every second.

[2]

(ii) How many seconds will it take for this wave to travel 12 m?

Show your working. 6 m = 3 waves
2m = 1 wave

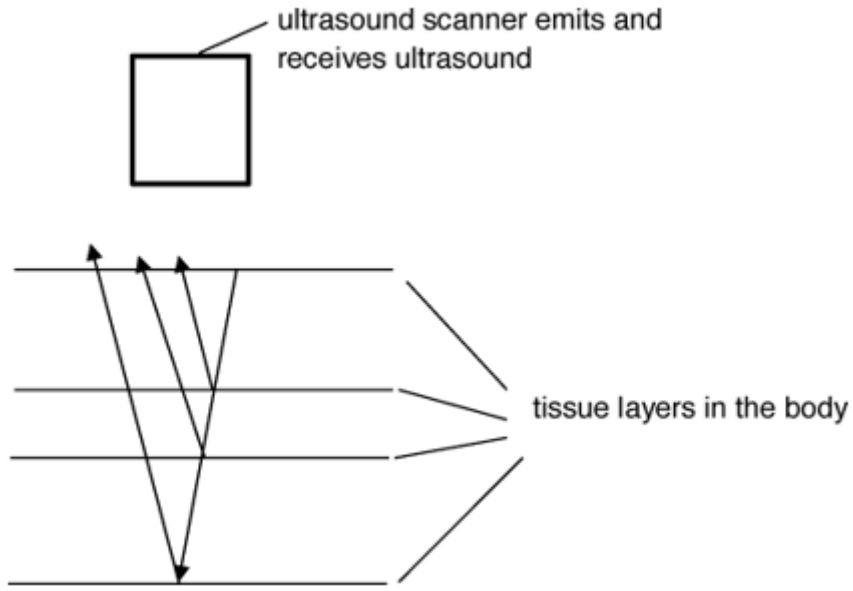
$V = f\lambda$
$V = 2 \times 2 = 4 ms^{-1}$

$V = \frac{d}{t}$
$t = \frac{d}{V} = \frac{12}{4} = 3s$

Answer = ... 3 ..... seconds

[3]

(c) Ultrasound scans are used to produce images of tissues inside the body.



Ultrasound waves are emitted.

The waves reflect from layers of tissue inside the body.

Explain how the reflections are used to produce an image of the tissues. **[3]**

A computer measures the time taken for the reflections to reach the ultrasound probe and calculates the distance the probe is from each tissue layer. The intensities of reflected ultrasound and the time taken for it to travel back provide information necessary to produce an image.

(d) Ultrasound and X-rays are used to scan patients in hospitals.

Complete the table to show a medical use, benefits and risk of using these waves to scan patients.

Wave	Medical use	Example of a benefit	Risk
X-rays	Shows up hard tissues inside the body.	Takes images of broken bones.	Damages living cells by causing:
Ultrasound	shows a live feed of soft tissue inside the body.	Provides a live video feed of a foetus.	None

[3]

Total Marks for Question Set 25: 12