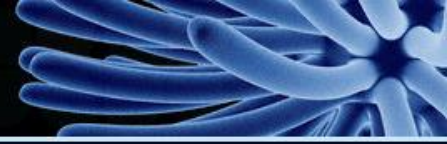


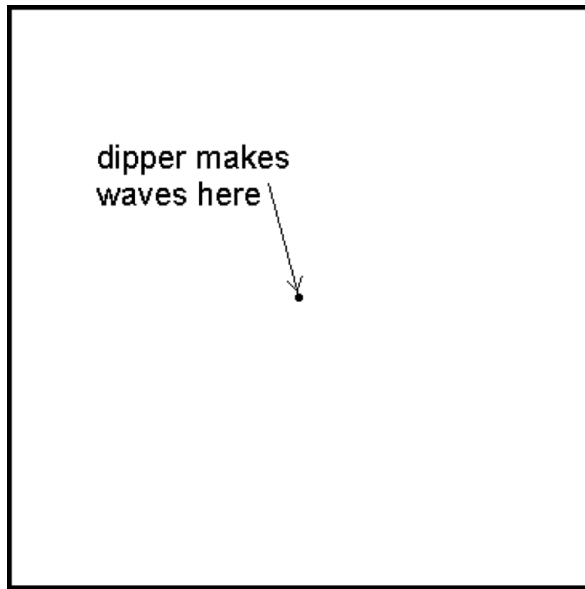
✓ Upgrade

Go to the next screen, and navigate from there using the links at the bottom of every screen.

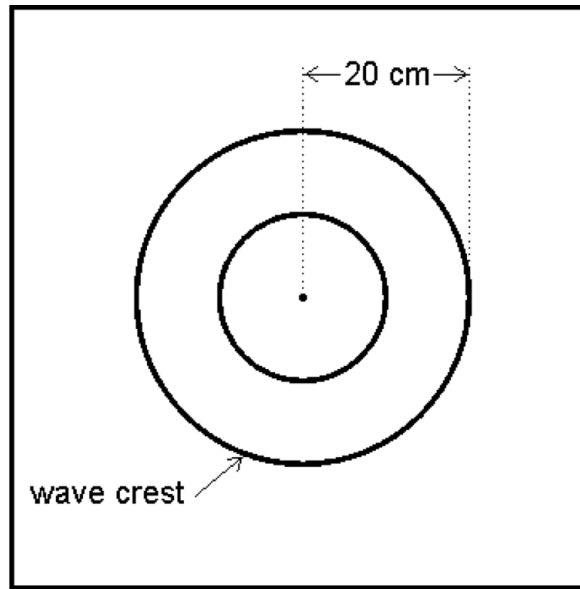


Question (part 1)

A dipper makes water waves in the middle of a ripple tank.
Two seconds later, two waves have spread out from the dipper.
The diagrams below show the view from above the ripple tank.



dipper starts making waves



two seconds later

[Question \(part 1\)](#)

[Question \(part 2\)](#)

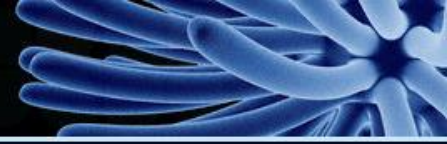
[Explanation of question \(part 1\)](#)

[Explanation of question \(part 2\)](#)

[G–E answer](#)

[✓ Upgrade to D–C answer](#)

[✓ Upgrade to B–A* answer](#)



Question (part 2)

(a) Explain why the frequency of the waves is 1 hertz.

.....
..... [1]

(b) Use the information on the second diagram to calculate the wavelength of the waves.

wavelength = cm [1]

(c) Use the equation

$$\text{speed} = \text{frequency} \times \text{wavelength}$$

to calculate the speed of the waves.

speed = cm/second [1]

Question (part 1)

Question (part 2)

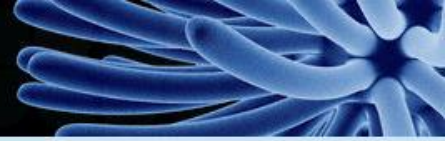
Explanation of question (part 1)

Explanation of question (part 2)

G–E answer

✓ Upgrade to D–C answer

✓ Upgrade to B–A* answer



Explanation of question (part 1)

In both parts, you need to interpret the 'before' and 'after' diagrams to see how many waves have been generated, and how far they have travelled, in the time given.

For (a), specification statement P1.2.20 states 'recall that the frequency of the waves, in hertz (Hz), is the number of waves each second that are made by the source, or that pass through any particular point'. You have to explain that 1 hertz (1 wave each second) will produce two waves in two seconds.

Question (part 1)

Question (part 2)

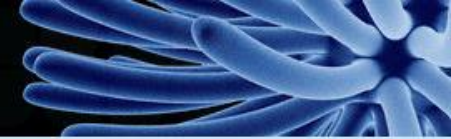
Explanation of question (part 1)

Explanation of question (part 2)

G–E answer

✓ Upgrade to D–C answer

✓ Upgrade to B–A* answer



Explanation of question (part 2)

For (b), specification statement P1.2.21 states 'recall that the wavelength of waves is the distance between the corresponding points on two adjacent cycles'. In this case the distance between wavecrests is half of 20 cm.

For (c), specification statement P1.2.24 states 'use the equation:

$$\text{wave speed} = \text{frequency} \times \text{wavelength}'$$

so wave speed = 1 Hz \times 10 cm = 10 cm/second.

(Note that specification statement P1.2.17, 'in relation to waves use the equation:

$$\text{distance} = \text{speed} \times \text{time}'$$

can also be used here, but the equation needs to be rearranged.)

Question (part 1)

Question (part 2)

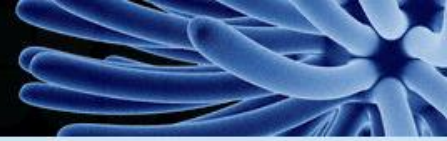
Explanation of question (part 1)

Explanation of question (part 2)

G–E answer

✓ Upgrade to D–C answer

✓ Upgrade to B–A* answer



G–E answer

- (a) Frequency is how often it happens.
- (b) wavelength = 20 cm
- (c) speed = $1 \times 20 = 20$ cm/second

✓ Upgrade comment

- (a) is not enough – it has to be ‘per second’ or ‘in one second.’
- (b) has not spotted that 20 cm is *two* wavelengths.
- (c) Although the answer is wrong, ‘error carried forward’ means that you are not penalised twice. The wrong wavelength lost the mark in (b), but in (c) you are allowed to use your own answer from part (b).

The E/F/G candidate has a basic understanding of waves, but lacks detailed knowledge. Calculation can be done well if the equation is given and it does not need to be rearranged.

Mark total: 1/3

Question (part 1)

Question (part 2)

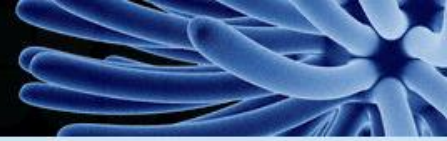
Explanation of question (part 1)

Explanation of question (part 2)

G–E answer

✓ Upgrade to D–C answer

✓ Upgrade to B–A* answer



D–C answer

(a) Frequency is how many waves there are every second.

(b) Two waves are 20 cm, so they must be 10 cm each.

(c) speed = 10 cm/second

The C/D candidate shows clear understanding of waves and can do the calculations required.

Upgrade comment

(a) and (b) each get the mark. Notice that the definitions do not have to be word-for-word the same as the specification or the book, but they have to show the meaning is clearly understood.

In (c), although it is good to show working, a correct answer with no working does get full credit.

Mark total: 3/3

Question (part 1)

Question (part 2)

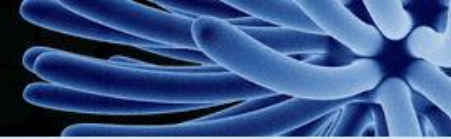
Explanation of question (part 1)

Explanation of question (part 2)

G–E answer

Upgrade to D–C answer

Upgrade to B–A* answer



B–A* answer

Not applicable in Foundation Tier.

This question is targeted at the middle of the C–G range covered in a Foundation Tier paper.

[Question \(part 1\)](#)

[Question \(part 2\)](#)

[Explanation of question \(part 1\)](#)

[Explanation of question \(part 2\)](#)

[G–E answer](#)

[✓ Upgrade to D–C answer](#)

[✓ Upgrade to B–A* answer](#)