O Level Combined Physics Structured

General Wave Properties Test 1.0

Q1

Fig. 5.1 shows sea waves approaching a beach at a speed of 1.5 m/s. Two complete waves hit the sand every 10 s.

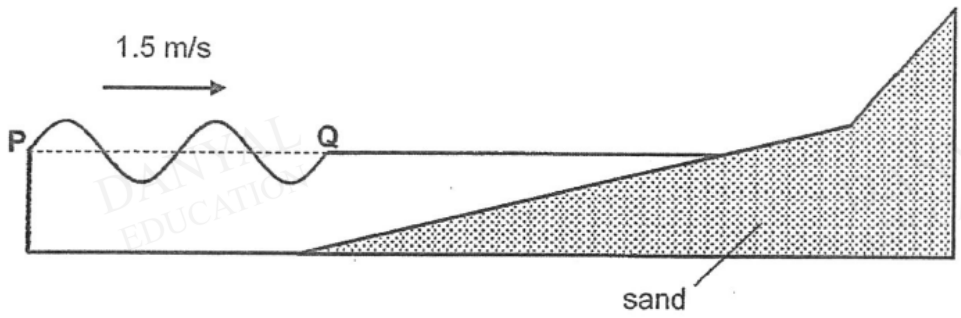

Fig. 5.1

(a) Determine the frequency of the wave.

frequency = ...[1]

(b) Calculate the wavelength of the wave between P and Q.

wavelength = ...[2]

(c) Determine the distance between P and Q.

distance = ...[1]

Q2

Fig. 6.1 shows three waves A, B and C. They travel 12.0 meters in 2.0 s through the same medium.

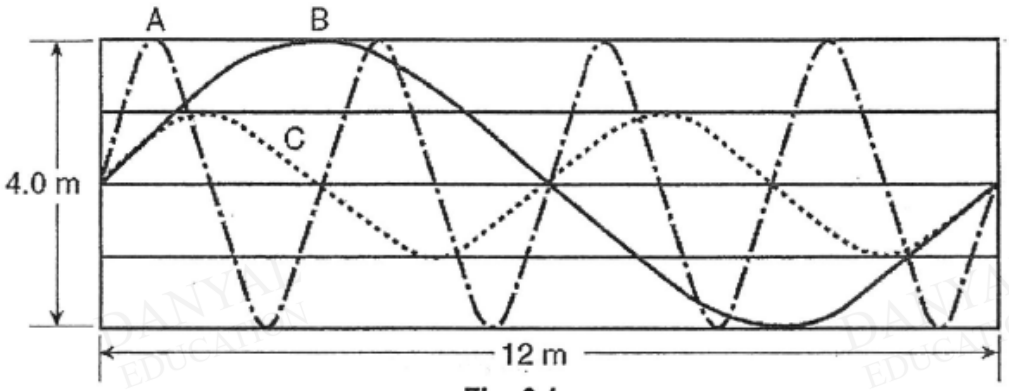

Fig. 6.1

(a) Calculate the wavelength of wave A.

wavelength = _____ m [1]

(b) Determine the period of wave B.

period = _____ s [1]

(c) Calculate the speed of wave C.

speed = _____ ms^{-1} [1]

Q3

Fig 6.1 shows the top view of a transverse water wave that travels a distance 22 m from A to **B** in 1.5 s. A particle X is on the wavefront A.

Fig 6.2 shows the front view of particle X.

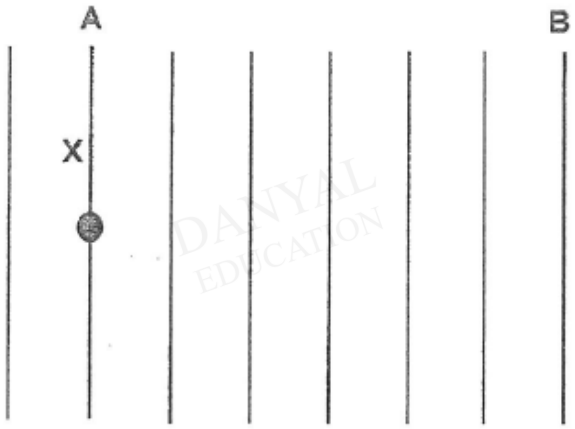

Fig 6.1

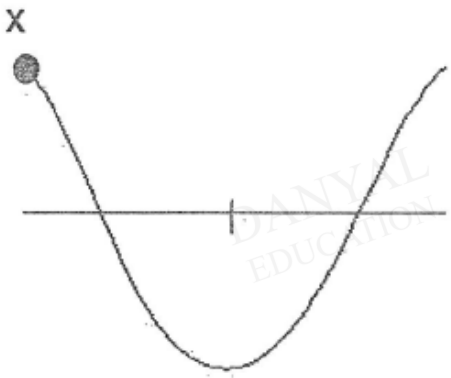

Fig 6.2

(a) State what is meant by the term wavefront.

.....

..... [1]

(b) Explain why the water wave is considered a transverse wave.

.....

..... [1]

(c) Calculate the velocity, wavelength and frequency of the wave.

velocity = ... m/s

wavelength = ... m

frequency = ... Hz [3]

Q4

Fig. 7.1 shows the displacement-time graph of a wave.

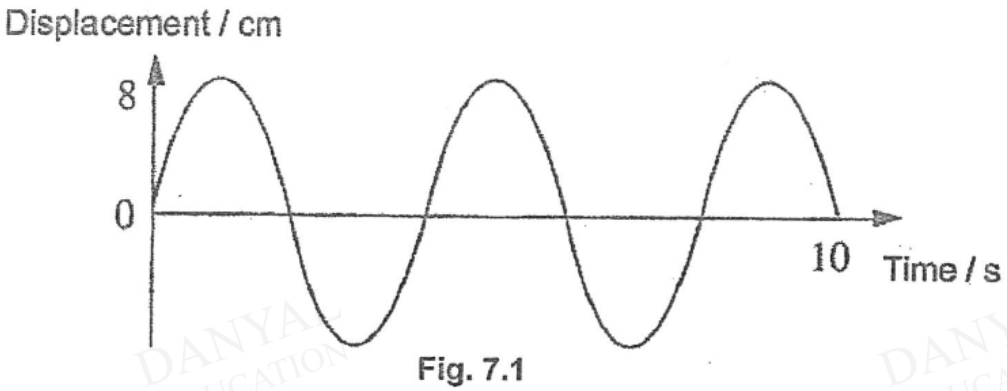

Fig. 7.1

Determine

(a) the frequency of the wave, and

frequency = ... [2]

(b) the speed of the wave if the wavelength is 6.0 m.

speed = ... [1]

Q5

a) **Fig. 11.1** shows a student setting up waves on a long elastic cord.

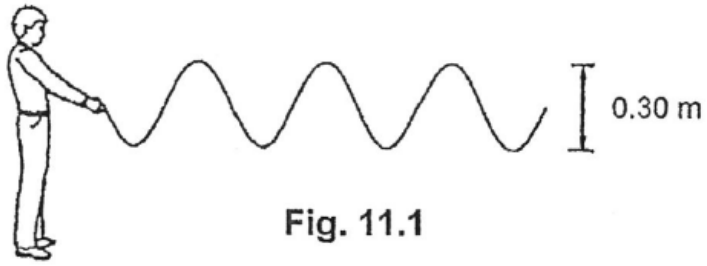

Fig. 11.1

The student's hand makes one complete up-and-down movement in 0.40 s. In each up-and-down movement, the hand moves through a height of 0.30 m. The wavelength of the waves on the string is 0.80 m.

For each wave, determine

i) the amplitude, [1]

ii) the frequency, [2]

iii) the speed. [2]

Answers

General Wave Properties Test 1.0

Q1

(a)	Frequency =	2/10	=	0.20 Hz		A1
(b)	$\lambda = \frac{v}{f}$	=	1.5/0.2		Allow ECF from (a)	C1
		=	7.5 m			A1
(c)	d =	2 x 7.5	=	15 m	Allow ECF from (b)	A1

Q2

Fig. 6.1 shows three waves A, B and C. They travel 12.0 meters in 2.0 s through the same medium.

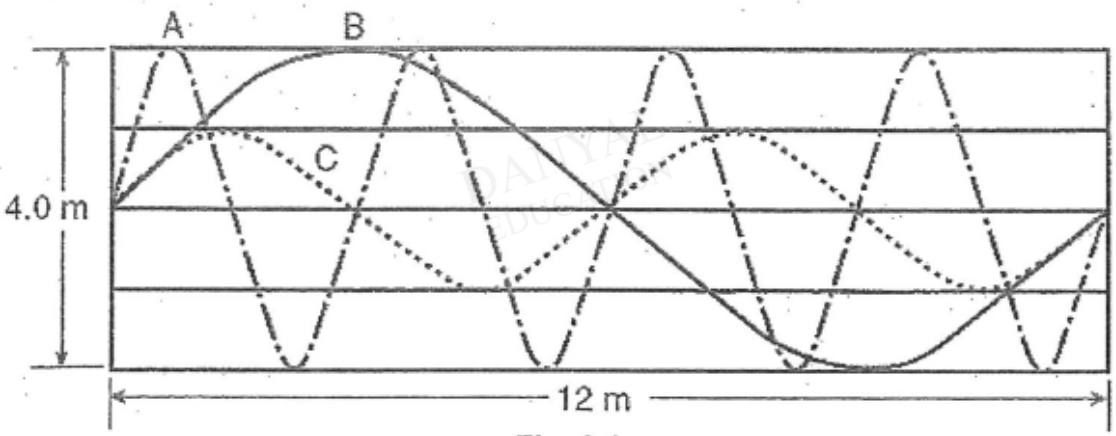

Fig. 6.1

(a) Calculate the wavelength of wave A.

wavelength of A = 12 / 4
= **3.0 m** [A1]

wavelength = _____ m [1]

(b) Determine the period of wave B.

Period of B = 2.0 s [A1]

period = _____ s [1]

(c) Calculate the speed of wave C.

Speed of C = d / t
= 12.0 / 2.0
= 6.0 m/s [A1]

speed = _____ ms^{-1} [1]

Q3

3a	The imaginary line through all points on a wave that are in phase	1
b	The water particle moves in a direction perpendicular to the direction of wave motion	1
c	v = d/ t = 22/1.5 = 14.7 m/s	1
	wavelength = 22/6 = 3.67 m	1
	frequency = velocity / wavelength = 14.7/3.67 = 4.0 Hz	1

Q4

4a $f = 1/T$
$= 1/ 4.0$
$= 0.25$ Hz

4b $v = f\lambda$
$= 0.25$ Hz × 6.0 m
$= 1.5$ ms^{-1}

Q5

a) i) 0.15m

ii) $f = 1/T \rightarrow f = 1/0.4 = 2.5$ Hz

iii) $V = f\lambda \rightarrow V = 2.5 \times 0.8 = 2$ m/s