4.2 Travelling Waves

Question Paper

Course	DP IB Physics
Section	4. Waves
Topic	4.2 Travelling Waves
Difficulty	Hard

Time allowed: 20

Score: /10

Percentage: /100

Question 1

The intensity, I, of a sound wave is inversely proportional to the square of the distance, d, from the source and directly proportional to the square of the amplitude, A.

At distance d from the point source of a sound wave, the amplitude of the wave is $6A$.

What is the amplitude at a distance of $3d$?

A. $\frac{1}{3}A$

B. $2A$

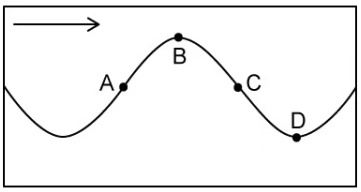
C. $3A$

D. $6A$

[1 mark]

Question 2

The diagram shows a cross-sectional view through a water wave travelling from left to right.



At which point is the water moving with maximum speed in the upward direction?

[1 mark]

Question 3

The table below contains the frequencies of various parts of the electromagnetic spectrum.

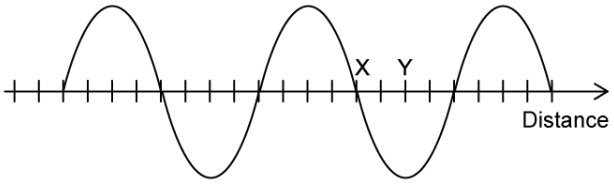
Which row correctly describes X as infrared and Y as X-rays?

	X	Y
A.	3×10^5 Hz	3×10^{20} Hz
B.	3×10^{10} Hz	3×10^{16} Hz
C.	3×10^{18} Hz	3×10^{14} Hz
D.	3×10^{14} Hz	3×10^{19} Hz

[1 mark]

Question 4

The diagram shows a wave with a frequency of 25 Hz travelling from left to right.



At this particular instant in time, the displacement from the equilibrium position of point X is zero.

What is the shortest time to elapse for the displacement of point Y to be zero?

A. 0.005 s

B. 0.01 s

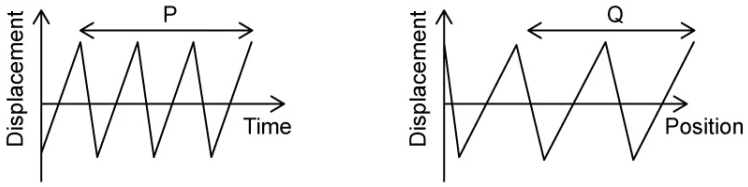
C. 0.05 s

D. 0.10 s

[1 mark]

Question 5

The graphs below show the displacement of a wave as a function of time and position.



What is a correct expression for wave speed?

A. $\frac{2PQ}{3}$

B. $\frac{3PQ}{2}$

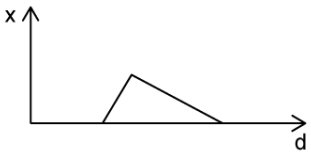
C. $\frac{2Q}{3P}$

D. $\frac{3Q}{2P}$

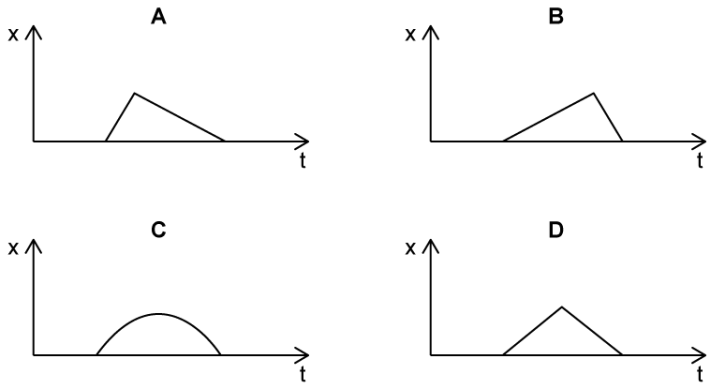
[1 mark]

Question 6

The graph shows the displacement, *x*, of a wave pulse as a function of distance, *d*.



Which graph correctly shows the displacement of the wave pulse as a function of time, *t*?



[1 mark]

Question 7

The star Deneb emits EM waves of wavelengths 500 μm, 5 μm, 0.5 μm and 0.005 μm.

Which row correctly identifies the areas of the EM spectrum to which these wavelengths belong?

	500 μm	**5 μm**	**0.5 μm**	**0.005 μm**
A.	Microwave	Infrared	Visible	Ultraviolet
B.	Radio	Microwave	Infrared	Visible
C.	Infrared	Visible	Ultraviolet	X-ray
D.	Microwave	Infrared	Ultraviolet	Gamma

[1 mark]

Question 8

Visible light has wavelengths ranging from 400 nm to 700 nm.

What is the maximum frequency of visible light?

A. 3×10^{-18} Hz

B. 7.5×10^{-18} Hz

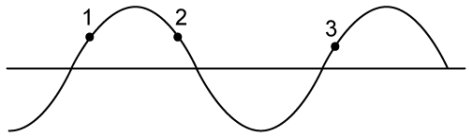
C. 3×10^{-16} Hz

D. 7.5×10^{-14} Hz

[1 mark]

Question 9

The diagram shows the positions of three points on a string as a transverse wave travels along it from left to right.



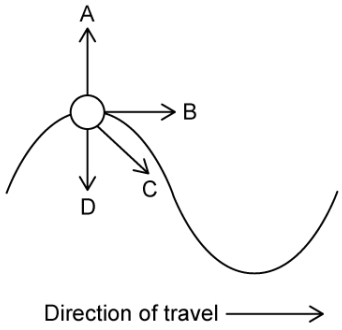
Which row correctly shows the velocities of the points on the string?

	1	2	3
A.	↓	↓	↓
B.	↑	↑	↓
C.	↑	↓	↑
D.	↓	↑	↓

[1 mark]

Question 10

The diagram below shows a water particle on the crest of a wave in a ripple tank.



Which arrow correctly shows the force acting on the particle?

[1 mark]