Year 12 Physics 2011

<u>Wave Phenomena Unit Test</u>

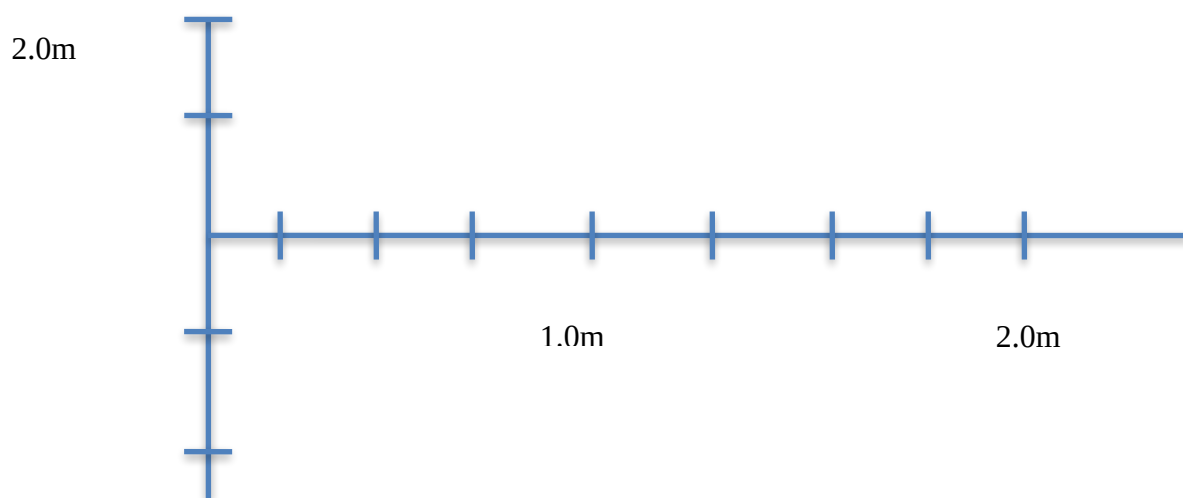| Name:	Mark: / 50
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Notes to Students:

You must include **all** working to be awarded full marks for a question.

Marks will be deducted for incorrect or absent units.

Marks will be deducted for incorrect numbers of significant figures.

1. a) On the axis below draw two complete waves of amplitude 2.00m and wavelength of 1.00 m.

2.0m

1.0m   2.0m

[2]

b) If the speed of the wave is 420 ms^{-1} Calculate the frequency of the wave.

[2]

c) What is the period of the wave?

[2]

2. A small moth of size 0.80cm is flying in front of a bat. What is the lowest frequency that the bat needs to emit to be able to see the moth?

[3]

3. a) The pilot of a twin engine Cessna has one engine running at 3100rpm notices that the engines are making a throbbing sound with a frequency of 5 Hz. What is he experiencing and how can you explain this phenomena.

[2]

b) If the pilot increases the revs slightly of the other engine he notices that the throbbing is more frequent. What are the revs of the second engine.

[3]

4. A brass tube stands vertically in a tall jar of water so that it's top is level with the water surface. The tube is raised vertically and a

continuously vibrating tuning fork is held above the open end. A second resonance point is heard when the tube is raised 0.293 m from the position of the first point of resonance. If the speed of sound in air is 346ms^{-1}, find the frequency of the tuning fork.

[3]

5. You are waiting on the terminating road at a 'T' junction giving way to an ambulance which is travelling towards you and then continues past you on it's way with sirens sounding.

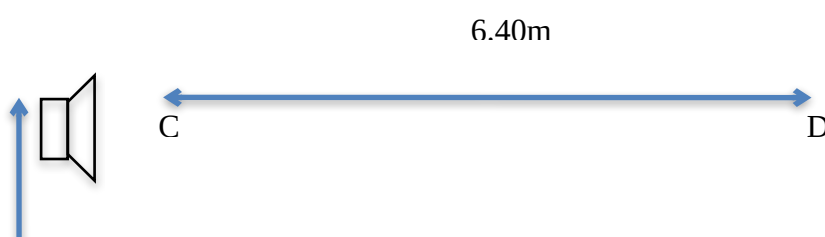a) What do you notice about the siren through it's journey?

[2]

b) What is the name of this phenomena?

[2]

c) Explain what causes this change in sound that is heard as the ambulance moves.

[3]

6. Two load speakers are connected in phase and are both emitting sounds of 360 Hz. If the speakers are 2.50 m apart assuming the speed of sound is 346 ms^{-1}

6.40m

C   D

a) find the wavelength of the wave?

[2]

b) Describe what the person would hear if they walked from A to B.

[3]

c) Describe what the person would hear if they walked from C to D.

[3]

d) If the person started walking from just in front of the speaker on the line CD a distance of 6.40 m what would they hear?
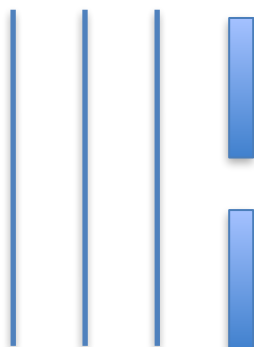
[3]

7. The latest trend in radio controlled models is using 2.4 GHz transmitters as this band allows multiple users with minimal interference. Calculate the wavelength that these transmitters would use as a carrier wave.
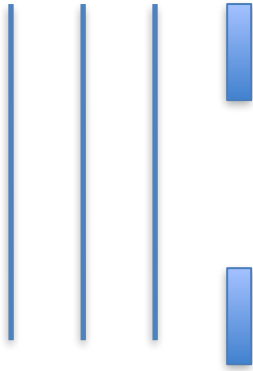
[3]

8. Complete the following diagrams indicating the transmitted wave.

a)

b)

9. Define the following

a) Forced vibration

[2]

b) natural frequency

[1]

c) resonance

[2]

10. An open pipe will need to be how long for the air column in the pipe to resonate at its 3rd harmonic if the vibrating source is 250 Hz?

[3]