NAME_____

Electromagnetic Waves Assignment

1. Draw a diagram of an electromagnetic wave, indicating the relationship between the direction of oscillation of the electric field, the direction of oscillation of the magnetic field, and the direction of travel of the wave.

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2. A horde of rampaging pteranodons has taken control of a local radio station. They plan to transmit their cretaceous propaganda to the unsuspecting populace. During their swooping reconnaissance they noted that most people have their radio antennae oriented vertically.

a) State and explain which orientation the pteranodons should choose for their transmitting antennae in order to give people the clearest signal.

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b) State the plane of polarisation of the emitted waves.

/1

c) If the electrons in the antennae are vibrating at 9.01×10^{7} Hz, state the frequency of the emitted waves.

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d) Calculate the wavelength of the emitted waves in air, given the speed of light in air is 3.00×10^{8} ms^{-1}.

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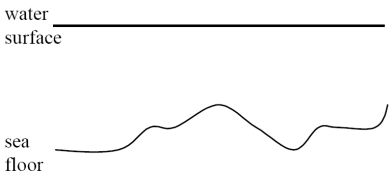
3. Explain why transmissions from some country television channels are polarised at right angles to city channels.

/2

4.

a) Explain with the aid of a copied and completed version of the diagram below how the depth of a body of water can be determined by the detection of reflections of laser light from the surface and the bottom of the water.



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b) Calculate the depth of water if reflections from the surface and the bottom of a lake are detected after a delay of 2.61 μs and 2.89 μs respectively, where 1 μs = 1×10^{-6} s. The speed of the light in water is 2.25×10^{8} ms^{-1}.

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c) Justify the use of powerful lasers in the LADS.

/2

TOTAL /20