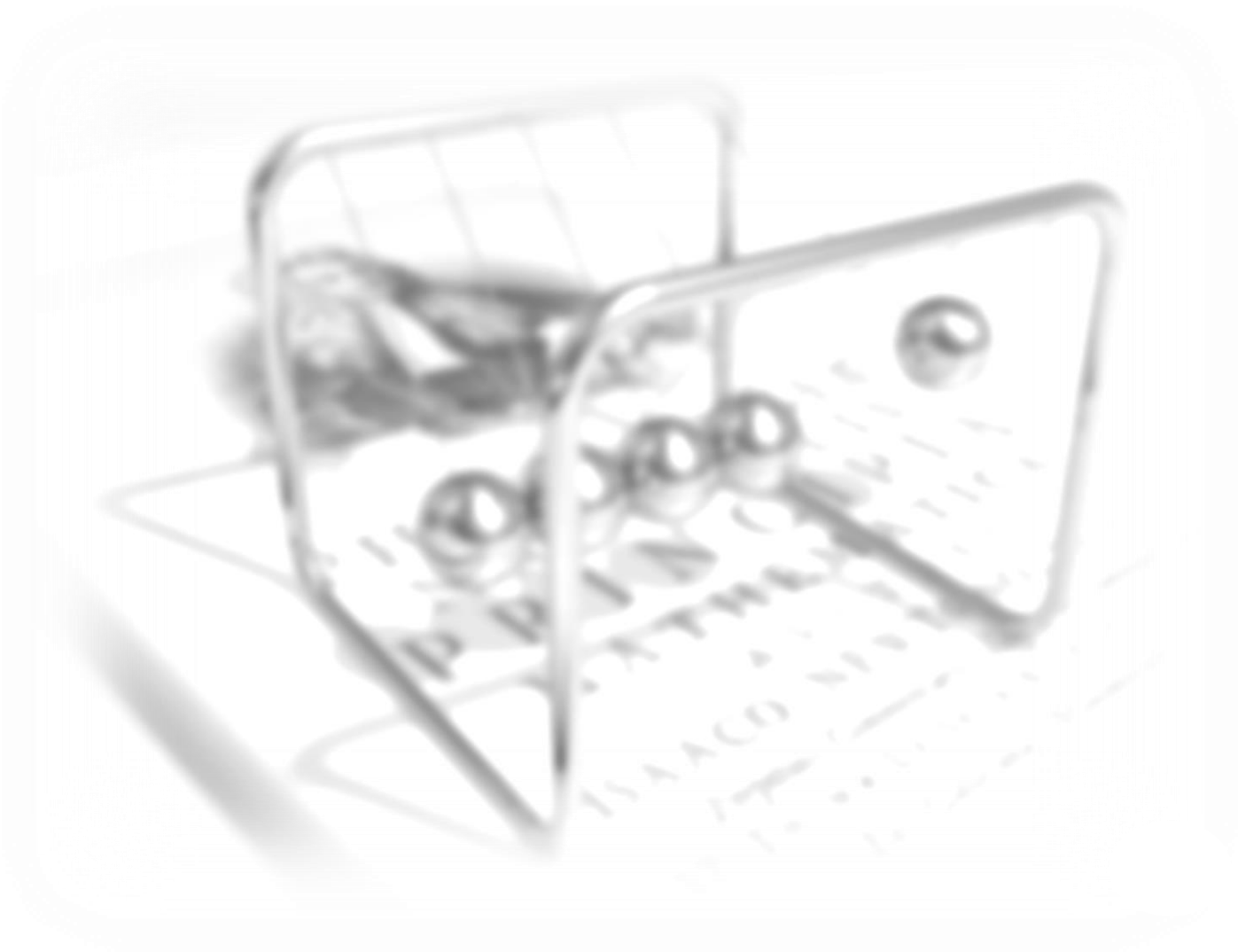
Name:

PHYSICS

Topics 4 & 5

LEARNING OUTCOMES



Maintain a record of your progress

Use the booklet to guide revision

Close the Gap

Contemporary record of the Topics / Learning outcomes that I am finding toughest:

Topic 4 - Waves

4.1	Recall that waves transfer energy and information without transferring matter	☹ 😐 ☺
4.2	Describe evidence that with water and sound waves it is the wave and not the water or air itself that travels	☹ 😐 ☺
4.3	Define and use the terms frequency and wavelength as applied to waves	☹ 😐 ☺
4.4	Use the terms, amplitude, period and wave velocity as applied to waves	☹ 😐 ☺
4.5	Describe the difference between longitudinal and transverse waves by referring to sound, electromagnetic, seismic and water waves	☹ 😐 ☺
4.6	Recall and use both the equations below for all waves: wave speed = frequency × wavelength wave speed = distance ÷ time	☹ 😐 ☺
4.7	Describe how to measure the velocity of sound in air and ripples on water surfaces	☹ 😐 ☺
4.8	Calculate depth or distance from time and wave velocity	☹ 😐 ☺
4.9	Describe the effects of a reflection b refraction c transmission d absorption of waves at material interfaces	☹ 😐 ☺
4.10	Explain how waves will be refracted at a boundary in terms of the change of direction and speed	☹ 😐 ☺
4.11	Recall that different substances may absorb, transmit, refract or reflect waves in ways that vary with wavelength	☹ 😐 ☺
4.12	Describe the processes which convert wave disturbances between sound waves and vibrations in solids, and a explain why such processes only work over a limited frequency range b use this to explain the way the human ear works	☹ 😐 ☺
4.13	Recall that sound with frequencies greater than 20 000 hertz, Hz, is known as ultrasound	☹ 😐 ☺
4.14	Recall that sound with frequencies less than 20 hertz, Hz, is known as infrasound	☹ 😐 ☺
4.15	Explain uses of ultrasound and infrasound, including a sonar b foetal scanning c exploration of the Earth's core	☹ 😐 ☺
4.16	Describe how changes, if any, in velocity, frequency and wavelength, in the transmission of sound waves from one medium to another are inter-related	☹ 😐 ☺
4.17	Core Practical: Investigate the suitability of equipment to measure the speed, frequency and wavelength of a wave in a solid and a fluid	☹ 😐 ☺

Topic 5 – Light and the electromagnetic spectrum

5.1	Explain, with the aid of ray diagrams, reflection, refraction and total internal reflection (TIR), including the law of reflection and critical angle	☹ 😐 ☺
5.2	Explain the difference between specular and diffuse reflection	☹ 😐 ☺
5.3	Explain how colour of light is related to a differential absorption at surfaces b transmission of light through filters	☹ 😐 ☺
5.4	Relate the power of a lens to its focal length and shape	☹ 😐 ☺
5.5	Use ray diagrams to show the similarities and differences in the refraction of light by converging and diverging lenses	☹ 😐 ☺
5.6	Explain the effects of different types of lens in producing real and virtual images	☹ 😐 ☺
5.7	Recall that all electromagnetic waves are transverse, that they travel at the same speed in a vacuum	☹ 😐 ☺
5.8	Explain, with examples, that all electromagnetic waves transfer energy from source to observer	☹ 😐 ☺
5.9	Investigate refraction in rectangular glass blocks in terms of the interaction of electromagnetic waves with matter	☹ 😐 ☺
5.10	Recall the main groupings of the continuous electromagnetic spectrum including (in order) radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, x-rays and gamma rays	☹ 😐 ☺
5.11	Describe the electromagnetic spectrum as continuous from radio waves to gamma rays and that the radiations within it can be grouped in order of decreasing wavelength and increasing frequency	☹ 😐 ☺
5.12	Recall that our eyes can only detect a limited range of frequencies of electromagnetic radiation	☹ 😐 ☺
5.13	Recall that different substances may absorb, transmit, refract or reflect electromagnetic waves in ways that vary with wavelength	☹ 😐 ☺
5.14	Explain the effects of differences in the velocities of electromagnetic waves in different substances	☹ 😐 ☺
5.15	Explain that all bodies emit radiation, that the intensity and wavelength distribution of any emission depends on their temperature	☹ 😐 ☺
5.16	Explain that for a body to be at a constant temperature it needs to radiate the same average power that it absorbs	☹ 😐 ☺
5.17	Explain what happens to a body if the average power it radiates is less or more than the average power that it absorbs	☹ 😐 ☺
5.18	Explain how the temperature of the Earth is affected by factors controlling the balance between incoming radiation and radiation emitted	☹ 😐 ☺
5.19	Core Practical: Investigate how the nature of a surface affects the amount of thermal energy radiated or absorbed	☹ 😐 ☺
5.20	Recall that the potential danger associated with an electromagnetic wave increases with increasing frequency	☹ 😐 ☺
5.21	Describe the harmful effects on people of excessive exposure to electromagnetic radiation, including:	☹ 😐 ☺

	a microwaves: internal heating of body cells b infrared: skin burns c ultraviolet: damage to surface cells and eyes, leading to skin cancer and eye conditions d x-rays and gamma rays: mutation or damage to cells in the body	
5.22	Describe some uses of electromagnetic radiation a radio waves: including broadcasting, communications and satellite transmissions b microwaves: including cooking, communications and satellite transmissions c infrared: including cooking, thermal imaging, short range communications, optical fibres, television remote controls and security systems d visible light: including vision, photography and illumination e ultraviolet: including security marking, fluorescent lamps, detecting forged bank notes and disinfecting water f x-rays: including observing the internal structure of objects, airport security scanners and medical x-rays g gamma rays: including sterilising food and medical equipment, and the detection of cancer and its treatment	☹ 😐 ☺
5.23	Recall that radio waves can be produced by, or can themselves induce, oscillations in electrical circuits	☹ 😐 ☺
5.24	Recall that changes in atoms and nuclei can a generate radiations over a wide frequency range b be caused by absorption of a range of radiations	☹ 😐 ☺

Notes:

You must know, and be able to use, these equations:

wave velocity = frequency x wavelength

$v = f \times \lambda$

metres per second (m/s) = hertz (hz) x metres (m)

wave velocity = distance / time

$v = x / t$

metres per second (m/s) = metres (m) / seconds (s)