IB Physics

Topic 4 – Waves and Simple Harmonic Motion

Block	Class	Due on this class
	•Intro to Simple Harmonic Motion (SHM) •Conservation of energy •Period and frequency	**Read:** 11.1-2
	•Sinusoidal Nature of SHM Demo •Rotational Analog to SHM •Resonance (Intro/Film) •Resonance Demos •Destroying the school	**Read:** 11.3,5,6 **Check:** (T4.1)11:1, 2(130 N/m), 3, 4(680 N/m, 2.5 cm, 2.5 Hz,), 6(.095 N/m, 2.2 Hz) & Schaum's 14:1, 2, 3, 4
	•More Resonance •Simple Pendulums •Work on SHM Problems	**Read:** 11.4 **Check:** (T4.1)11:8(3.8 Hz), 9, 13 & Schaum's 14:7
	•Anatomy of a wave •Frequency, wavelength and velocity •Types of waves •Energy transport •Position-time graphs	**Read:** 11.7-9 **Check:** (T4.1)11:14(.489 s, 2.04 Hz, .215 m, 35.5 m/s/s, (.215m)sin[(12.8 s^{-1})t], 2.86 J), 17, 18(.35m, .875 Hz, 1.14 s, .74 J, .68 J, .06 J), 19, 28(1.4 s, .72 Hz), 29
	•**Quiz on SHM** •Incidence and reflection •The principle of Superposition	**Read:** 11.11, 23.2 **Check:** (T4.1)11:21, 26(136 N/m, 20.3 m)& Schaum's 14: 8, 9 **Turn In PS T4.1**: **(**11:1, 2, 3, 4, 6 & S14:1, 2, 3, 4**), (**11:8, 9, 13 & S14:7**), (**11:14, 17, 18, 19, 28, 29**), (**11:21, 26 & S14: 8, 9**)**[1]
	•Interference/Two source patterns •Standing waves	**Read:** 24.1-3[2] **Read:** 11.12, 12.7 **Check:** (T4.2)11:34(2.8 m/s), 35, 51, 53 & Schaum's 23: 20,21
	•Standing waves •Waves on a string •Characteristics of sound	**Read:** 11.12, 12.1,5,6 **Check:** (T4.2)12:48(343 Hz, 1030 Hz, 1715 Hz) & Schaum's 23: 23
	•Making sound •Resonant modes and standing waves •Beat formation •Sound, Standing waves and Music: Beware of the undertone	**Read:** 12.5,7 **Check:** (T4.2)11:39, 41, 42(1900 km, cannot be determined), 55, 56(70 Hz), 57 12:1, 3, 5(use 2950 m/s for speed of sound in concrete)
	•Diffraction •Bats •Description of Sound lab	**Read:** 11.13 **Check:** (T4.2)12:26(87 N), 27, 28(.66 m), 29, 42(.50 Hz), 43, 44(28.5 kHz), 45
	•Speed of sound lab - An eclectic group project	**Check:** Your lab plan
	•The Doppler effect •Shock waves	**Read:** 12.8,9 **Check:** (T4.2)12:30(8.6 mm<L<8.6 m), 31, 33, 35, 36(closed, 88 Hz), 37, 38(open, 4.3 m), 49
	•**Quiz** on Chapter 12 •Properties of Electromagnetic waves •Refraction in one and two dimensions •Refractive index and wavelength: dispersion	**Read:** 11.13, 22.3,5, 24.2,4, 23.4,5 **Check:** (T4.3)12:39, 51, 52(43,200 Hz), 53, 54(120 Hz), 55 **Turn In PS T4.2: (**11:34, 35, 51, 53 & S23: 20,21**), (**12:48 & S23: 23**), (**11:39, 41, 42, 55, 56, 57 12:1, 3, 5**), (**12:26, 27, 28, 29, 42, 43, 44, 45**), (**12:30, 31, 33, 35, 36, 37, 38, 49**)**
	•Solving refraction problems •Total internal reflection and critical angle	**Read:** 11.13, 24.2,4, 23.4,5,6 **Check:** (T4.3)12:57, 60(5.8 m/s), 63
	•Young's double slit experiment	**Read:** 24.3 **Check:** (T4.3)12:77, 86(55.39 kHz), 23:26(1.97x10^8 m/s, 1.99x10^8 m/s), 27, 30(36°), 31, 40(61.7°, Lucite)
	•Diffraction gratings •Thin film interference and blowing bubbles (Qualitative) •Polarisation (Qualitative)	**Read**: 24.5, 8, 10 **Check:** (T4.3)12:73, 78(12.3 m/s), 23:32(41°), 33, 41, 24:2(1.1x10^{-6} m), 3, 4(440nm, 6.82x10^{14}Hz), 5
	Test on Topic 4	**Turn In PS T4.3: (**12:39, 51, 52, 53, 54, 55**), (**12:57, 60, 63 **), (**12:77, 86, 23:26, 27, 30, 31, 40**), (**12:73, 78, 23:32, 33, 41, 24:2, 3, 4, 5**)** **Turn In:** Speed of sound (EV, Pla, Plb)

[1]The Schaum's problems are part of other problem sets (T4.1, T4.2, …) Don't turn them in separately.

[2] Yes – this is not a typo. Chapter 24 starts on page 723. We jump around a bit in this chapter.