Year 12 Science: Wave behaviour: reflection, refraction, diffraction and interference

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. A wave has a frequency of 4.0 Hz and a wavelength of 0.60 m. Find its speed.

2. Find the period of that wave.

3. Find the wavelength of a 2.4 GHz Wi-Fi signal.

4. Water waves travel at 0.30 m s^{-1} in deep water and 0.20 m s^{-1} in shallow water. They meet the boundary at 30° to the normal. Find the angle in the shallow water.

5. Two dippers in phase make waves with λ = 2.0 cm. A point is 9.0 cm from one dipper and 12.0 cm from the other. Is it on a nodal or an antinodal line?

Exam-style question: swell at a marina

Ocean swell with a period of 8.0 s and a wavelength of 100 m rolls towards a marina. The breakwater has a 12 m wide entrance, and the water inside gets shallower towards the boat ramp.

6. Calculate the speed of the swell.

7. Describe what happens to the waves as they pass through the entrance, and why.

8. Inside, the water gets shallower. Explain what happens to the speed, frequency, wavelength and amplitude of the waves.

9. A second entrance is opened further along the breakwater. Explain why boats at some moorings now rock a lot while boats at others hardly move.

Fix the mistake

10. Correct this statement: "The waves slow down in shallow water, so their frequency goes down."

11. Correct this statement: "Diffraction through the gap makes the wavelength longer."

12. Correct this statement: "A nodal line is where the crests from both sources meet."

13. Correct this statement: "12 waves in 4.0 s, 2.5 cm apart: $v = 3.0 \times 2.5 = 7.5\ m\ s^{-1}$."