7 Waves – Part 2 — Answers

Answers

7.1 $I = \dfrac{P}{4\pi r^2} = \dfrac{100}{4\pi(5.0)^2} \approx 0.32$ W m^{-2}.

7.2 Intensity becomes $2^2 = 4$ times larger ($I \propto A^2$).

7.3 180° (i.e. π radians) — exactly out of phase.

7.4 Moving away → plus sign: $f_o = \dfrac{340 \times 500}{340 + 25} = \dfrac{170000}{365} \approx 466$ Hz.

7.5 Intensity becomes $\frac{1}{4}$ as large ($I \propto 1/r^2$).

7.6 As the siren approaches, the wavefronts are bunched up, so you hear a higher frequency; once it passes and moves away, the wavefronts are stretched, so the frequency you hear drops. The change happens as it goes by.

7.7 Moving away. A longer wavelength (lower frequency) is what the Doppler effect gives when the source recedes — so the star is moving away from us.