

## 7 Waves – Part 2 —Answers

---

### Answers

---

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

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

**7.3**  $180^\circ$  (i.e.  $\pi$  radians) —exactly out of phase.

**7.4** Moving away  $\rightarrow$  plus sign:  $f_o = \frac{340 \times 500}{340 + 25} = \frac{170000}{365} \approx 466 \text{ Hz}.$

**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.