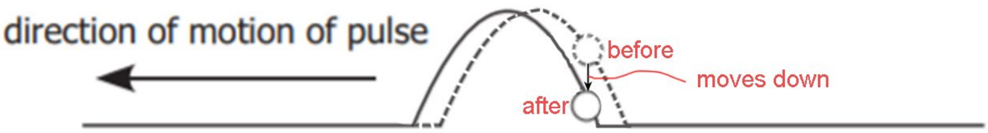
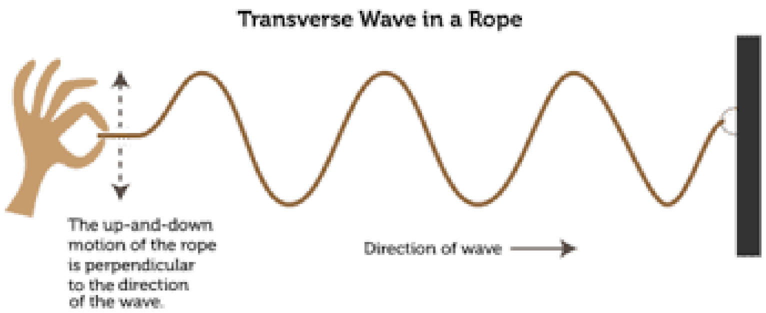
Assess Quizzes from the o-book – Explanations for the answers.

Chapter 14 Review – Support

Q	Reason
1	By definition. See page 382. One key word in the question is ‘successive’, so for example, the distance between one crest and the next (and not just between two crests).
2	 Think of being on a surfboard and you’re on the back of the wave as it passes. You’ll go lower.
3	The distance between successive compressions is the wavelength. It could also be the distance between successive rarefactions.
4	$f = \frac{v}{\lambda}$ $\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$ $\frac{10}{2} = \frac{12}{\lambda_2}$ $\lambda_2 = \frac{12 \times 2}{10} = 2.4\,cm$
5	*Trans* means ‘across’, which is across (perpendicular) to the wave motion. Just learn it. See page 378. 
6	The ring indicates a ‘free’ boundary, hence, there is <u>no</u> phase inversion upon reflection. So, the pulse stays the same way up. See page 389.
7	The thick rope acts as a fixed boundary. When it reflects off the boundary it acts like it has met a fixed boundary so there is a phase change and it is inverted. However, the pulse stays the same way up (no phases inversion) upon transmission into the heavy rope.
8	By definition, spreading is diffraction. See page 401.

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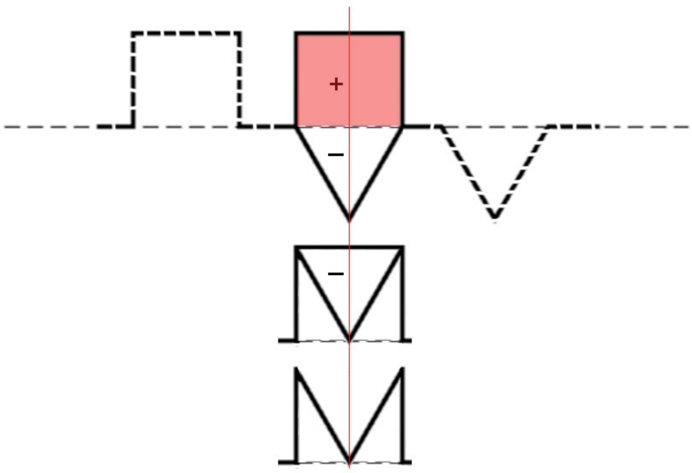
9	Think of being on a surfboard and you're on the back of the wave as it passes. You'll go downwards, so the direction of the velocity vector is down.
10	$f=\frac{1}{T}=\frac{1}{0.2}=5\,Hz$ $\lambda=15\,cm=0.15\,m$ $v=f\lambda$ $=5\times0.15$ $=0.75\,m\,s^{-1}$

Chapter 14 Review – Consolidate

Q	Reason
1	There is no phase change (inversion) upon reflection so the boundary must be acting like a free boundary, and so the rope must be light. The medium on the left is therefore more dense.
2	Displacements are always added. It is a vector quantity so +/- is taken into account.
3	$f=\frac{1}{T}=\frac{1}{0.5}=2\,Hz$
4	You have to add displacements together when they are on top of each other. The top pulse is all + displacements, and the bottom on is all – displacements. A lot of the displacement cancels out. 
5	The air particles are like the steel particles on a slinky. They move back and forth from their equilibrium position, and the bigger you make the starting pulse (that is, louder) the bigger the displacements of each steel particle as the wave passes.

Assess Quizzes from the o-book – Explanations for the answers.

Chapter 14 Review – Extend

Q	Reason
1	Original waves have short wavelength compared to the one in deep water. We learn that "S" stands for shallow, short (wavelength), slow (speed), small (angle). Hence, the wave passes from shallow to deep. It is being refracted (*re* = 'back', *fract* = 'broken'; so like a broken bone).
2	The crests to the left of P will add together to form a super-crest, and the parts of the waves to the right of P will also add to form, this time, a super-trough.
3	Using a ruler, or by eye, we see that the wavelength in medium 1 is about 2/3 of the 1 cm scale marker. The waves in medium 2 have a wavelength of the same size as the marker which is 1 cm. The refractive index from 1 to 2 is: $n_{1\to2} = n_{12} = \frac{\lambda_1}{\lambda_2} = \frac{0.67}{1.0} = 0.67$ The only other possibility is 0.50 but that would mean the wavelength in medium 1 is half that of medium 2, and that is plainly not the case (use a ruler to check).
4	They can't add to form a super-crest or super-trough, but they can add to cancel out.
5	Point P will always be a nodal point (no oscillation, so will remain stationary). This is because the waves have the same wavelength, same speed (because it is in the same medium – a spring), and they are out of phase by 180^{o} (1/2 a wavelength).