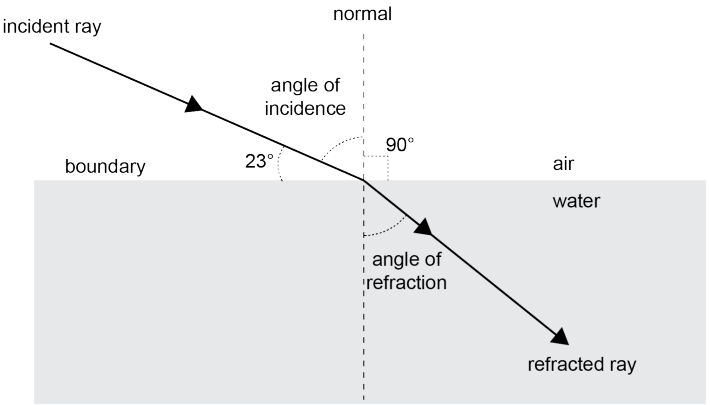
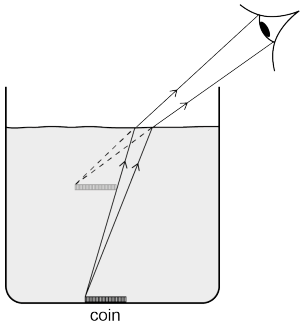
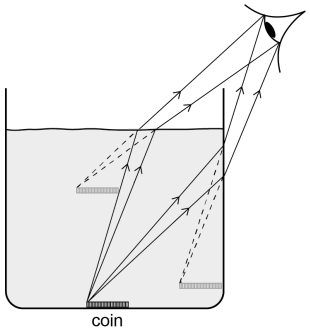
Assessment Schedule – 2021

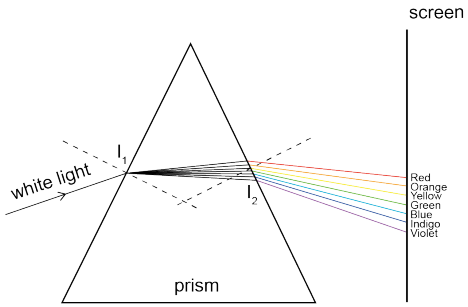
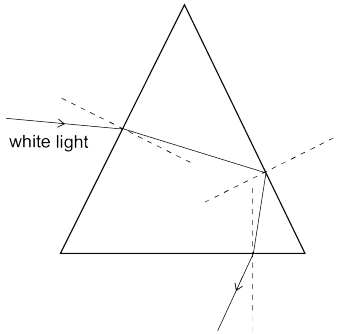
Physics: Demonstrate understanding of aspects of wave behaviour (90938)

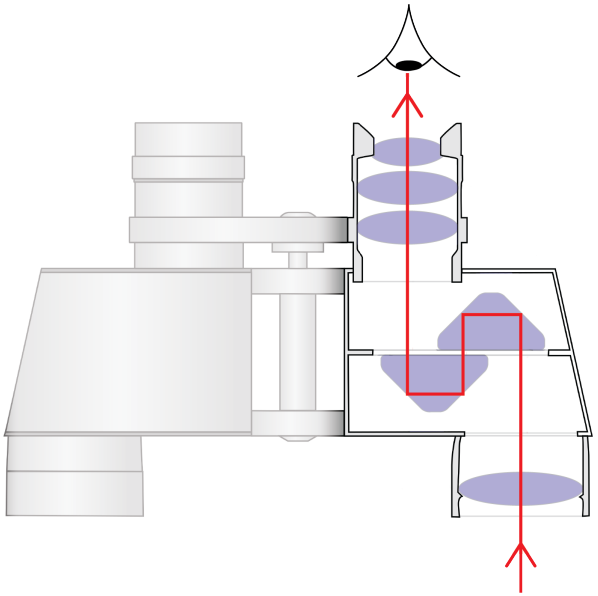
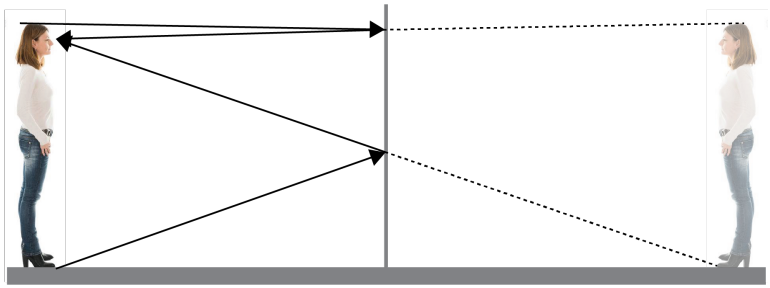
Evidence

Q	Evidence	Achievement	Merit	Excellence
ONE (a)	Refraction is the bending of light. OR Refraction is the change in direction of a wave passing from one medium to another.	• Correct definition.		
(b)(i)		• Correctly drawn refracted ray. OR Correct angle of incidence.	• BOTH correct.	
(ii)	Angle of incidence = 67°.			

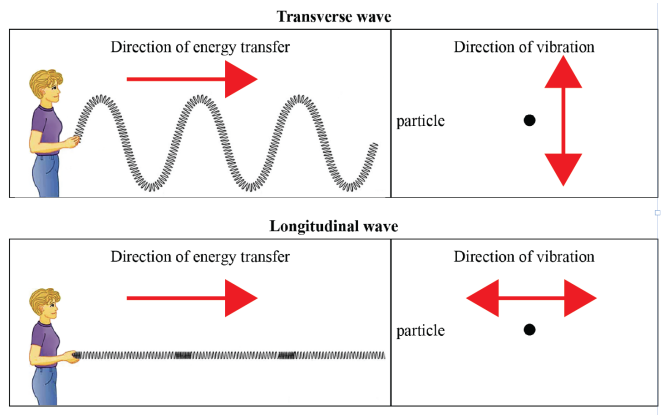
(c)	 When the cup is empty, light travels in straight lines, and as you are viewing from an angle, you cannot see the bottom, and hence you cannot see the coin. When water is in the cup, light enters the water, which is a denser medium and bends the light to see the bottom, and hence the coin.	• Ray diagram correct. OR Explanation of why you can see the coin.	• BOTH correct.	
(d)	 The image of the two coins results from light coming from two different paths. One path (top view) is going through water and then refracting away from the normal, and thus making the coin appear closer. The other path (side view), the light goes through water then glass and then into our eyes, which makes the coin look bigger.	• Either ray of light from the coin to the eye. OR Partial explanation of why you can see two coins.	• Complete ray diagram. OR Correct explanation.	• Complete answer.

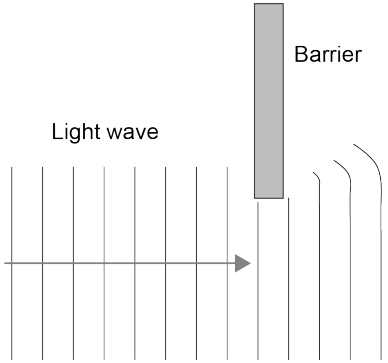
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No evidence.	1A	2A OR 1M	3A OR 1A + 1M	4A OR 2A + 1M OR 1A + 1E	1A + 2M OR 1M + 1E	2A + 2M OR 3M	1A + 1M + 1E	2M + 1E

Q	Evidence	Achievement	Merit	Excellence
TWO (a)		• Correct spectrum.		
(b)(i) (ii)	Total internal reflection. 	• Total internal reflection stated. OR Correct drawing.	• BOTH correct.	

(c)		• Drawing of light ray partially correct.	• Correct drawing of light ray with arrows showing the direction.	
(d)	 For a person to see their feet, the mirror needs to be a minimum of half the height of the person. It does not matter where they stand, as the law of reflection states angle in = angle out. Therefore, to see their feet, a person needs a mirror to be minimum half their height.	• Correct ray diagram. OR Demonstrates some idea of law of reflection for reason why mirror height does not change.	• Complete ray diagram including minimum height of mirror indicated on diagram. OR Explains why the mirror height stays same by law of reflection.	• Complete answer.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No evidence.	1A	2A OR 1M	3A OR 1A + 1M	4A OR 2A + 1M OR 1A + 1E	1A + 2M OR 1M + 1E	2A + 2M OR 3M	1A + 1M + 1E	2M + 1E

Q	Evidence	Achievement	Merit	Excellence
THREE (a)	Frequency is the number of waves that pass a fixed point per unit of time. OR Number of vibrations per second.	• Correct.		
(b)	 Transverse wave: vibrations are at right angles to the direction of travel Longitudinal waves: vibrations are parallel to direction of travel. Require medium to travel	• Correct drawing of a transverse wave. OR Correct drawing of a longitudinal wave. OR Direction of particle.	• Correct drawings. AND Direction of particle.	

(c)(i) (ii)	Phenomenon: diffraction.  Diagram should have: • waves evenly spaced • waves curving around the barrier as shown.	• States diffraction. OR Correct drawing of diffraction around a barrier.	• BOTH correct.	
(d)	$v = \lambda f$ $= 0.0357 \times 8.4 \times 10^{9}$ $= 3 \times 10^{8}\ \text{m s}^{-1}$ $d = vt \rightarrow t = \frac{d}{v}$ $t = \frac{4.6 \times 10^{12}\ \text{m}}{3 \times 10^{8}\ \text{m s}^{-1}}$ $= 1533.33\ \text{s}$ Conversion to hours $= \frac{1533.33\ \text{s}}{3600}$ $= 4.259$ hours Issues with signal received on Earth. Very weak signal due to energy spread over a very large area as it travels outwards from the transmitter. Background radiation can cause background noise that needs to be filtered out.	• Correct calculation of speed of radio waves. OR Correct method but incorrect calculations, e.g. forgot to convert cm to m and km to m. OR Identifies an issue with the signal.	• Correct time calculated. OR Explains an issue with a signal received on Earth.	• Time correctly calculated and correctly explains an issue with the signal.

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Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 6	7 – 12	13 – 18	19 – 24