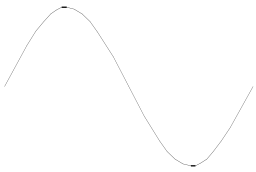
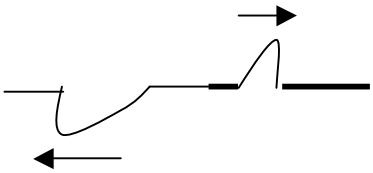
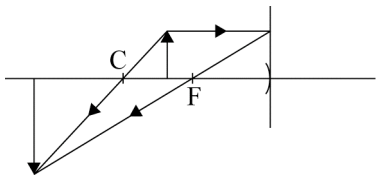
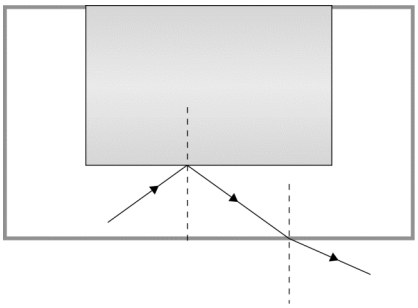
Assessment Schedule – 2008

Physics: Demonstrate understanding of waves (90254)

Evidence Statement

Q.	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
ONE (a)		[1]A correct resultant pulse (double the amplitude) OR correct position (starting 4 squares from left) of pulse.	[1]A correct resultant pulse AND correct position of pulse.	
(b)	 • Both pulses smaller amplitude than original pulse. • Reflected pulse inverted. • Reflected pulse reversed. • Transmitted pulse not phase changed. • Transmitted pulse closer to boundary. • Wavelength of reflected pulse same as original • Wavelength of transmitted pulse, smaller than original.	[1] Must show transmitted and reflected pulse and 3 points correct.	5 points correct.	[1]6 points correct.
(c)	Frequency remains the same. $\frac{v_{thin}}{\lambda_{thin}} = \frac{v_{thick}}{\lambda_{thick}}$ $v_1 = v_{thin}$ $\frac{x+5}{.30} = \frac{x}{.20}$ $v_{thick} = 10 \text{ m s}^{-1}$ $v_{thin} = 15 \text{ m s}^{-1}$	[2] Correct substitution and re-arranging. OR $v_{thin} = v_{thick} + 5$	[2]One speed correct.	[2]Both speeds correct.
(d)	The speed decreases. Frequency remains constant. the wavelength is directly proportional to speed and hence when speed decreases, wavelength decreases.	[1]Wavelength is shorter.	[1] Wavelength is shorter because frequency does not change and speed reduces.	
(e)	$v = f\lambda$ $f = \frac{v}{\lambda} = \frac{4}{5} = 0.8$ $T = \frac{1}{f} = \frac{1}{0.8} = 1.3 \text{ s}$	[2] Correct substitution. OR $f = 0.8$ Hz	[2] Correct answer for period. Allow $T = 1.25$ s	
TWO (a)	Diffraction	[1]Correct answer.		

(b)	Diagram shows waves with unchanged wavelength and less diffraction.	[1]Correct answer, unchanged wavelengths and less diffraction.		
(c)	Circular waves that emerge from the two gaps in the barrier have the same frequency, wavelength and amplitude. They form an interference pattern. The bird is at a nodal point where the path difference is half a wavelength. Destructive interference takes place and the bird remain still.	[1]Explains that the bird would be reasonably still. OR Any correct reference to interference.	[1] Bird being still because it is at a nodal point where destructive interference (trough plus crest cancel) takes place.	[1]Merit, plus reference to pathdifference of half a wavelength (out of phase).
THREE (a)	Concave mirror or converging mirror.	[1]Correct answer.		
(b)		[1]Any two correct rays AND object between F and C.	[1]As for Achievement, plus correct object drawn in. Arrows on rays correct.	
(c)	$\frac{1}{d_o}=\frac{1}{f}-\frac{1}{d_i}$ $\frac{1}{d_o}=\frac{1}{24}-\frac{1}{60}$ $d_o = 40$ cm	[2]Correct formula and substitution OR correct substitution.	[2]Correct answer.	
FOUR (a)	Concave or diverging lens.	[1]Correct answer.		
(b)	$M=\frac{h_i}{h_o}=\frac{d_i}{d_o}$ $\frac{-0.1}{0.3}=\frac{d_i}{3}$ $d_i=\frac{-0.1\times 3.0}{0.3}=-1.0$ cm $\frac{1}{f}=\frac{1}{d_i}+\frac{1}{d_o}=\frac{1}{-1}+\frac{1}{3}$ $f=-1.5$ cm	[2] Value for image distance obtained without taking the negative sign into consideration (= 1.0 cm). Using Descarte's or Newton's method OR Correct value for image distance.	[2]Correct working with one error. f = 0.75 cm	[2]Correct working and answer.
FIVE (a)	$n_1\sin\theta_1=n_2\sin\theta_2$ $\theta_2=\sin^{-1}\left(\frac{1\sin 48}{1.67}\right)=26.4^\circ$ $n_2\sin\theta_2=n_3\sin\theta_3$ $\theta_3=\sin^{-1}\left(\frac{1.67\sin 26.4}{1.472}\right)=30^\circ$	[2]Correct formula and correct substitution OR angle of refraction in glass 23.6°.	[2] Angle of refraction in glass 26.4° OR angle of refraction in turpentine 27°.	[2] Angle of refraction in turpentine 30°.
		[1] Answer to 2sf.		

(b)		[1]Diagram shows light reflecting.	[1]Diagram shows light reflecting at an equal angle and refracting away from the normal when it exits into air. (Allow second TIR)	
(c)	$n_1 \sin\theta_c = n_2 \sin\theta_2$ $1.67 \sin\theta_c = 1.472 \sin 90$ $\theta_c = \sin^{-1}\left(\frac{1.472 \sin 90}{1.67}\right)$ $\theta_c = 61.8^\circ$	[2]Correct formula and substitution. (Allow $\theta_c = 36.8°$)	[2]Correct answer.	

Total opportunities:
Criterion 1: 11A1 + 6M1 + 2E1
Criterion 2: 6A2 + 6M2 + 3E2

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
$5 \times$ A1	$2 \times$ A1 + $3 \times$ M1	$2 \times$ A1 +$2 \times$ M1 +$1 \times$ E1
$3 \times$ A2	$2 \times$ A2 + $3 \times$ M2	$2 \times$ A2 +$2 \times$ M2 + $2 \times$ E2