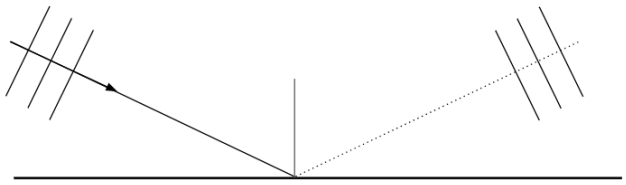
Question number			Answer	Notes	Marks
11	(a)	(i)	line drawn at 90 degrees to side of boat at point where direction of travel touches boat;	ignore normal inside boat	1
		(ii)	66 (degrees);	accept in range 64-68 degrees	1
		(iii)	three wavefronts parallel and constant wavelength;	by eye; condone different wavelength to incident wavefronts	3
			to the right of the normal and above boat surface; correct angle of reflection;	by eye;	
				allow 'reflected ray' if no other mark awarded	
	(b)	(i)	transverse (waves/particles) vibrate at right angles to the direction of travel of the wave;	allow 'vibrations/oscillates at…' allow 'perpendicular to' for 'at right angles'	2
			longitudinal (waves/particles) vibrate along line of direction of travel of the wave;	allow 'energy transfer' for 'travel' allow '(anti-)parallel to' for 'along'	
		(ii)	wavelength or distance between wavefronts smaller; speed **of waves** is constant; reference to wave equation $v = f\lambda$;	if no other marks awarded, 1 mark for reference to Doppler effect	3

(Total for Question 11 = 10 marks)