Question number	Answer	Notes	Marks
6 (a)	any two from: MP1. ruler; MP2. protractor; MP3. named suitable light source; MP4. optical pin(s);	 e.g. ray box, light box, laser ignore torch	2
(b) (i)	ray drawn bending in the correct direction; ray drawn parallel to ray before it enters the block;	 judge by eye	2
(ii)	normal drawn perpendicular to block's surface where light ray enters;	judge by eye normal must be drawn in both air and block	1
(iii)	angle of incidence = 44 (degrees); angle of refraction = 26 (degrees);	allow 43-45 allow 25-27	2
(iv)	refractive index = $\frac{\text{sin (angle of incidence)}}{\text{sin (angle of refraction)}}$;	allow standard symbols and rearrangements e.g. n = sin(i) ÷ sin (r)	1
(v)	substitution; evaluation; e.g. (n =) sin44 / sin26 (n =) 1.6	allow ecf from (iii) allow range 1.5-1.7	2
(c)	idea that multiple angles (of incidence) measured; graph of sin(i) against sin(r) plotted; **gradient** of graph = refractive index;	 can be gained from diagram ignore orientation of axes can be gained from diagram reject if inconsistent with graph. However, accept if sin(r) on y-axis then gradient = 1/n	3

Total for Question 6 = 13 marks