Question	Answer	Marks	AO Element	Notes	Guidance
1	normal correctly positioned (1) correct reflected ray at 50° to normal (1)	**2**			
2	50°	**1**			
3(a)	60 (°)	**1**			
3(b)	normal correctly positioned (1) correct reflected ray at 60° to normal (1) same value as in **(a)** (1)	**3**			
4(a)	normal at X correct by eye	**1**			
4(b)	reflected ray for Y has angle *i* = angle *r* by eye	**1**			
5(a)	straight line to mirror **AND** normal correctly positioned	**1**			
5(b)	two correct reflections drawn	**1**			
5(c)	angle of incidence = angle of reflection	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
6	angle of incidence: N (1) angle of reflection: S (1) angle of refraction: P (1)	**3**			
7(a)	normal	**1**			
7(b)	(angle of) incidence	**1**			
7(c)	double(s)	**1**			
8(a)	refraction **OR** reflection	**1**			
8(b)	if refraction in **(a)** change or increase or decrease in speed of wave **OR** change in the refractive index **OR** if reflection in **(a)** mention of surface or boundary	**1**			
9	D - The missing ray is a weak reflected ray.	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
10(a)	normal correctly positioned correct reflected ray at 45° to normal *r* correctly indicated angle *i* = angle *r*	**4**			
10(b)	parallel to the incident ray at P	**1**			
11(a)	1st straight incident ray from close to point object to mirror correctly reflected, *i* = *r* 2nd straight incident ray <u>from point object</u> to mirror correctly reflected, *i* = *r*	**2**			
11(b)	**BOTH** reflected rays extended back to intersect behind mirror **BOTH** reflected rays extended back <u>in straight lines</u> AND I in correct position **AND** {labelled **OR** clearly indicated}	**2**			
12(a)	normal line drawn at 90° to mirror by eye	**1**			
12(b)	reflected ray drawn with *i* = *r* by eye	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
12(c)	angle of incidence = angle of reflection	**1**			
12(d)	mark is for the explanation linked to candidate's diagram. e.g. if answer is YES they should state that the reflected ray hits/reaches the (other) driver/car or can be seen	**1**			
13	D	**1**			
14	B	**1**			
					[Total: 36]