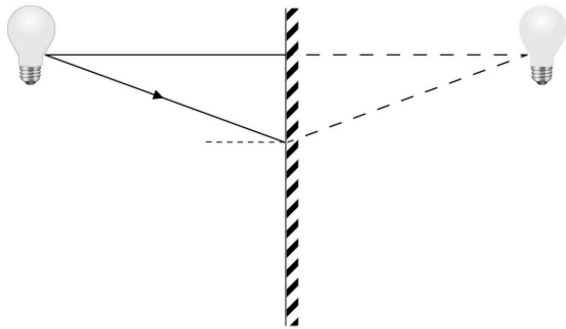
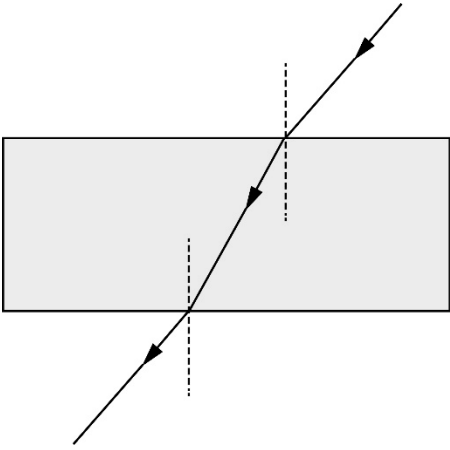
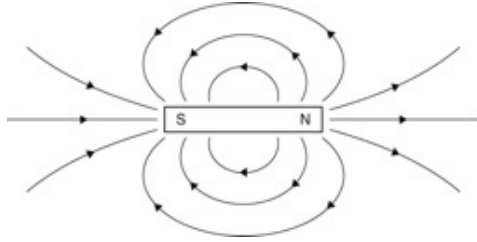


Question	Part	Step	Answer	Mark scheme	
1	a	6th	molecules gain energy	2 marks – 1 for each point	
		6th	molecules spread further apart		
	b	9th	Region E is for steam, where the particles will:	2 marks – 1 for each bullet point	
		9th	<ul style="list-style-type: none"> be separate and move fast have more energy/be hotter as in diagram 1. Or Region A is for ice, where the particles will:		
			<ul style="list-style-type: none"> be held close together and vibrate less have less energy/be colder as in diagram 3.		
c	7th	117 ÷ 125	2 marks 1 mark for substitution 1 mark for final answer (2 marks if final answer is correct, even if no working shown)		
	7th	= 0.936 (g/cm ³) [Accept 0.94/0.9]			
	d	7th	C As water volume increases, density reduces.	1 mark	
	e	8th	Any three from:	3 marks – 1 for each point	
		8th			<ul style="list-style-type: none"> higher temperature makes the liquid (volume) expand the same amount in each thermometer
		8th			<ul style="list-style-type: none"> liquid rises further up thin tube (for same temperature change)
		8th			<ul style="list-style-type: none"> markings on the thin tube are further apart so thin tube easier to read/more precise
2	a	3rd	drag [Accept water resistance/air resistance, do not accept friction.]	1 mark	
	b	6th	the particles of water/air hit the boat (as it moves) or force is needed to push the water/air (particles) out of the way	1 mark	
	c	4th	more streamlined [Accept narrower/smooth/shallower.]	1 mark	
	d	6th	density of wood is lower than density of water	1 mark	
3	a	5th	C Pressure increases as you go deeper.	1 mark	
	b	5th	C It is caused by forces from air particles hitting you.	1 mark	
4		6th	light is faster	1 mark	
5		3rd	opaque [Do not accept black.]	1 mark	
6		5th	C dispersion	1 mark	

Question	Part	Step	Answer	Mark scheme
7	a	5th	ray drawn with a ruler, reflected at the correct angle (by eye)	1 mark
	b	6th	<p>image of bulb drawn behind mirror, equidistant behind as bulb is in front <i>and</i> a line connecting object and image (by eye line should be perpendicular to mirror) <i>or</i> back trace of the marked ray to point where image is marked</p>  <p>[Accept image position correctly marked (even if not drawn as a bulb).]</p>	1 mark
8	a	6th	normal line correctly drawn at 90° to surface	1 mark
	b	7th 7th	<p>straight ray drawn across inside of block, closer to normal than incident ray</p> <p>straight ray drawn exiting block parallel with initial incident ray</p>  <p>[Each ray must join previous so they are all continuous (lose mark for each discontinuity).]</p>	2 marks – 1 for each point
9	a	4th	B lens	1 mark
	b	4th	J	1 mark
	c	4th	Both correct for 1 mark: B/aperture and H/pupil [Ignore D/shutter and G/iris.]	1 mark
	d	4th	Both correct for 1 mark: C/light sensor/CCD and F/retina	1 mark

Question	Part	Step	Answer	Mark scheme
10		7th 7th	Any two from: <ul style="list-style-type: none"> • hat only reflects red light • hat absorbs all other colours (than red) • all the (green) light is absorbed or no light is reflected 	2 marks – 1 for each point
11	a	2nd	Both correct for 1 mark: kitchen = 18 °C; tea = 64 °C (accept 63)	1 mark
	b	6th	the tea is hotter/higher temperature than the air [Accept converse.]	1 mark
	c	4th 4th	left/kitchen thermometer is more accurate [Accept converse.] left/kitchen thermometer has smaller scale divisions [Accept converse; accept left scale division is 1° and right thermometer scale division is 2°.]	2 marks – 1 for each point
12	a	5th	fan B	1 mark
	b	7th	48 000 (J) [Accept 48 kJ/kilojoules.]	1 mark
	c	7th	28.8 (kWh)	1 mark
	d	5th	80%/0.8	1 mark
	e	7th	440 (J) [Accept 0.44 kJ/kilojoules.]	1 mark
	f	5th	heat/sound	1 mark
13	a	5th	(infrared) radiation	1 mark
	b	6th	stops/reduces conduction [Accept air is an insulator.]	1 mark
	c	7th 7th 7th	Any three from: <ul style="list-style-type: none"> • heat from his head warms the air • air particles spread further apart • air becomes less dense • air rises • warmer air passes energy to cooler air above • cooler air falls to replace the rising air • a convection current is set up 	3 marks – 1 for each point
14	a	4th	the picture has an extra planet/there should only be eight planets/Pluto should not be in the picture [Accept other words to that effect.]	1 mark
	b	4th	they reflect sunlight	1 mark
	c	6th 6th	Mercury's year/88 days is shorter than our year Mercury orbits more quickly/its orbit is smaller	2 marks – 1 for each point
	d	6th	the axis is not tilted/the axis is straight/vertical	1 mark

Question	Part	Step	Answer	Mark scheme
15	a	3rd 4th	correct shape arrows pointing to south pole on all field lines 	2 marks – 1 for each point
	b	5th 5th	it lines up with/is affected by the Earth's magnetic field <i>or</i> a correct magnetic poles interaction comment to show the direction of north	2 marks – 1 for each point
16	a	5th	Both of: A having a haircut B eating lunch	1 mark
	b	5th	All of: A having a haircut B eating lunch C going to the moon	1 mark
17	a	5th	Its distance is the same as that travelled by light in 4.2 years.	1 mark
	b	3rd	it gives off its own light	1 mark
	ci	3rd	B galaxy	1 mark
	cii	3rd	Milky Way	1 mark

Final Step Calculation

Marks	Step
1–4	Below 2nd
5–9	2nd
10–15	3rd
16–24	4th
25–34	5th
35–43	6th
44–50	7th
51–55	8th
56–60	9th