

Question	Answer	Marks
1(a)(i)	(distance =) 400 (m)	B1
1(a)(ii)	4(0) (m / s)	A3
	$400 \div 100$	(C2)
	(speed =) gradient of distance-time graph OR distance $\div$ time	(C1)
1(a)(iii)	stationary OR stopped OR at rest (between 100 and 150 s)	B1
	(then) constant / steady speed (between 150 and 250 s)	B1
1(b)	15 (m / s) (due) west / W	B1

Question	Answer	Marks
2(a)	7.7	A3
	$400 \div 52$	(C2)
	(density =) mass $\div$ volume OR m / V	(C1)
	g / cm^3	B1
2(b)	friction OR drag OR (air) resistance	B1
	3.9 (N)	B1
2(c)	(weight = $97.5 \div 42$) = 2.3 (N)	A4
	$W \times 42 = 3.9 \times 25$ {OR 97.5} OR ($W =$) $3.9 \times 25 / 42$	(C3)
	(moment of cylinder =) 3.9×25 OR 97.5	(C1)
	clockwise moment = anticlockwise moment OR moment of cylinder = moment of block	(C1)

Question	Answer	Marks
3(a)	at least 4 circles widely separated (gaps at least the diameter of circles)	B1
	random arrangement	B1
3(b)	any three from: regular / uniform arrangement fixed (positions) vibrating close(ly) OR tight(ly) (packed)	B3
3(c)(i)	conduction	B1
3(c)(ii)	any three from: water particles (at bottom of pan) gain thermal / internal / kinetic energy (water) particles move apart density of liquid decreases OR liquid becomes less dense less dense liquid rises causing liquid to circulate (in pan)	B3
3(c)(iii)	100 (°C)	B1

Question	Answer	Marks
4(a)(i)	(amplitude =) 15 (cm)	B1
4(a)(ii)	(frequency =) 0.5 (Hz)	A2
	(frequency =) number of waves sent out / emitted in one second OR 1 wave in 2.0 (s) OR frequency = $1 \div 2(0)$	(C1)
4(b)	diffraction	B1
4(c)(i)	refraction	B1
4(c)(ii)	(change of) wavelength OR (wave) speed OR velocity	B1

Question	Answer	Marks
5(a)	microwaves (after radio waves)	B1
	X-rays (after ultraviolet)	B1
5(b)	(use of infrared) any one from: electric grills, short range communications such as remote controllers for televisions, intruder alarms, thermal imaging, optical fibres, (heating) solar panels	B1
	(use of ultraviolet) any one from: security marking, detecting fake bank notes, sterilising water / food	B1
5(c)	(infrared can cause) (skin) burns	B1
	(ultraviolet can cause) damage to (surface / skin) cells / eyes OR skin cancer OR can cause eye conditions e.g. cataracts	B1

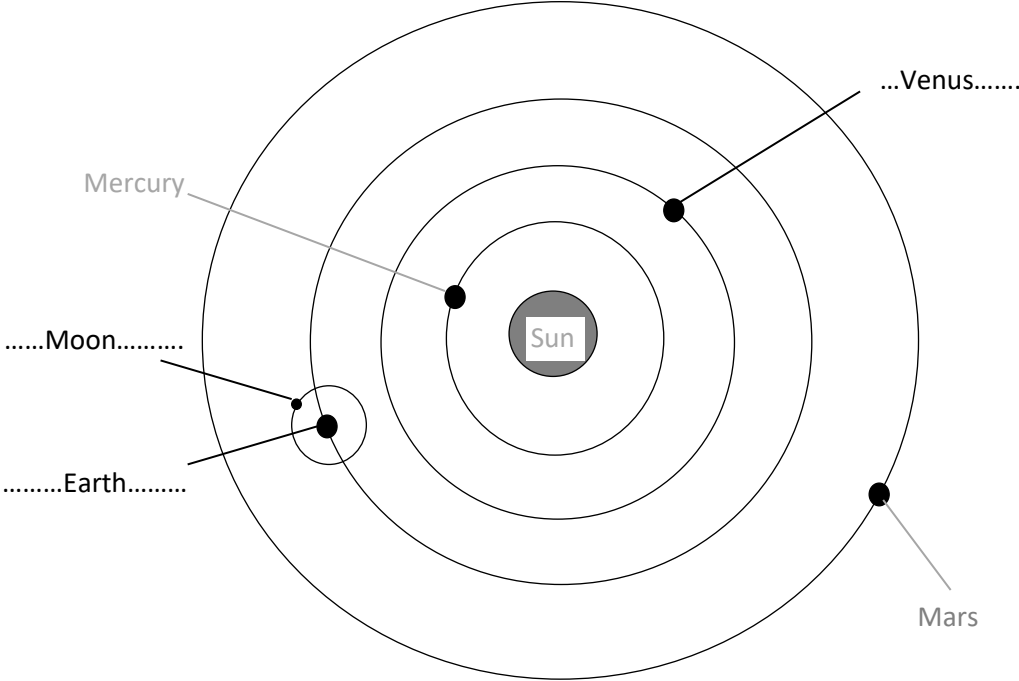
Question	Answer	Marks
6(a)	KE of wind	B1
	rotates / turns / spins turbine OR blades	B1
	(turbine) turns / spins / rotates generator	B1
6(b)	(output voltage =) 1200 (V) OR 1.2 <u>kV</u>	A4
	(V =) 624 000 ÷ 520	(C3)
	conversion: 624 kW = 624 000 (W)	(C1)
	power = $I \times V$ OR (V =) $P \div I$	(C1)
6(c)	any two from: greater efficiency as lower current (is used) (so) reduces power / energy losses thinner cables can be used (so reducing costs) OR pylons further apart idea of increased distance of transmission (of electrical power)	B2

Question	Answer	Marks
7(a)	7 (cm)	B1
7(b)	arrow drawn (perpendicularly) from principal axis to intersection of rays.	B1
7(c)	(image is) real	B1
	inverted	B1

Question	Answer	Marks
8(a)	(plotting) compass OR iron filings	B1
	detail of method	B1
	idea of using a (plotting) compass to give direction of magnetic field	B1
8(b)	any four from: current in coil P (changing) magnetic field around / in coil P (magnetic field) links with / cuts coil Q an induced emf (across) coil Q OR voltage / current produced / generated in coil Q (induced emf) causes pointer on (sensitive) voltmeter to move when current steady no changing magnetic field OR no field (lines) cutting coil Q pointer then returns to zero	B4

Question	Answer	Marks
9(a)(i)	(to) change / control current (in circuit / heater) OR change / control p.d. voltage (across heater)	B1
9(a)(ii)	$(6.0 \div 1.5 =) 4$ (cells)	B1
9(a)(iii)	symbol for voltmeter seen or used	B1
	connected in parallel with heater	B1
9(b)	$(E =) 260$ (J)	A3
	$(E =) 1.6 \times 40 \times 4.0$	(C2)
	$(E =) I \times t \times V$ OR $P = I \times V$ AND $(E =) P \times t$	(C1)

Question	Answer	Marks
10(a)(i)	(nucleon number =) 225 (proton number =) 89 (Ac)	B1
10(a)(ii)	(number of electrons =) 89	B1
10(b)	point at (20, 2.0) plotted correctly	B1
	point at (30, 1.0) plotted correctly	B1
	points joined by a (smooth) curve to about 30 days	B1

Question	Answer	Mark
11(a)		B1
		B1
		B1
11(b)	Hydrogen and	B1
	Helium (answers maybe in either order)	B1
	visible (light) and	B1
	Ultraviolet (answers maybe in either order)	B1
11(c)	100 000 (light-years)	B1