SCIENCE (PHYSICS) – Paper 2 Physics (set 2.8) – mark scheme

Use this to mark your own attempt. Accept any correct alternative that answers the question as set. Marks are for the ideas, not the exact words. Unless stated, ecf (error carried forward) applies in calculations. Chermistry practice paper – not an official examination paper.

Total marks: 65 (Section A: 55 marks; Section B: one question of 10 marks)

Textbook references are quoted word for word from *Discover Physics, 5th ed*.

Section A – Question 1 [5]

Part	Answer and mark points	Marks
1(a)	• uniform acceleration is a constant rate of change of velocity (1) • the graph is a straight line through the origin, gradient = (8.0 − 0) / 4.0 = **2.0 m/s^2** (1) **Accept:** change in velocity / time taken. a = Δv / Δt. The calculation mark needs the unit. NOT: constant speed **Textbook: Discover Physics, 5th ed., p. 24 (Ch 2 Kinematics, 2.1)** > *"Uniform acceleration is a constant rate of change of velocity."*	2
1(b)	straight line drawn from (10 s, 8.0 m/s) down to (14 s, 0 m/s) (1) **Accept:** ruled line; the end point must be on the time axis at 14 s	1
1(c)	• distance = area under the graph = ½(6 + 14) × 8.0 (or 16 + 48 + 16) = **80 m** (1) • 80 m is less than 90 m, so the capsule stops 10 m short of the port (does not reach it) (1) **Accept:** any correct area method. ecf from a wrong distance for the second mark	2

Section A – Question 2 [6]

Part	Answer and mark points	Marks
2(a)	• friction: contact; normal force: contact; gravitational force: non-contact; electrostatic force: non-contact • 4 correct rows (2); 3 correct rows (1); 2 or fewer (0) **Accept:** two marks for all four correct. Two ticks in one row: that row is wrong **Textbook: Discover Physics, 5th ed., p. 47 (Ch 3 Force and Pressure, 3.1)** > *"This type of force between objects that are in contact is known as contact force."* **Textbook: Discover Physics, 5th ed., p. 48 (Ch 3 Force and Pressure, 3.1)** > *"Non-contact forces are those that do not require objects to be in contact to exist."*	2
2(b)	• a region (of space) (1) • in which a mass experiences a force due to gravitational attraction (1) **Accept:** NOT: the force of gravity itself; NOT: an area where there is gravity (no mention of a force on a mass) **Textbook: Discover Physics, 5th ed., p. 50 (Ch 3 Force and Pressure, 3.2)** > *"A gravitational field is a region in which a mass experiences a force due to gravitational attraction."*	2

2(c)	• mass on Mars = **900 kg** (the mass does not change; it is the amount of matter in the lander) (1) • weight on Earth = 900 × 10 = **9000 N** AND weight on Mars = 900 × 3.7 = **3330 N** (weight is a gravitational force, so it depends on the field strength) (1) **Accept:** 3.3 × 10^3 N; 3300 N; 3330 N. Both weights are needed for the second mark. NOT: a mass in newtons or a weight in kilograms **Textbook: Discover Physics, 5th ed., p. 49 (Ch 3 Force and Pressure, 3.2)** *"Mass is a measure of the amount of matter in a body."* **Textbook: Discover Physics, 5th ed., p. 50 (Ch 3 Force and Pressure, 3.2)** *"Weight is the gravitational force acting on an object that has mass."*	2

Section A – Question 3 [3]

Part	Answer and mark points	Marks
3(a)	• weight (W) vertically downwards AND normal (contact) force (N) vertically upwards (1) • tension (T) in the rope horizontally to the right (along the rope) AND friction (F) horizontally to the left (1) **Accept:** allow R for the normal force; allow P / pull for the tension. All arrows must start at the dot and be labelled. Because the speed is constant, T = F and W = N; do not penalise arrow lengths unless clearly wrong (e.g. friction longer than tension)	2
3(b)	the crate slows down (decelerates) and stops, because friction between the crate and the floor acts opposite to the motion (as a resistive force) (1: both parts needed) **Accept:** the crate stops (after sliding a distance) because friction acts against the motion. NOT: the crate stops immediately; NOT: the crate keeps moving at constant speed **Textbook: Discover Physics, 5th ed., p. 74 (Ch 4 Dynamics, 4.3)** *"Friction opposes motion between surfaces in contact."* **Textbook: Discover Physics, 5th ed., p. 74 (Ch 4 Dynamics, 4.3)** *"Friction is a resistive force because it acts in the opposite direction to motion."*	1

Section A – Question 4 [3]

Part	Answer and mark points	Marks
4(a)	when a body is in equilibrium, the sum of the clockwise moments about a pivot equals the sum of the anticlockwise moments about the same pivot (1) **Accept:** sum of clockwise moments = sum of anticlockwise moments (about any point), for a body in equilibrium. NOT: the moments are equal (without clockwise / anticlockwise) **Textbook: Discover Physics, 5th ed., p. 85 (Ch 5 Turning Effects of Forces, 5.2)** *"The principle of moments states that when a body is in equilibrium, the sum of clockwise moments about a pivot is equal to the sum of anticlockwise moments about the same pivot."*	1
4(b)	anticlockwise moment = 60 × 0.40 = 24 N m; clockwise = 30 × 0.20 + 45 × d; 24 = 6.0 + 45d, so d = **0.40 m** (1) **Accept:** moments in N cm (2400 = 600 + 45d, d = 40 cm). The mark is for the correct distance with a correct moment equation. 0.53 m (plank weight left out) scores 0	1
4(c)	the plank is in equilibrium, so upward force = sum of the downward forces = 60 + 30 + 45 = **135 N** (1) **Accept:** ecf only if the same three weights are added; NOT 90 N (plank weight left out)	1

Section A – Question 5 [3]

Part	Answer and mark points	Marks
5(a)	energy cannot be created or destroyed, it can only be transferred from one store to another (total energy of an isolated system is constant) (1) **Accept:** NOT: energy cannot be used up **Textbook: Discover Physics, 5th ed., p. 108 (Ch 6 Energy, 6.1)** > *"The principle of conservation of energy states that energy cannot be created or destroyed. Energy can be transferred from one store to another. The total energy of an isolated system is constant."*	1
5(b)	• KE at launch = $\frac{1}{2}mv^2 = \frac{1}{2} \times 0.50 \times 20^2 = 100$ J, and this becomes GPE at the top (1) • $mgh = 100$, $h = 100 / (0.50 \times 10) =$ **20 m** (1) **Accept:** $h = v^2 / 2g = 400 / 20 = 20$ m scores 1 mark only unless the energy argument is shown	2

Section A – Question 6 [3]

Part	Answer and mark points	Marks
6(a)	• rock: fixed volume and fixed shape; sea water: fixed volume but no fixed shape; air: no fixed volume and no fixed shape (1: all three rows correct) **Accept:** two ticks in one row: that row is wrong **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"Solids have a fixed volume and a fixed shape."* **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"Liquids have a fixed volume and no fixed shape."* **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"Gases have no fixed volume (compressible) and no fixed shape."*	1
6(b)	• rock: the particles are closely packed in a regular pattern and held in fixed positions by strong attractive forces, so they can only vibrate about those positions and the block keeps its shape (1) • sea water: the particles are close together but in an irregular pattern, and they slide over each other (without fixed positions), so the water flows and takes the shape of its container (1) **Accept:** the forces between the particles in water are weaker than in a solid. NOT: the particles in water are further apart (they are slightly less closely packed only); NOT: the particles in rock do not move at all **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"Particles are closely packed and arranged in a regular pattern."* **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"Particles vibrate about fixed positions. They are held in position by strong attractive forces between the particles."* **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"Particles are slightly less closely packed than in solids and arranged in an irregular pattern."* **Textbook: Discover Physics, 5th ed., p. 125 (Ch 7 Kinetic Particle Model of Matter, 7.1)** > *"The particles slide over each other throughout the liquid without fixed positions."*	2

Section A – Question 7 [4]

Part	Answer and mark points	Marks
7(a)	• energy is transferred from the instrument (higher temperature) to the panel (lower temperature) (1) • the instrument cools and the panel warms up until they are at the same temperature (thermal equilibrium) (1) **Accept:** NOT: coldness flows into the instrument **Textbook: Discover Physics, 5th ed., p. 134 (Ch 8 Thermal Processes, 8.1)** *"Energy is transferred from a region of higher temperature (hotter object) to a region of lower temperature (cooler object) until both regions have the same temperature. The two regions are said to be in a state of thermal equilibrium."*	2
7(b)(i)	radiation (the only process that works across a vacuum) AND a matt black (dark, rough) surface is a good emitter of radiation, so it emits (loses) energy at a faster rate than a shiny surface (1 mark: both parts needed) **Accept:** NOT: matt black attracts / absorbs heat only; NOT: conduction or convection to space (there is no medium) **Textbook: Discover Physics, 5th ed., p. 140 (Ch 8 Thermal Processes, 8.2)** *"Radiation is the process of energy transfer by electromagnetic waves. It does not require a medium."* **Textbook: Discover Physics, 5th ed., p. 142 (Ch 8 Thermal Processes, 8.2)** *"The shiny, smooth and light-coloured surface of an object absorbs incoming radiation at a slower rate. The same surface also emits radiation at a slow rate. Hence, a poor emitter of radiation is also a poor absorber of radiation. The reverse is true for matt, rough and dark-coloured surfaces."*	1
7(b)(ii)	the air above the warm ground is heated, expands and becomes less dense than the surrounding cooler air, so it rises (convection current) (1) **Accept:** need both: expands / less dense, and rises. NOT: heat rises **Textbook: Discover Physics, 5th ed., p. 146 (Ch 8 Thermal Processes, 8.3)** *"The air above the land heats up and rises."* **Textbook: Discover Physics, 5th ed., p. 139 (Ch 8 Thermal Processes, 8.2)** *"The warm liquid, being less dense than its surroundings, will rise."*	1

Section A – Question 8 [6]

Part	Answer and mark points	Marks
8(a)	the air particles vibrate back and forth parallel to the direction of wave travel, producing compressions (particles closer together) and rarefactions (particles further apart) (1) **Accept:** high pressure / low pressure regions. NOT: the air particles travel from the rocket to the spectators **Textbook: Discover Physics, 5th ed., p. 172 (Ch 10 Sound, 10.1)** *"Sound is a longitudinal wave created by a vibrating source."* **Textbook: Discover Physics, 5th ed., p. 172 (Ch 10 Sound, 10.1)** *"The compressed regions are called compressions and the extended regions are called rarefactions (Figure 10.1)."*	1
8(b)	540×10^3 = **5.4×10^5 m** (540 000 m) (1) **Accept:** 5.4×10^5 m only; NOT 5.4×10^3 m	1
8(c)	4000×6.5 µm = 26 000 µm = $26\,000 \times 10^{-6}$ m = **26 mm** (1) **Accept:** 2.6×10^1 mm. Award the mark only if the µ to m to mm conversion is correct	1

8(d)(i)	ultraviolet (third box) AND infrared (fifth box) (1) **Accept:** both needed, in the correct boxes **Textbook: Discover Physics, 5th ed., p. 185 (Ch 11 Electromagnetic Waves, 11.1)** > *"In the electromagnetic spectrum, electromagnetic waves are arranged in order of their frequency or wavelength."*	1
8(d)(ii)	the frequency decreases (from gamma rays to radio waves) (1) **Accept:** gamma rays have the highest frequency; radio waves the lowest. NOT: it increases **Textbook: Discover Physics, 5th ed., p. 184 (Ch 11 Electromagnetic Waves, 11.1)** > *"In this chapter, we learn that the continuous electromagnetic wave spectrum covers a large range of wavelengths and frequencies (Figure 11.1)."*	1
8(e)	heating (of body tissue / cells, as the microwaves are absorbed and the internal energy rises), which can burn or damage living cells and tissues (1) **Accept:** cooking / burning of tissue; damage to cells by heating. NOT: ionisation or cancer (microwaves are not ionising); NOT: X-rays are hot **Textbook: Discover Physics, 5th ed., p. 193 (Ch 11 Electromagnetic Waves, 11.2)** > *"Absorption of electromagnetic waves may cause heating (e.g. microwave oven for cooking), ionisation and damage to living cells and tissues."* **Textbook: Discover Physics, 5th ed., p. 189 (Ch 11 Electromagnetic Waves, 11.2)** > *"The energy transfer leads to an increase in the internal energy and a corresponding higher temperature."*	1

Section A – Question 9 [5]

Part	Answer and mark points	Marks
9(a)(i)	the angle of incidence is equal to the angle of reflection (1) **Accept:** i = r **Textbook: Discover Physics, 5th ed., p. 202 (Ch 12 Light, 12.1)** > *"The second law of reflection states that the angle of incidence θi is equal to the angle of reflection θr."*	1
9(a)(ii)	angle of reflection = angle of incidence = 50° (from the normal), so the angle between the reflected ray and the mirror surface = 90° − 50° = **40°** (1) **Accept:** 40° only for the mark; 50° (the angle to the normal), 80° and 100° are wrong	1
9(b)	ray **C** ticked (the ray bends towards the normal as the light enters the optically denser glass) AND the angle named as the angle of refraction (1: both parts needed) **Accept:** NOT: ray B (no bending); NOT: ray A (bends away from the normal); NOT: angle of incidence **Textbook: Discover Physics, 5th ed., p. 210 (Ch 12 Light, 12.2)** > *"Similarly, a light ray bends towards the normal when it travels from air (an optically less dense medium) to glass (an optically denser medium)."*	1
9(c)	• refractive index = the ratio of the speed of light in a vacuum to the speed of light in the medium (1) • $n = (3.00 \times 10^8) / (2.05 \times 10^8) =$ **1.46** (1) **Accept:** n = c / v. 1.5 (to 2 s.f.); 1.463. No unit **Textbook: Discover Physics, 5th ed., p. 210 (Ch 12 Light, 12.2)** > *"The refractive index n of a medium is defined as the ratio of the speed of light in a vacuum to the speed of light in the medium."*	2

Section A – Question 10 [5]

Part	Answer and mark points	Marks
10(a)	• t = 30 × 60 = 1800 s (1) • $Q = It$ = 1.5 × 1800 = **2700 C** (1) **Accept:** 2.7 × 10^3 C. 1 mark for 1.5 × 30 = 45 (time not converted)	2
10(b)	1200 J of work is done (energy transferred) per coulomb (per unit charge) in driving the charges through the component (gap) (1) **Accept:** NOT: the current is 1200 A **Textbook: Discover Physics, 5th ed., p. 233 (Ch 13 Electric Charge and Current of Electricity, 13.3)** *"The potential difference (p.d.) across a component in a circuit is the work done per unit charge in driving charges through the component."*	1
10(c)	• 250 mA = 0.250 A (1) • $R = V / I$ = 5.0 / 0.250 = **20 Ω** (1) **Accept:** 1 mark for 5.0 / 250 = 0.020 Ω (unit not converted); NOT 20 without a unit	2

Section A – Question 11 [4]

Part	Answer and mark points	Marks
11(a)	• series loop with correct symbols: battery (cell), switch, fuse, LED (arrow direction away from the positive terminal is not penalised), fixed resistor, all in one complete loop (1) • voltmeter drawn in parallel with the LED only (not across the resistor or the whole circuit) (1) **Accept:** the fixed resistor symbol is a rectangle. A missing symbol or a break in the loop loses the first mark	2
11(b)(i)	**12 V** (the p.d. across the separate branches of a parallel circuit is the same) (1) **Textbook: Discover Physics, 5th ed., p. 256 (Ch 14 D.C. Circuits, 14.2)** *"In a parallel circuit, the p.d. across the parallel branches is the same."*	1
11(b)(ii)	$I = V / R$ = 12 / 8.0 = **1.5 A** (1)	1

Section A – Question 12 [4]

Part	Answer and mark points	Marks
12(a)	• the current passes through the heating element, which is made of a wire with a high resistance (1) • electrical energy is transferred to the internal energy of the element, so it becomes hot and the energy is transferred by heating to the pipe (1) **Accept:** charges / free electrons collide with ions in the wire, making the ions vibrate more. NOT: the wire has no resistance **Textbook: Discover Physics, 5th ed., p. 268 (Ch 15 Practical Electricity, 15.1)** *"All heating elements have high electrical resistances."* **Textbook: Discover Physics, 5th ed., p. 268 (Ch 15 Practical Electricity, 15.1)** *"When electric current passes through these alloys, their temperature increases rapidly."*	2
12(b)(i)	$P = VI$ = 28 × 2.5 = **70 W** (1) **Accept:** 70 J/s	1
12(b)(ii)	$t = E / P$ = 42 000 / 70 = 600 s = **10 min** (1) **Accept:** $E = VIt$ with the same numbers; ecf from a wrong power in (i). 600 s without the conversion to minutes scores 0	1

Section A – Question 13 [4]

Part	Answer and mark points	Marks
13(a)(i)	94 + 144 = **238** (1) **Textbook: Discover Physics, 5th ed., p. 320 (Ch 17 Radioactivity, 17.1)** > *"The nucleon number is the total number of neutrons and protons in the nucleus of an atom."*	1
13(a)(ii)	nucleon number 94 + 146 = 240, so the notation is $^{240}_{94}Pu$ (1) **Accept:** nucleon number 240 on top, proton number 94 at the bottom, symbol Pu **Textbook: Discover Physics, 5th ed., p. 320 (Ch 17 Radioactivity, 17.1)** > *"The proton number is the number of protons in an atom."*	1
13(b)(i)	the count rate halves from 800 to 400 counts per second in **88 years**, so the half-life is 88 years (1) **Accept:** any pair of readings that show the count rate halving (e.g. 400 to 200 counts/s between 88 and 176 years) **Textbook: Discover Physics, 5th ed., p. 328 (Ch 17 Radioactivity, 17.2)** > *"The half-life of a radioactive nuclide is the time taken for half the nuclei of that nuclide in any sample to decay."*	1
13(b)(ii)	264 / 88 = 3 half-lives, so the count rate = 800 / 2^3 = **100 counts per second**, which is above 60, so the generator is still working (1: value and conclusion) **Accept:** 800 → 400 → 200 → 100; the value read from the graph at 264 years. The conclusion needs the comparison with 60	1

Section B – Question 14 [10]

Part	Answer and mark points	Marks
14(a)(i)	P is the temporary magnet because it loses its magnetism when the current is switched off (picks up 0 clips); Q is the permanent magnet because it stays magnetised without the current (still picks up 7 clips) (1) **Accept:** P is the iron rod and Q is the steel rod. Both identifications and a reason are needed **Textbook: Discover Physics, 5th ed., p. 294 (Ch 16 Magnetism and Electromagnetism, 16.1)** > *"Temporary magnets retain their magnetism in the presence of an electric current or a permanent magnetic field."* **Textbook: Discover Physics, 5th ed., p. 294 (Ch 16 Magnetism and Electromagnetism, 16.1)** > *"Permanent magnets do not require the presence of an electric current or a permanent magnetic field to retain their magnetism."*	1
14(a)(ii)	iron is easily magnetised and demagnetised (a soft magnetic material), so the core loses its magnetism when the current is switched off and the crane releases the scrap metal (1) **Accept:** NOT: iron is soft (in the sense of physical hardness) **Textbook: Discover Physics, 5th ed., p. 294 (Ch 16 Magnetism and Electromagnetism, 16.1)** > *"The terms "soft" and "hard" do not refer to the hardness of the materials, but to the material's ability to become and remain magnetised."*	1
14(a)(iii)	steel is difficult to magnetise and demagnetise (a hard magnetic material), so the needle stays magnetised as a permanent magnet and keeps pointing north (1) **Accept:** NOT: steel is hard (in the sense of physical hardness) **Textbook: Discover Physics, 5th ed., p. 294 (Ch 16 Magnetism and Electromagnetism, 16.1)** > *"The terms "soft" and "hard" do not refer to the hardness of the materials, but to the material's ability to become and remain magnetised."*	1

14(b)(i)	place the plotting compass at P; the direction in which the north end of the needle points (once it comes to rest) shows the direction of the magnetic field at P (1) **Accept:** mark the ends of the needle with dots and join them with an arrow. NOT: the needle points to the north pole **Textbook: Discover Physics, 5th ed., p. 298 (Ch 16 Magnetism and Electromagnetism, 16.2)** *"The direction of the field lines is indicated by the direction of the plotting compass needle (Figure 16.28)."*	1
14(b)(ii)	Y is a south pole, because the field direction at P (shown by the needle) points towards Y and magnetic field lines run from the north pole to the south pole (1) **Accept:** the north end of the compass is attracted to a south pole. NOT: Y is north because the needle points north **Textbook: Discover Physics, 5th ed., p. 297 (Ch 16 Magnetism and Electromagnetism, 16.2)** *"By convention, the field lines have arrows that point out from the north pole of the magnet and point into the south pole."*	1
14(c)(i)	• tone A is louder (1) • it has the larger amplitude (the trace is taller; 3 divisions compared with 2 divisions) (1) **Accept:** the second mark needs amplitude. NOT: it has a longer wavelength **Textbook: Discover Physics, 5th ed., p. 175 (Ch 10 Sound, 10.2)** *"Loudness is generally related to the amplitude of a sound wave. The larger the amplitude, the louder the sound."*	2
14(c)(ii)	tone B has the higher pitch because it has a higher frequency (more waves in the same time, shorter period) (1) **Accept:** the trace of B shows 2 cycles for each cycle of A **Textbook: Discover Physics, 5th ed., p. 175 (Ch 10 Sound, 10.2)** *"The higher the frequency, the higher the pitch."*	1
14(d)	• one period = 2 divisions × 0.50 ms/div = 1.0 ms, $f = 1 / T = 1 / 0.0010$ = **1000 Hz** (1) • $\lambda = v / f = 340 / 1000$ = **0.34 m** (1) **Accept:** 1.0 kHz. ecf from a wrong period. The period must be read as 1.0 ms (not 2 divisions) **Textbook: Discover Physics, 5th ed., p. 161 (Ch 9 General Wave Properties I, 9.2)** *"The period T is the time taken by each point on the wave to complete one oscillation."* **Textbook: Discover Physics, 5th ed., p. 161 (Ch 9 General Wave Properties I, 9.2)** *"The frequency f is the number of oscillations each point on the wave completes per second."*	2

Section B – Question 15 [10]

Part	Answer and mark points	Marks
15(a)	• the focal length is the distance between the optical centre of the lens and the principal focus (focal point) (1) • the detector is placed at the principal focus (focal plane), **0.80 m** from the lens (1) **Accept:** rays from a distant star are parallel and meet at the principal focus. NOT: the distance from the lens to the image for any object; the distance needs the unit **Textbook: Discover Physics, 5th ed., p. 216 (Ch 12 Light, 12.3)** *"The distance between the optical centre C and the principal focus point F"* **Textbook: Discover Physics, 5th ed., p. 216 (Ch 12 Light, 12.3)** *"The point on the principal axis where all rays parallel to the principal axis meet after passing through the lens"*	2

15(b)	• sin i / sin r = sin 50° / sin 30° = 1.53 (1) • sin r = sin 70° / 1.53 = 0.614 (1) • r = **38°** (37.8°) (1) **Accept:** ecf from a wrong constant. 37 to 38 degrees accepted **Textbook: Discover Physics, 5th ed., p. 210 (Ch 12 Light, 12.2)** *"The second law of refraction states that for two given media, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant"*	3
15(c)(i)	the sum of the p.d.s across the components in a series circuit is equal to the p.d. across the whole circuit (1) **Textbook: Discover Physics, 5th ed., p. 253 (Ch 14 D.C. Circuits, 14.1)** *"The sum of the potential differences in a series circuit is equal to the potential difference across the whole circuit."*	1
15(c)(ii)	• 28 = 12.0 + V_H, so the p.d. across H (and across the parallel pair) = 28 − 12.0 = **16.0 V** (1) • the 12.0 V is the p.d. across the lamp only; the p.d.s across the lamp and across the parallel pair must add up to 28 V (so the student is wrong) (1) **Accept:** the heater and the motor are in parallel branches, so they have the same p.d. of 16.0 V; ecf for the explanation from the calculated value **Textbook: Discover Physics, 5th ed., p. 253 (Ch 14 D.C. Circuits, 14.1)** *"The sum of the potential differences in a series circuit is equal to the potential difference across the whole circuit."* **Textbook: Discover Physics, 5th ed., p. 256 (Ch 14 D.C. Circuits, 14.2)** *"In a parallel circuit, the p.d. across the parallel branches is the same."*	2
15(d)(i)	the current from the source is equal to the sum of the currents in the separate branches (1) **Textbook: Discover Physics, 5th ed., p. 255 (Ch 14 D.C. Circuits, 14.2)** *"In a parallel circuit, the total current flowing into or out of the parallel branches is equal to the sum of the individual currents in each parallel branch."*	1
15(d)(ii)	2.00 − 0.85 = **1.15 A** (1) **Accept:** 1.2 A	1