Errata List for Physics Matters for GCE 'O' Level Textbook (5th Edition)
ISBN: 978-981-4987-97-4
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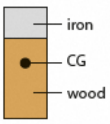
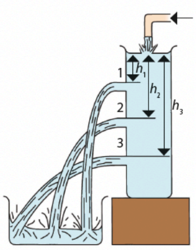
Note: The following errata will be corrected in subsequent reprints of this book.

Chapter	Page No.	Original	Change
1	7	**Metre Rule and Measuring Tape** The metre rule and measuring tape are instruments that are commonly used to measure length (Figure 1.6). A metre rule can measure lengths of up to one metre. A steel measuring tape is suitable for measuring straight distances longer than a metre. A cloth measuring tape is suitable for measuring the length along a curved surface, such as a person's waist or the diameter of a tree trunk.	Change "diameter" of a tree trunk to "circumference" of a tree trunk.
3	44	**Forces** To move our luggage from one point to another, we can either push it or pull it (Figure 3.1). Intuitively, a force can be thought of as a push or a pull due to interaction between objects to explain changes in motion. When a force is exerted on an object, the object can start or stop moving, slow down or speed up. It can also change the direction of motion of the object.  Figure 3.1 Our hands exert either a push or a pull on our luggage to move it.	Change definition to: "a force is an interaction between objects to explain changes in motion."
5	84	**Disciplinary Idea** Forces help us to understand motion. The line of action of the force at different positions on a body can cause a turning effect, i.e. a moment. The body may tend to turn about its pivot of an applied force has a non-zero distance from the pivot. If the body is in balance, then its centre of gravity is either directly below or above the pivot point. The net moment due to gravity acting on the body about the pivot point will be zero.	Change to: "about its pivot **if** an applied force"
5	88	Let's Practise 5.2, Figure 5.24  Figure 5.24 Composite block made of iron and wood	Shift point for "CG" up to be higher than the centre of the block
6	102	The water flowing out of outlet 3 spurts out furthest, followed by the water from outlet 2 and then from outlet 1. How far the water spurts depends on the water pressure. The greater the water pressure, the further the water spurts out. Thus, the water at outlet 3 experiences a greater pressure and the water at outlet 1 experiences a lower pressure. Hence, we can conclude that water pressure increases with depth.  Figure 6.15 A vessel with three outlets at different heights	Amend as follows: … Thus, the water at outlet 3 experiences the greatest pressure and the water at outlet 1 experiences the lowest pressure.

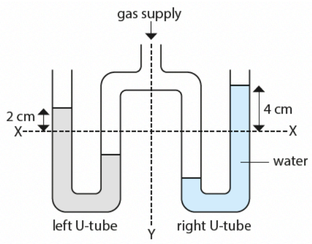
<table>
<tr><th>Chapter</th><th>Page No.</th><th>Original</th><th>Change</th></tr>
<tr><td>6</td><td>109</td><td>Question 5(b)


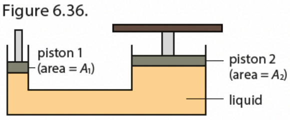
Figure 6.34
(a) Calculate the gas pressure. (Take density of water as 1000 kg/m^3.)
(b) Determine the density of the liquid in the right U-tube.
(c) If the diameter of the right U-tube is doubled, what would be the height above level X?</td><td>Change “right” to “left”</td></tr>
<tr><td>6</td><td>110</td><td>Question 1(c)
The hydraulic cylinder of the hydraulic press works on the principle shown in Figure 6.36.


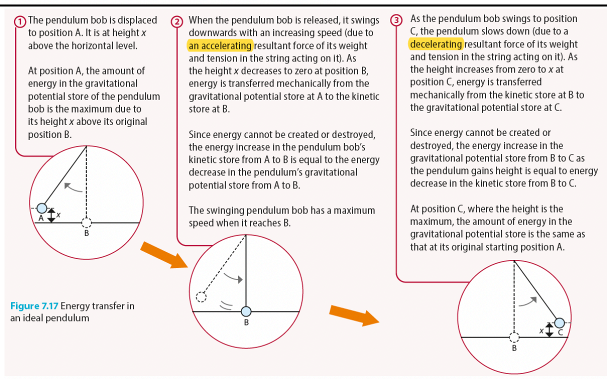
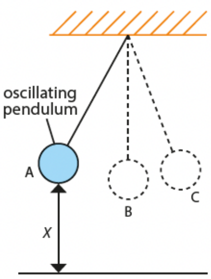
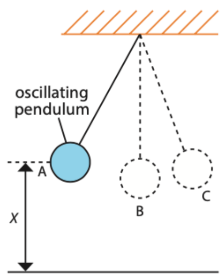
Figure 6.36
(a) Define pressure.
(b) Would the hydraulic cylinder of Figure 6.35 be the cylinder on the left or the right in Figure 6.36?
(c) A force of 800 N is required to cut the workpiece, and the ratio of areas A_1 to A_2 is 1 : 4. Calculate the force exerted by an operator on the lever to cut the workpiece.
(d) Would changing the liquid to a higher density in the hydraulic cylinder reduce the force exerted by the operator? Explain.</td><td>Change “lever” to “piston”</td></tr>
<tr><td>7</td><td>120</td><td>
1 The pendulum bob is displaced to position A. It is at height x above the horizontal level.
At position A, the amount of energy in the gravitational potential store of the pendulum bob is the maximum due to its height x above its original position B.
2 When the pendulum bob is released, it swings downwards with an increasing speed (due to an accelerating resultant force of its weight and tension in the string acting on it). As the height x decreases to zero at position B, energy is transferred mechanically from the gravitational potential store at A to the kinetic store at B.
Since energy cannot be created or destroyed, the energy increase in the pendulum bob’s kinetic store from A to B is equal to the energy decrease in the pendulum’s gravitational potential store from A to B.
The swinging pendulum bob has a maximum speed when it reaches B.
3 As the pendulum bob swings to position C, the pendulum slows down (due to a decelerating resultant force of its weight and tension in the string acting on it). As the height increases from zero to x at position C, energy is transferred mechanically from the kinetic store at B to the gravitational potential store at C.
Since energy cannot be created or destroyed, the energy increase in the gravitational potential store from B to C as the pendulum gains height is equal to energy decrease in the kinetic store from B to C.
At position C, where the height is the maximum, the amount of energy in the gravitational potential store is the same as that at its original starting position A.

Figure 7.17 Energy transfer in an ideal pendulum</td><td>For panel 2, rephrase to:
…(due to the resultant force of its weight and…)

For panel 3, rephrase to:
…(due to the resultant force of its weight and…)</td></tr>
<tr><td>7</td><td>121</td><td>Figure 7.19

</td><td>Increase the length of the arrow X such that it reaches the middle of the pendulum bob:

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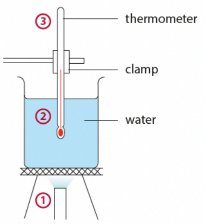
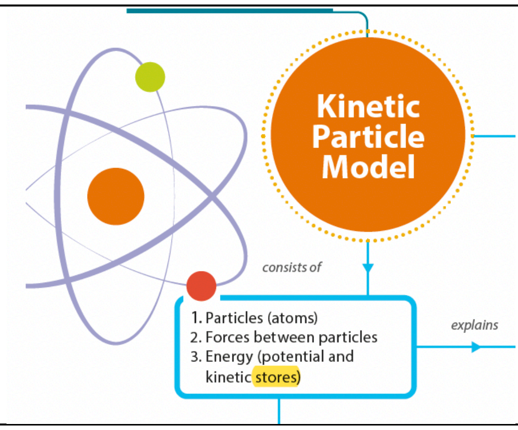
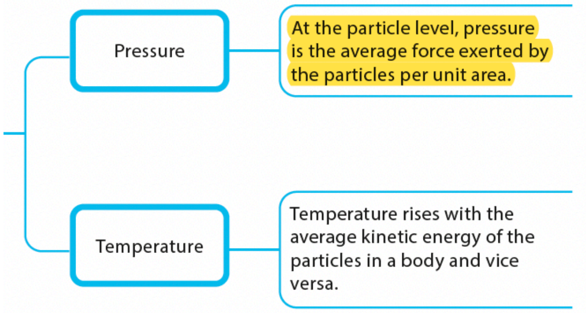
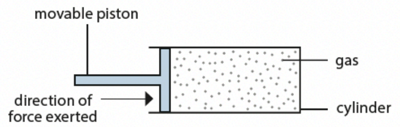
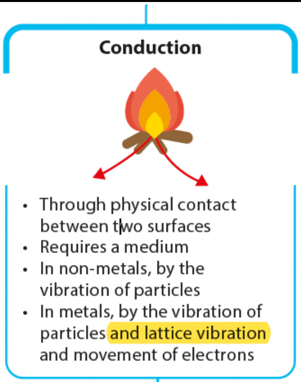
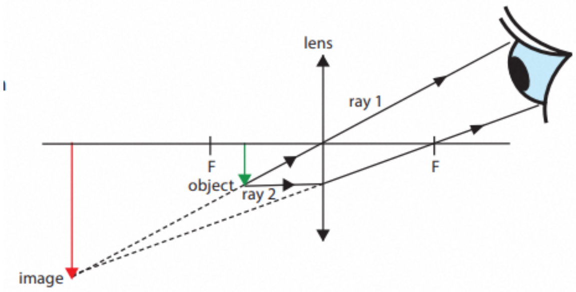
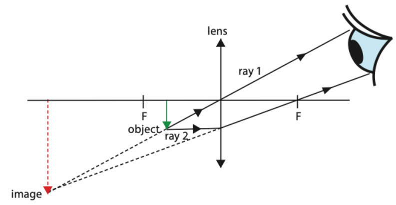
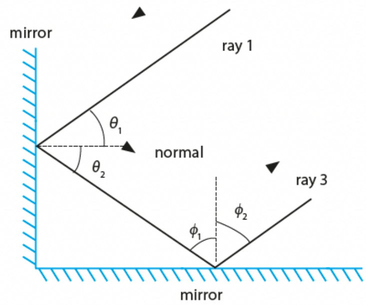
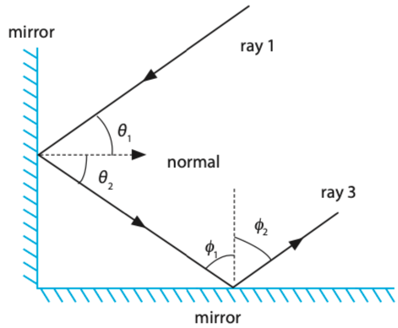
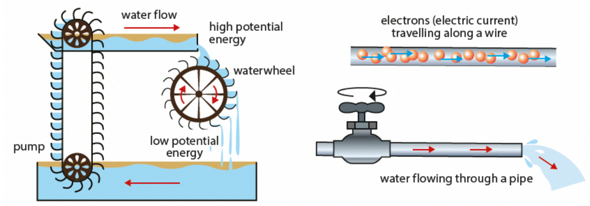
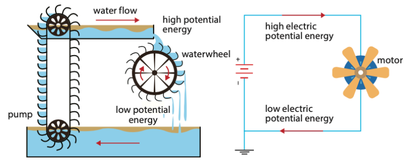
Chapter	Page No.	Original	Change
7	135	Question 3(a) The pendulum bob is displaced to point R, 2.0 cm above P and released from rest. Assuming that air resistance is negligible, calculate the: (a) amount of energy in the gravitational potential store of the pendulum bob at point R; and (b) amount of energy in the kinetic store of the bob at point Q, 0.5 cm above P.	Amend as follows: difference in amount of energy in the gravitational potential store of the pendulum between points R and P
8	138	② **Forces** The forces between the particles are represented by springs. Due to the spring, there are attractive forces pulling the particles together. We will learn how this behaviour is crucial in allowing a change of state.	Amend as follows: The attractive forces in the springs weaken when stretched. We will later learn that this behaviour is crucial in allowing a change of state.
8	143	 ① When a substance such as water is heated, the energy in the kinetic store of the particles increases and the particles vibrate or move faster. ② Hence, when the thermometer is in contact with the water, the more energetic particles in the water transfer some of the energy to the less energetic particles in the thermometer through collisions. ③ With more energy, the particles tend to push each other further apart so the matter expands. However, liquids expand more easily than solids. The liquid column in the thermometer expands noticeably along the calibrated scale but the length of the thermometer's glass body hardly changes. **Figure 8.7** How a thermometer measures the temperature of a substance	For panel 1, rephrase to: When a substance such as water is heated, the kinetic energy of the particles increases, and the particles vibrate or move faster.
8	143	**Pressure** In Chapter 6, we learnt that pressure is the average force per unit area. For a thick book resting on a table top, the pressure due to the book is equal to its weight divided by the area of contact with the table. At the particle level, this pressure is the average force per unit area exerted by the particles of the book when they collide with the table surface.	Amend as follows: A solid only exerts pressure downwards on its base due to its weight but a fluid (liquid or gas) exerts pressure in all directions. When gas is trapped in a container, the particles exert pressure on all the inner walls of the container (Figure 8.8).
8	144	When there are many gas particles colliding with the inner wall of the container, the forces add up. The total force exerted by the gas per unit area is the pressure. ▶ At the particle level, pressure is the average force exerted by the particles per unit area.	Amend as follows: Gases exert pressure, which is the average force exerted by the particles per unit area.

Chapter	Page No.	Original	Change
8	144	**Worked Example 8B** (a) How does an increase in temperature affect the kinetic store of the particles in matter? (b) Containers A and B have the same number and type of particles at the same temperature. The volume of container B is larger than container A. Explain whether the two containers have the same gas pressure. **Answer** (a) When temperature increases, the average kinetic energy of the particles in the body increases. (b) No, the gas pressure in B is lower than in A. Since container B has a larger volume, the number of particles per unit volume decreases. Therefore, the gas particles collide less frequently with the inner wall of the container. This leads to a smaller average force exerted per unit area.	Amend as follows: (a) How does an increase in temperature affect the average kinetic energy of the particles in matter? (b) (i) Containers A and B have the same number and type of particles at the same temperature. The volume of container B is larger than container A. In which container do the gas particles collide more frequently with the walls of the container? (ii) Which container experiences a larger pressure due to the gas inside it? Answer (b) (i) Since container B has a larger volume, the number of particles per unit volume is lower than that in container A. Therefore, the gas particles in container A collide more frequently with the inner walls of the container. (ii) Container A experiences a larger gas pressure due to the larger average force exerted per unit area.
8	144	**Let's Practise 8.2** 1 A gas is kept in a container. (a) Explain what happens to the gas pressure in the container when the temperature of the container is increased. (b) Explain what happens to the gas pressure in the container after some gas is released from the container.	Amend as follows: (a) Explain what happens to the motion of the gas particles in the container when the temperature is increased. (b) Explain what happens to gas pressure in the container ~~after some gas is released from the container~~.
8	145		Delete "stores" from point 3.

Chapter	Page No.	Original	Change
8	145		Amend as follows: Gases exert pressure, which is the average force exerted by the particles per unit area.
8	146	Section B, Question 1 1 A container with a moveable piston is filled with some gas (Figure 8.10).  Figure 8.10 (a) Explain why the pressure in the container increases when the piston is pushed in. (b) Explain why a gas can be compressed but not a liquid. (c) Explain why the number of collisions per unit area inside the container decreases when the container is put inside a freezer.	Delete part (a).
9	156	 Figure 9.16 Order of the rate of emission or absorption of radiation	Delete "Lower surface temperature" and "Higher surface temperature".
9	164		Amend as follows: In metals, by the vibration of particles ~~and lattice vibration~~ and movement of electrons
10	169	▶ **Heat capacity** *C* of an object is the change of its internal energy per unit change in its temperature. ▶ $C = \frac{Q}{\Delta\theta}$ where Q = change in internal energy (J) by energy transfer $\Delta\theta$ = change in temperature (K or °C)	Amend as follows: **Heat capacity** *C* of an object is the change in amount of its internal energy per unit change in its temperature. where Q = amount of energy transferred (J) to or from the internal store of the object by heating

Chapter	Page No.	Original	Change
10	169	▶ **Specific heat capacity** *c* of a material is the change of its internal energy per unit mass for each unit change in its temperature. ▶ $c = \frac{C}{m} = (\frac{Q}{m\Delta\theta})$ where C = heat capacity (J/K or J/°C) Q = change in internal energy (J) by energy transfer m = mass of substance (kg) $\Delta\theta$ = change in temperature (K or °C)	Amend as follows: **Specific heat capacity** *c* of a material is the change in amount of its internal energy per unit mass for each unit change in its temperature. where *Q* = amount of energy transferred (J) to or from the internal store of the material by heating
14	258	 **Figure 14.57** Formation of a virtual image (*u* < *f*, where *u* is the object distance)	Change the red line arrow to dotted line arrow to indicate that it is virtual:  **Figure 14.57** Formation of a virtual image (*u* < *f*, where *u* is the object distance)
14	265	Figure 14.68 **1** Two mirrors are perpendicular to each other as shown in Figure 14.68.  **Figure 14.68**	Amend the arrows as follows: 
16	285	**Lighting displays in Singapore are a common sight. This dazzling display of lights will not be possible without electric currents. Ironically, we cannot see electric currents in most instances. We only recognise it when it flows through other objects. In our modern lives, as we learn how to harness and control it, electric currents has brought about many conveniences. It enables us to use our smartphones and the Internet. Electric currents also occurs in nature and is all around us. What are electric currents and how can we understand it?**	Amend as follows: …We only recognise them when they flow through other objects. In our modern lives, as we learn how to harness and control them, electric currents have brought many conveniences. They enable us to use our smartphones and the Internet. Electric currents also occur in nature and are all around us. What are electric currents and how can we understand them?
16	289	A common analogy for describing electric current flowing in a circuit is the flow of water. Consider the flow of water in Figure 16.7. For this analogy, it is also useful to think of water as the amount of charge. The battery is likened to the water pump and its e.m.f. is similar to the pumping action that creates the water flow. Energy in the chemical potential store is transferred to the kinetic store of the electric charge as it flows through the circuit.	Amend as follows: … chemical store of the battery is transferred …

Chapter	Page No.	Original	Change
16	289	 Figure 16.7 Using the flow of water as an analogy to describe electric current flowing in a circuit	Amend as follows: 
16	290	Let us look at Figure 16.7 again. Energy is transferred electrically from the chemical potential store of the battery to the kinetic (rotation) and internal (thermal) stores of the motor. The amount of electrical work done by each coulomb of charge passing through the motor is called the potential difference.	Amend as follows: Energy is transferred electrically from the chemical potential store of the battery to the kinetic ~~(rotation)~~ and internal ~~(thermal)~~ stores of the motor.
16	290	**Disciplinary Idea** Matter and energy make up the Universe. In this section, we see that energy transfers in electrical circuits are brought about by a flow of electric charge (matter) or current and are related to potential differences. For instance, the motor is able to turn (increase in kinetic store of the motor). This is brought about by running an electric current through the motor.	Amend as follows: …(increase in energy in the kinetic store of the motor).
16	293	**Learning Outcomes** • State that *resistance = p.d./current*. • Apply the relationship $R = V/I$ to new situations or to solve related problems. • Recall and apply the relationship of the proportionality between resistance and the length and cross-sectional area of a wire to new situations or to solve related problems. • Describe the effect of temperature increase on the resistance of a metallic conductor. • Sketch an interpret the I–V characteristic graphs for a metallic conductor at constant temperature (ohmic conductor), for a filament lamp and for a semiconductor diode.	Change to: Sketch and interpret…

<table>
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<tr><td>16</td><td>296</td><td>
Worked Example 16D
Wire P and wire Q are both made from the same materials. They are 10 m long. The resistance of wire P is 75 Ω and its cross-sectional area is 0.1 mm². If wire P has a cross-sectional area of 1 mm², what is the resistance of wire Q?

Thought Process
Since wire P and Q are made from the same material, they have the same value of constant k.
As the length of both wires are the same, the difference in the resistances of the wires is only dependent on the cross-sectional areas.

Answer
$R = k\frac{l}{A}$

For wire P and wire Q, we can write the relationship as: $R_p = \frac{k_R}{A_p}$
$k_p = R_pA_p$ ----- (1)

$R_Q = \frac{k_Q}{A_Q}$
$k_Q = R_QA_Q$ -----(2)

Since the wire are of the same material, $k_p = k_Q$
Equating equations 1 and 2: $\frac{R_Q}{R_p} = \frac{A_p}{A_Q}$
$R_Q = \frac{A_p}{A_Q}R_p = \frac{0.1}{1}(75) = 7.5\ \Omega$
</td><td>
Amend as follows:

Worked Example 16D
Wire P and wire Q are both made from the same materials. They are 10 m long. The resistance of wire P is 75 Ω and its cross-sectional area is 0.1 mm². If wire Q has a cross-sectional area of 1 mm², what is the resistance of wire Q?

Thought Process
Since wire P and Q are made from the same material, they have the same value of constant k.
As the length of both wires are the same, the difference in the resistances of the wires is only dependent on the cross-sectional areas.

Answer
$R = k\frac{l}{A}$

For wire P and wire Q, we can write the relationship as:
$R_p = \frac{k_pl_p}{A_p}$ ----- (1)
$R_Q = \frac{k_Ql_Q}{A_Q}$ -----(2)

Since the wire are of the same material, $k_p = k_Q$. In addition, $l_p = l_Q$.
Equating equations 1 and 2: $\frac{R_Q}{R_p} = \frac{A_p}{A_Q}$
$R_Q = \frac{A_p}{A_Q}R_p = \frac{0.1}{1}(75) = 7.5\ \Omega$
</td></tr>
<tr><td>16</td><td>297</td><td>
Conductors that do not have a direct proportional relationship between V and I are known as non-ohmic conductors. This is because the resistances of these conductors change as their temperature changes. A tungsten filament lamp is an example of a non-ohmic conductor. The resistance of tungsten increases as temperature increases. Other examples of non-ohmic conductors are **diodes** and negative temperature coefficient (NTC) **thermistors**.
</td><td>
Amend as follows:

A tungsten filament lamp is an example of a non-ohmic conductor. The resistances of non-ohmic conductors are not constant and they vary with temperature. In the case of tungsten, its resistance increases as the temperature increases.
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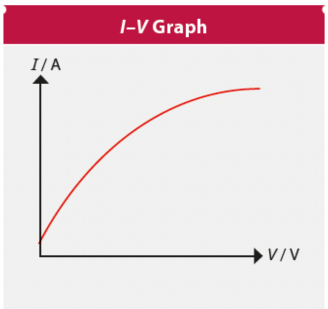
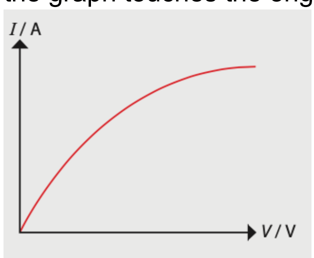
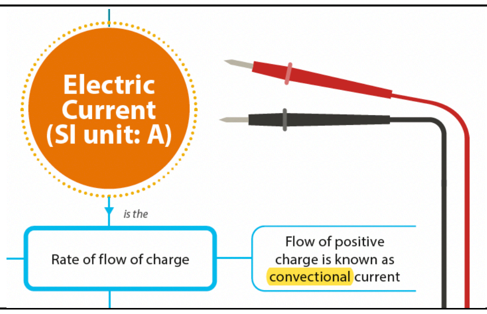
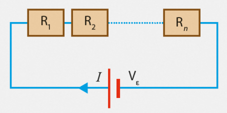
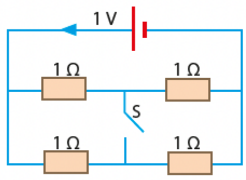
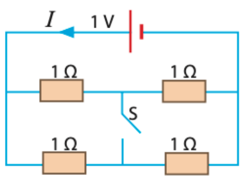
<tr><td>16</td><td>298</td><td>


</td><td>
Shift the horizontal axis up so that the graph touches the origin:


</td></tr>
<tr><td>16</td><td>298</td><td>
Procedure
1 Set up the apparatus according to the circuit diagram in Figure 16.20.
2 Adjust the rheostat to the maximum resistance so that the initial current is small. This also minimises heating of the rheostat.
3 Record the ammeter (I) and voltmeter (V) readings.
4 Adjust the rheostat to reduce the current by 1 A. Record the ammeter I and voltmeter V readings.
5 Repeat step 4 to obtain four more readings.
6 Plot V / V against I / A. Determine the gradient of the graph.
</td><td>
Change “reduce” to “increase”.
</td></tr>
<tr><td>16</td><td>300</td><td>


</td><td>
Change “convectional” to “conventional”.
</td></tr>
</table>

Chapter	Page No.	Original	Change
17	312	**Table 17.2** Effect of the different arrangements of electrical components on th potential difference of the circuit **Series Circuit** **Circuit Diagram**:  **Effective Resistance R_e**: $R_e = R_1 + R_2 + \ldots + R_n$ **Current in the Circuit**: $I = \frac{V_e}{R_e}$ **P.d. Across Any One Resistor R_i**: $V_i = IR_i$	Change “V_e” to “V_ε”.
17	313	**Series Circuits** ① The voltage across the bulbs in the series connection is half the voltage of the electromotive force of the dry cells. Voltage across each bulb = $\frac{V_e}{2}$ ② The current is the same at every point of the circuit. Current through each bulb = $\frac{V_e}{2R}$ ③ If one of the bulbs blows, the electrical path would be open and the other bulb will not lit up. **Figure 17.13** Comparison of series and parallel circuits	Change “lit” to “light”.
17	314	**Worked Example 17C** In Figure 17.14, calculate the p.d. V. **Thought Process** • To find the p.d. V, we need to know the value of the current I_1 flowing through the 1 Ω resistor since $V = (I_1)(1\ \Omega)$. • I_1 is half of I since $I = I_1 + I_2$ and $I_1 = I_2$ because the resistance in each branch is the same. • To find I_2, we need to know the effective resistance of the circuit. This can be done by first replacing R_1 and R_2 with an equivalent resistor. The effective resistance is the sum of the resistances of the equivalent resistor and the 1 Ω resistor.	Delete the subscript “2”.
17	317	This ratio of the resistances can also be expressed in terms of the length of the resistor or rheostat or the angle of turns of a potentiometer slider. Since R is proportional to I, V_1 and V_2 may be expressed as: $V_1 = \frac{I_1}{I_1 + I_2} V_s$ $V_2 = \frac{I_2}{I_1 + I_2} V_s$ where I_1 and I_2 are the equivalent lengths of R_1 and R_2	Replace “I_1” with “l_1” and “I_2” with “l_2”.
17	324	Section B, Question 5  **Figure 17.38**	Label current I:  **Figure 17.38**
18	334	**Damp Environment** A common misconception is that water and electricity should not come in contact due to a risk of electrocution. In fact, pure water does not conduct electricity. The water from taps and other sources usually contains charged ions and impurities that makes it a good conductor of electricity. For this reason, all activities in swimming pools must cease when there is a possibility of thunder strikes.	Change to: However, the water …

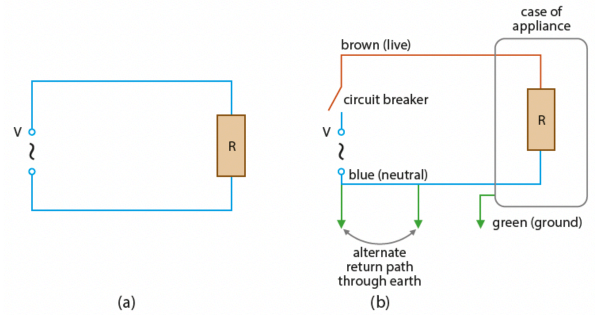
<table>
<tr><th>Chapter</th><th>Page No.</th><th>Original</th><th>Change</th></tr>
<tr><td>18</td><td>334</td><td>

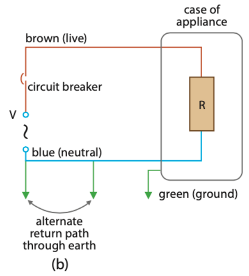
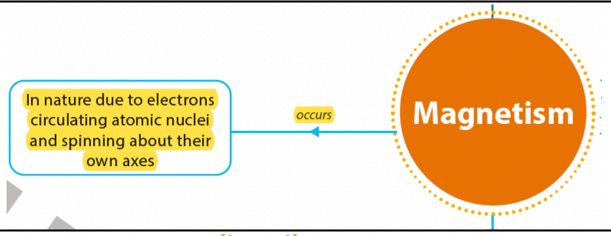
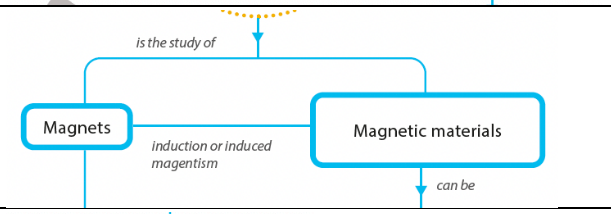
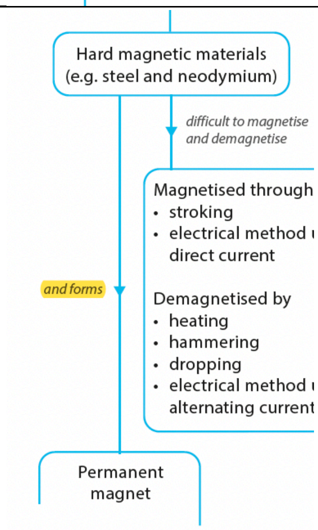
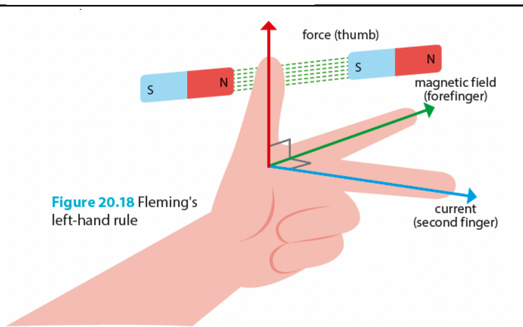
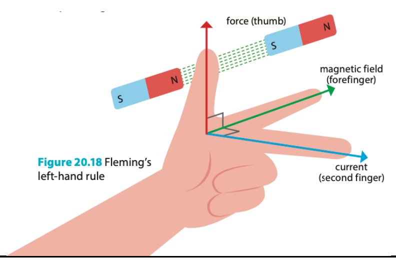
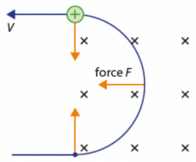
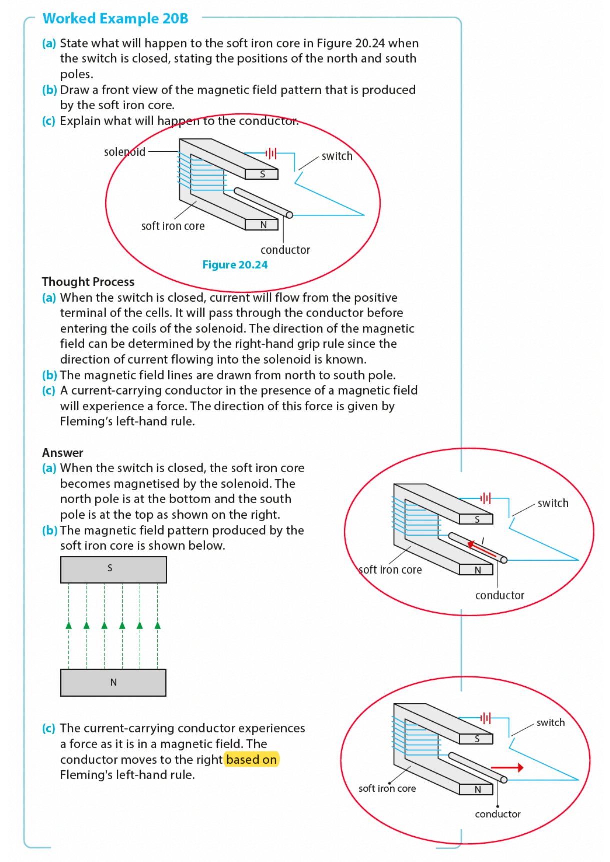
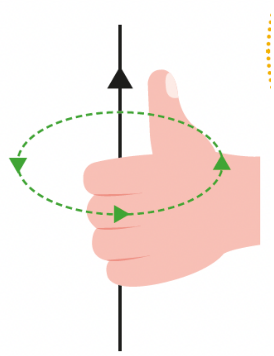
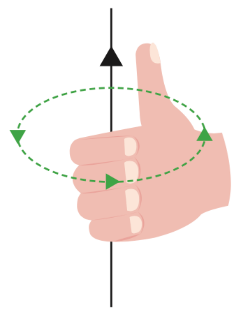
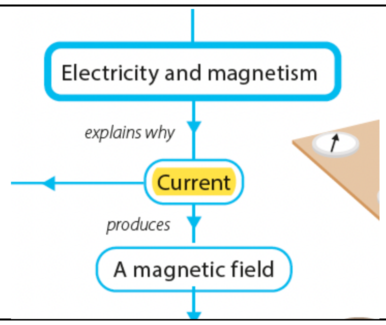
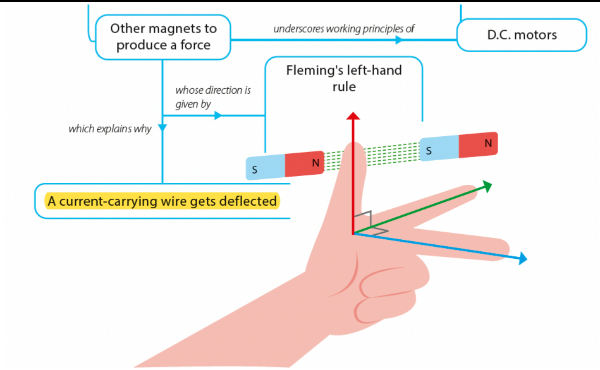
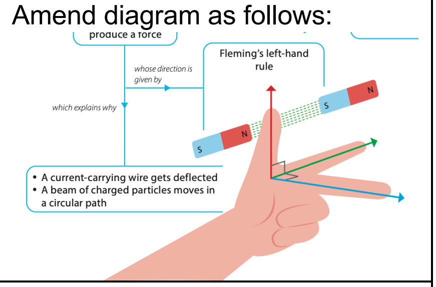
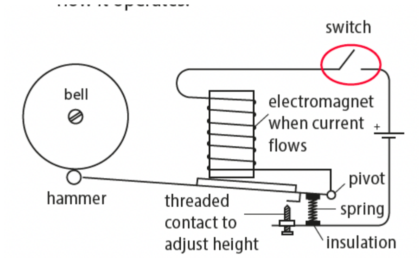
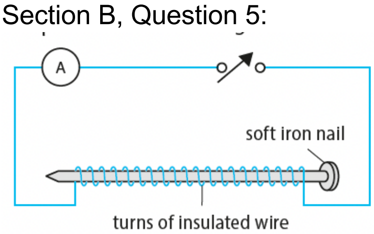
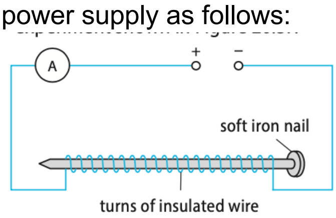
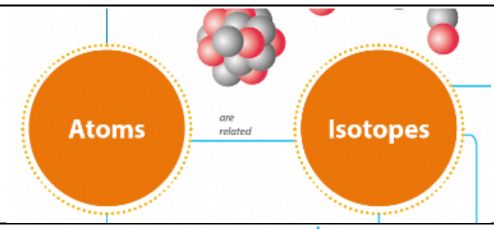
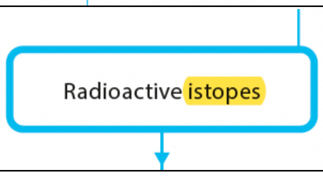
Figure 18.10 An alternating current circuit with (a) no safety features and (b) with safety features</td><td>Amend the symbol for circuit breaker:

</td></tr>
<tr><td>19</td><td>358</td><td>
</td><td>Delete the branch on how magnetism occurs.</td></tr>
<tr><td>19</td><td>358</td><td>
</td><td>Draw an arrow towards the left from “Magnetic materials” to “Magnets”.</td></tr>
<tr><td>19</td><td>358</td><td>
</td><td>Change to “can form”.</td></tr>
<tr><td>20</td><td>370</td><td>

Figure 20.18 Fleming's left-hand rule</td><td>Make the green dotted lines between N and S poles, and the green solid line representing magnetic field parallel:

</td></tr>
</table>

Chapter	Page No.	Original	Change
20	371	Figure 20.19(a) shows the force acting on a positively-charged particle as it moves through a magnetic field. The magnetic field shown is acting into the plane of the paper. The direction of current is the same as the direction of force on the charge, since the charge is positive. As the charge enters the magnetic field, the direction of force on the charge is given by Fleming's left-hand rule and is perpendicular to the path of travel. The resultant path is circular, with the force acting towards the centre of the circle.  (a) A positively charged particle entering a magnetic field	Change “force on” to “motion to”.
20	372	In order to maintain the anticlockwise rotation in Figure 20.20, the current flowing in the coil must always flow clockwise. This is achieved through the use of a split ring commutator. The split ring has two splits or gaps. As the coil rotates, it momentarily disconnects itself from the carbon brushes. At this point, the current from the cell is cut off from the coil and the momentum of the coil carries it past this position. Once the coil passes the vertical position, the split ring commutator comes into contact with the carbon brushes again. The current in the coil continues to flow in a clockwise manner.	Change “split ring” to “split-ring”.
20	372	As the coil rotates, it momentarily disconnects itself from the carbon brushes. At this point, the current from the cell is cut off from the coil and the momentum of the coil carries it past this position.	Rephrase to: …the current from the cell to the coil is cut off and the…”
20	372	**Figure 20.23** (a) Supply is cut-off momentarily when the coil is vertical and (b) current is maintained in a clockwise manner in the coil	Change “cut-off” to “cut off”.

Chapter	Page No.	Original	Change
20	373	 **Worked Example 20B** (a) State what will happen to the soft iron core in Figure 20.24 when the switch is closed, stating the positions of the north and south poles. (b) Draw a front view of the magnetic field pattern that is produced by the soft iron core. (c) Explain what will happen to the conductor. Figure 20.24 **Thought Process** (a) When the switch is closed, current will flow from the positive terminal of the cells. It will pass through the conductor before entering the coils of the solenoid. The direction of the magnetic field can be determined by the right-hand grip rule since the direction of current flowing into the solenoid is known. (b) The magnetic field lines are drawn from north to south pole. (c) A current-carrying conductor in the presence of a magnetic field will experience a force. The direction of this force is given by Fleming's left-hand rule. **Answer** (a) When the switch is closed, the soft iron core becomes magnetised by the solenoid. The north pole is at the bottom and the south pole is at the top as shown on the right. (b) The magnetic field pattern produced by the soft iron core is shown below. (c) The current-carrying conductor experiences a force as it is in a magnetic field. The conductor moves to the right based on Fleming's left-hand rule. 	Figure 20.24: Remove the labels "S" and "N". Figures under Answer: Amend open switches to closed switches. Third line of Answer (c): Change "based on" to "as determined by".
20	375		Amend as follows: 
20	375		Change to "Current or moving charge".

Chapter	Page No.	Original	Change
20	375		Text box with "A current-carrying wire gets deflected": Add a new point "A beam of charged particles moves in a circular path". Amend diagram as follows: 
20	377	Section B, Question 1  Figure 20.32	Change the open switch to closed switch.
20	377	Section B, Question 5:  Figure 20.37	Amend the symbol for d.c. power power supply as follows:  Figure 20.37
21	391	One of the main challenges in the transmission and distribution of electricity from power stations to households is the loss of power due to ohmic heating ($P = I^2R$) in the cables. If very large currents are transmitted, then losses can be very high due to the squaring effect of current in the power loss equation. For instance, if the current transmitted is 20 kA and the resistance in the cable is 0.01 Ω. Then, even at such a low resistance, the power loss would be 4 MW. This will cause a heating effect in the power cables.	Change to: …is 0.01 Ω, then even…
22	417	 **Reduce exposure time** An experimental set-up should be prepared first before introducing the radioactive source. Experiments involving radioactive materials should only be carried out in designated locations. These locations should only be used for work that requires the use of ionising radiation.	Add the following at the end of the second paragraph: Personnel working in these locations should have their time spent monitored.

Chapter	Page No.	Original	Change
22	417	 **Storage** Store a radioactive material in a sealed container that will absorb the radiation from the source. This prevents the nuclear radiation from penetrating through the container and escaping into the air. For instance, a instance of radioactive material must be stored in a lead box. The boxes should also be clearly labelled and kept in a secure place that is not easily accessible by anyone.	Change to: For instance, a sample of…
22	418		Delete "are related".
22	418		Change to "isotopes".
Answers	423	**Chapter 11: General Wave Properties I: Introduction** **Let's Review** **Section A: Multiple-choice Questions** 1 A 2 D 3 B 4 C 5 D	Amend answer to "C".
Answers	423	**Chapter 13: Electromagnetic Waves** **Let's Review** **Section A: Multiple-choice Questions** 1 A 2 C 3 D 4 B 5 C **Section B: Structured Questions** 2 (a) 0% (b) 30% 5 (a) 1.0×10^6 (b) 3.3×10^{-6} s or 3.3 μs (c) 82.5×10^{-6} m	Amend answers as follows: (b) 6.7×10^{-6} s (c) 1.7×10^{-4} m
Answers	423	**Chapter 14: Light** **Let's Practise 14.2** 1 1 2 1 **Let's Practise 14.4** 1 (a) 0.80 cm, 3.0 cm 2 (a) 6.0 cm, 6.0 cm **Let's Review** **Section A: Multiple-choice Questions** 1 D 2 B 3 A 4 C 5 C	Amend answers as follows: 1. B 2. A 3. D

<table>
<tr><th>Chapter</th><th>Page No.</th><th>Original</th><th>Change</th></tr>
<tr><td>Answers</td><td>424</td><td>

Chapter 18: Practical Electricity

Let's Practise 18.1
1 2400 W
2 $3.84

Let's Review
Section A: Multiple-choice Questions
1 A 2 A 3 C 4 A 5 D

Section B: Structured Questions
2 $0.72
4 (a) 56.52 A
(b)

<table>
<tr><th>Type of Washing Machine</th><th>Fuse Rating / A</th></tr>
<tr><td>5 kg load</td><td>3</td></tr>
<tr><td>10 kg load</td><td>5</td></tr>
<tr><td>15 kg load</td><td>10</td></tr>
</table>

5 (a) 8.83 kW h
(b) $1.77
(c) 55.2 hours

</td><td>Amend answer to "552 hours".</td></tr>
<tr><td>Answers</td><td>424</td><td>

Chapter 20: Electromagnetism

Let's Review
Section A: Multiple-choice Questions
1 D 2 B 3 C 4 D 5 C

</td><td>Amend answer to "C".</td></tr>
<tr><td>Quick Revision Guide</td><td>427</td><td>

- **Internal energy** consists of the kinetic energy associated with the random motion of the particles and the total potential energy between the particles in the system.
- **Heat capacity** *C* of an object is the change of its internal energy per unit change in its temperature.

▶ $C = \frac{Q}{\Delta\theta}$ where Q = change in internal energy (J) by energy transfer
$\Delta\theta$ = change in temperature (K or °C)

</td><td>

Amend as follows:

Heat capacity *C* of an object is the change in amount of its internal energy per unit change in its temperature.

where *Q* = amount of energy transferred (J) to or from the internal store of the object by heating

</td></tr>
<tr><td>Quick Revision Guide</td><td>428</td><td>

- **Specific heat capacity** *c* of a material is the change of its internal energy per unit mass for each unit change in its temperature.

▶ $c = \frac{C}{m} = \left(\frac{Q}{m\Delta\theta}\right)$ where C = heat capacity (J/K or J/°C)
Q = change in internal energy (J) by energy transfer
m = mass of substance (kg)
$\Delta\theta$ = change in temperature (K or °C)

</td><td>

Amend as follows:

Specific heat capacity *c* of a material is the change in amount of its internal energy per unit mass for each unit change in its temperature.

where *Q* = amount of energy transferred (J) to or from the internal store of the material by heating

</td></tr>
</table>