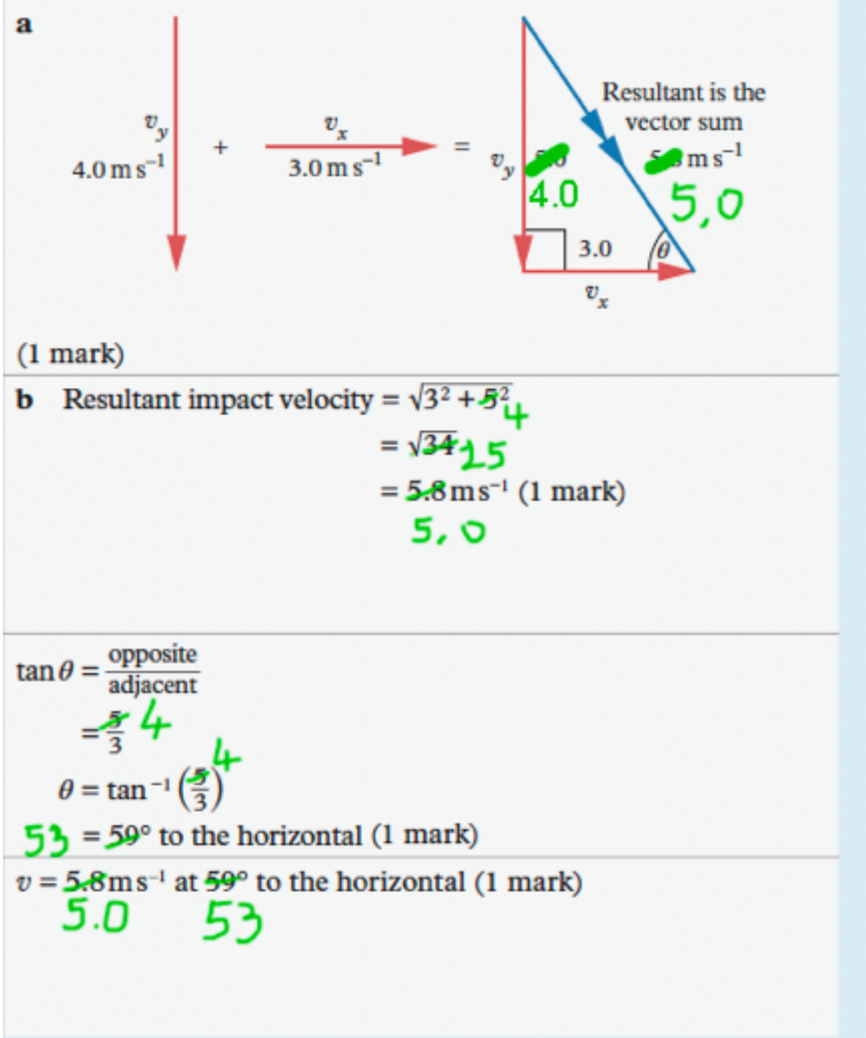
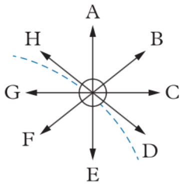
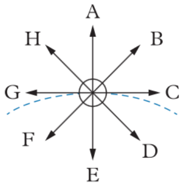
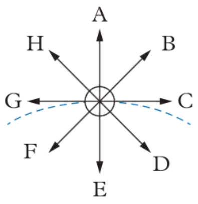
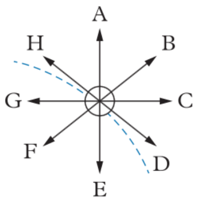
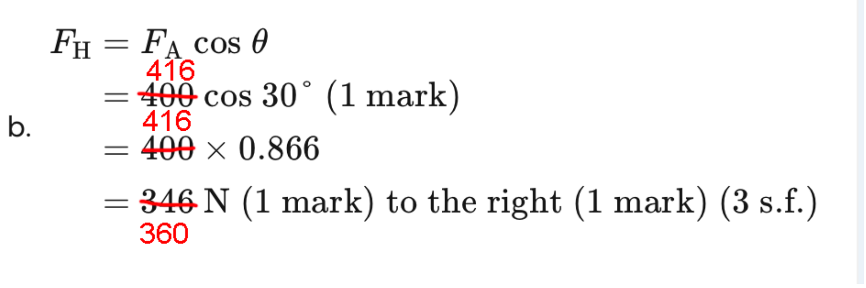
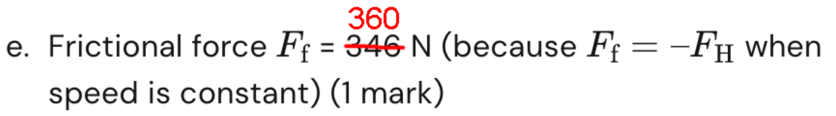
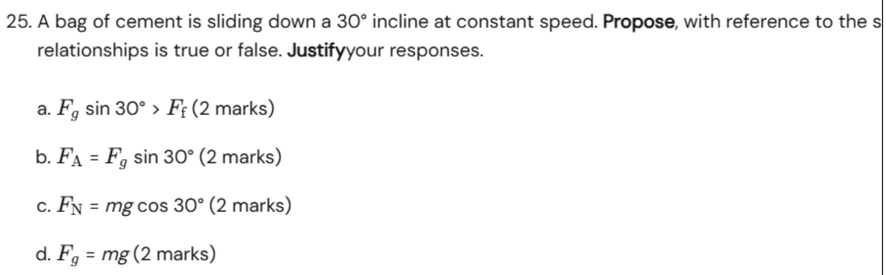
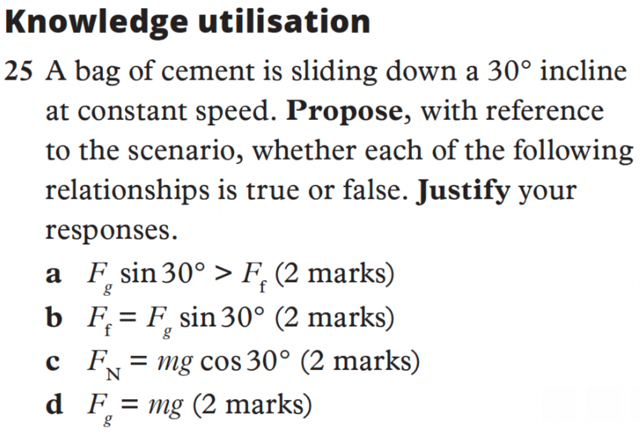
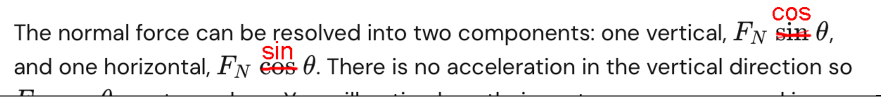
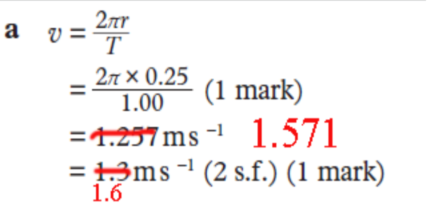
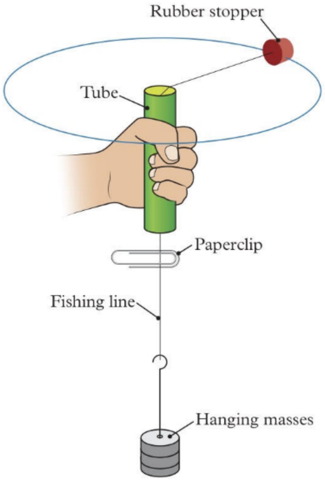
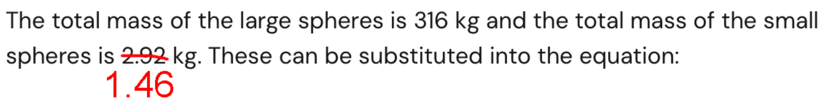
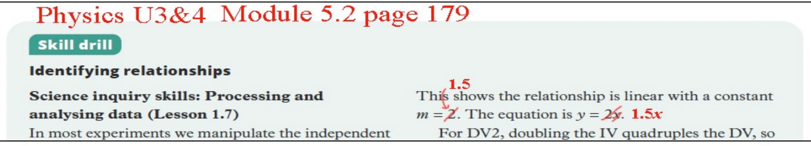
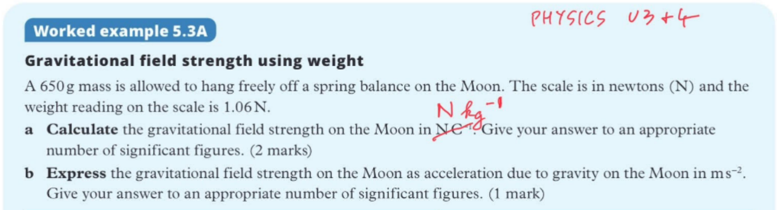
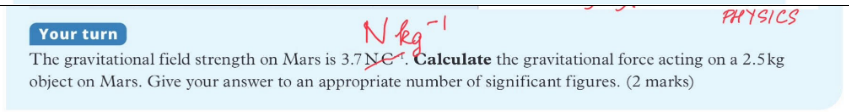
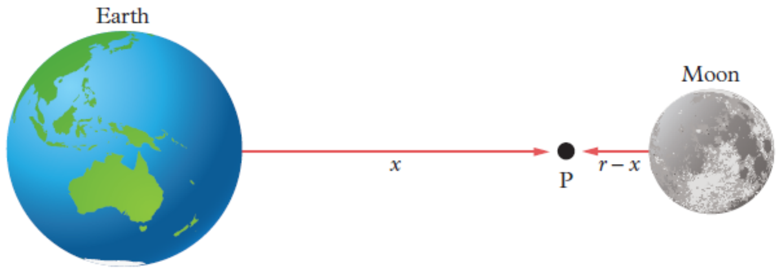
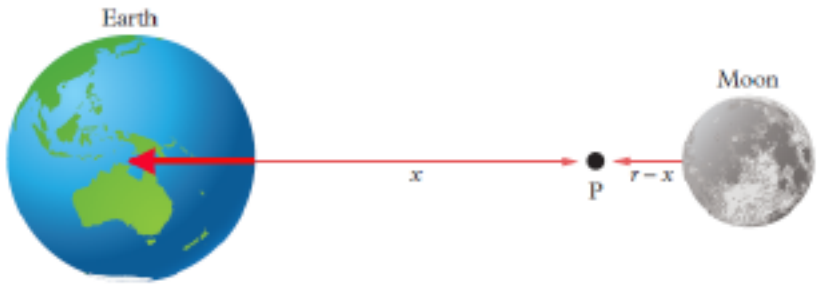
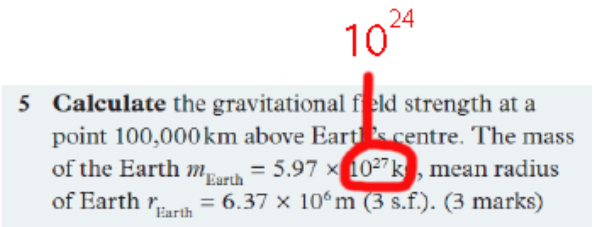
ERRATA U 3& 4

OXFORD *PHYSICS FOR QUEENSLAND* U3&4 (2025)

Module	Correction being made	Digital updated
2.1 WE2.1D page 58	Step 2: v_y should be 4.0 not 5.0, and other values as shown:  **a** (1 mark) **b** Resultant impact velocity = $\sqrt{3^2 + \cancel{5}^2}$ 4 = $\sqrt{\cancel{34}}$ 25 = ~~5.8~~ m s^{-1} (1 mark) 5.0 $\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$ $= \frac{\cancel{5}}{3}$ 4 $\theta = \tan^{-1}\left(\frac{\cancel{5}}{3}\right)$ 4 53 = ~~59~~° to the horizontal (1 mark) v = ~~5.8~~ m s^{-1} at ~~59~~° to the horizontal (1 mark) 5.0 53	No 6.3.26
2.5A Review Q6	Swap diagrams for (b) and (c) b. at its highest point  c. shortly before it hits the ground.  SHOULD BE:	No 6.3.26

	b. at its highest point  c. shortly before it hits the ground.  	
3.2 WE3.2D (b) and (e) page 108	Change b and e as shown below:  b. $F_H = F_A \cos\theta$ $= \overset{416}{\cancel{400}} \cos 30^\circ$ (1 mark) $= \overset{416}{\cancel{400}} \times 0.866$ $= \underset{360}{\cancel{346}}$ N (1 mark) to the right (1 mark) (3 s.f.)  e. Frictional force F_f = $\overset{360}{\cancel{346}}$ N (because $F_f = -F_H$ when speed is constant) (1 mark)	No 6.3.26
3.5 Review Questions	U3& 4. Module 3.5 Review Questions (Q25b)  25. A bag of cement is sliding down a 30° incline at constant speed. **Propose**, with reference to the s relationships is true or false. **Justify**your responses. a. $F_g \sin 30° > F_f$ (2 marks) b. $F_A = F_g \sin 30°$ (2 marks) c. $F_N = mg \cos 30°$ (2 marks) d. $F_g = mg$ (2 marks) The book view and the digital answers have the correct symbols for Q25b. The symbol on the right above for (b) should be F_f NOT F_A as shown correctly below:  **Knowledge utilisation** 25 A bag of cement is sliding down a 30° incline at constant speed. **Propose**, with reference to the scenario, whether each of the following relationships is true or false. **Justify** your responses. **a** $F_g \sin 30° > F_f$ (2 marks) **b** $F_f = F_g \sin 30°$ (2 marks) **c** $F_N = mg \cos 30°$ (2 marks) **d** $F_g = mg$ (2 marks)	

4.3 CYL4.3 Q 11b answer	**b** **Determine** how much time it takes the car to complete one lap of the circular track. (2 marks) Original answer $v = \frac{2\pi r}{T}$ $T = \frac{2\pi \times 80}{25}$ (1 mark) $= 20\,\text{s}$ (1 mark) CORRECT ANSWER The car was found in part (a) to not be able to navigate the corner as there was not enough friction to keep it on the road. (1 mark) The car would not be able to complete one lap. (1 mark)	No 6.3.26
4.3 page 159	The normal force can be resolved into two components: one vertical, F_N ~~sin~~ cos θ, and one horizontal, F_N ~~cos~~ sin θ. There is no acceleration in the vertical direction so	No 6.3.26
4.3 WE4.3E (a) Step 2 page 155	**a** $v = \frac{2\pi r}{T}$ $= \frac{2\pi \times 0.25}{1.00}$ (1 mark) = ~~1.257~~ ms $^{-1}$ 1.571 = ~~1.3~~ 1.6 ms $^{-1}$ (2 s.f.) (1 mark)	No 6.3.26
4.5 ReviewQ 4.5A Q4 page 164	ur workbook. **4** A student is investigating centripetal motion by whirling a rubber stopper of mass M above his head in a horizontal circle at constant speed.  They increase the mass, m, of the hanging slotted masses but want to keep the radius, r, constant. To do this, they must **A** increase ~~m~~ M or v. **B** increase ~~m~~ M or decrease v. **C** decrease ~~m~~ M or increase v. **D** decrease ~~m~~ M or v.	No 6.3.26

5.2 Page 179 (above Skill drill)	Change 2.92 to 1.46  The total mass of the large spheres is 316 kg and the total mass of the small spheres is ~~2.92~~ 1.46 kg. These can be substituted into the equation:	No 6.3.26
5.2 Skill Drill page 179	 Physics U3&4 Module 5.2 page 179 **Skill drill** **Identifying relationships** **Science inquiry skills: Processing and analysing data (Lesson 1.7)** In most experiments we manipulate the independent This shows the relationship is linear with a constant m = ~~2~~ 1.5. The equation is y = ~~2x~~. 1.5x For DV2, doubling the IV quadruples the DV, so	no 6.3.26
5.3 WE5.3A page 185	 **Worked example 5.3A** PHYSICS U3+4 **Gravitational field strength using weight** A 650 g mass is allowed to hang freely off a spring balance on the Moon. The scale is in newtons (N) and the weight reading on the scale is 1.06 N. **a** **Calculate** the gravitational field strength on the Moon in ~~N C^{-1}~~ N kg^{-1}. Give your answer to an appropriate number of significant figures. (2 marks) **b** **Express** the gravitational field strength on the Moon as acceleration due to gravity on the Moon in m s^{-2}. Give your answer to an appropriate number of significant figures. (1 mark)	no 10.1.26
5.3 WE5.3A. Your turn, page 185	 **Your turn** PHYSICS The gravitational field strength on Mars is 3.7 ~~N C^{-1}~~ N kg^{-1}. **Calculate** the gravitational force acting on a 2.5 kg object on Mars. Give your answer to an appropriate number of significant figures. (2 marks)	no 10.1.26
5.3 Fig 5 page 188	 Red line should extend to centre of Earth and have an arrow head  	no 6.3.26
5.3 CYL5.3 Q 5 page 195	 10^{24} 5 **Calculate** the gravitational field strength at a point 100,000 km above Earth's centre. The mass of the Earth m_{Earth} = 5.97 × 10^{27} kg, mean radius of Earth r_{Earth} = 6.37 × 10^6 m (3 s.f.). (3 marks)	no 6.3.26
5.3 WE5.3E Step 6, page 193	Change 0.4117 to 0.4103	No 6.3.26

<table>
<tr>
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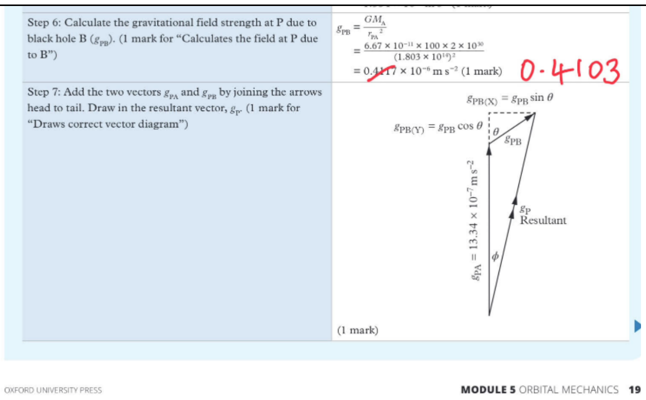
<td>
Step 6: Calculate the gravitational field strength at P due to black hole B (g_{PB}). (1 mark for "Calculates the field at P due to B")
$g_{PB} = \frac{GM_A}{r_{PA}^2}$
$= \frac{6.67 \times 10^{-11} \times 100 \times 2 \times 10^{30}}{(1.803 \times 10^{14})^2}$
$= 0.\cancel{4117} \times 10^{-6}$ m s^{-2} (1 mark) 0·4103
Step 7: Add the two vectors g_{PA} and g_{PB} by joining the arrows head to tail. Draw in the resultant vector, g_P. (1 mark for "Draws correct vector diagram")

(1 mark)
OXFORD UNIVERSITY PRESS
MODULE 5 ORBITAL MECHANICS 19</td>
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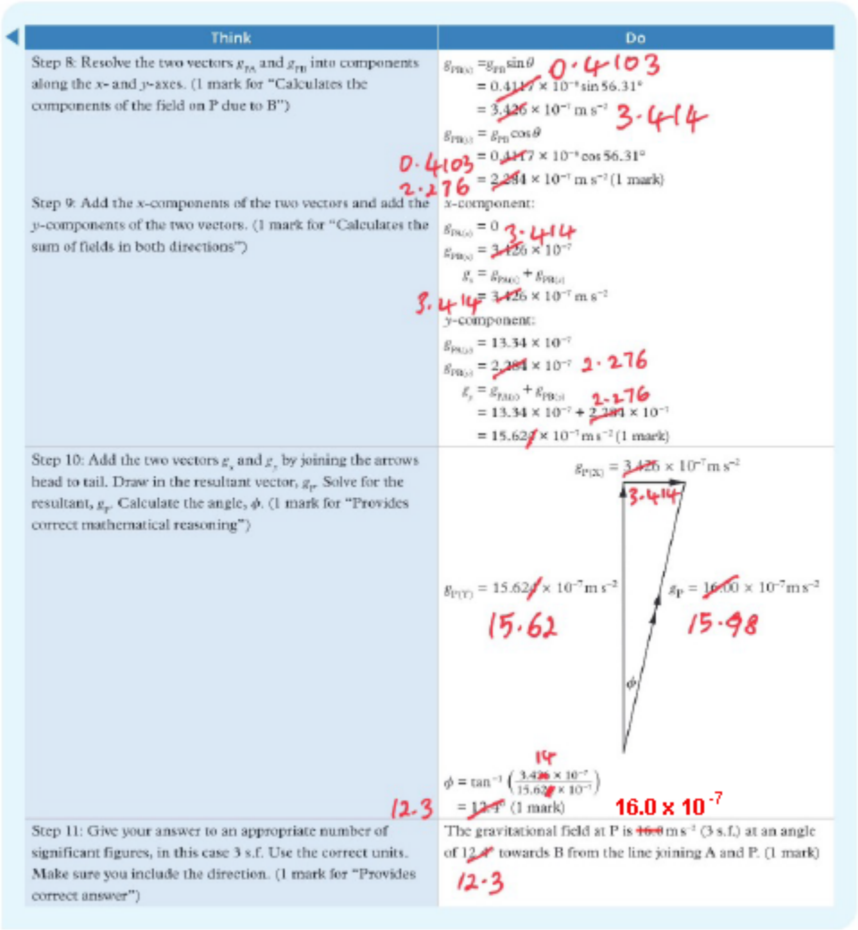
<tr>
<td>5.3 WE5.3E page 194</td>
<td>
Think | Do
Step 8: Resolve the two vectors g_{PA} and g_{PB} into components along the x- and y-axes. (1 mark for "Calculates the components of the field on P due to B")
$g_{PB(x)} = g_{PB} \sin\theta$ 0·4103
$= 0.\cancel{4117} \times 10^{-6} \sin 56.31°$
$= 3.\cancel{426} \times 10^{-7}$ m s^{-2} 3·414
$g_{PB(y)} = g_{PB} \cos\theta$
0·4103 $= 0.\cancel{4117} \times 10^{-6} \cos 56.31°$
2·276 $= \cancel{2.284} \times 10^{-7}$ m s^{-2} (1 mark)
Step 9: Add the x-components of the two vectors and add the y-components of the two vectors. (1 mark for "Calculates the sum of fields in both directions")
x-component:
$g_{PA(x)} = 0$ 3·414
$g_{PB(x)} = \cancel{3.426} \times 10^{-7}$
$g_x = g_{PA(x)} + g_{PB(x)}$
3.414 $= \cancel{3.426} \times 10^{-7}$ m s^{-2}
y-component:
$g_{PA(y)} = 13.34 \times 10^{-7}$
$g_{PB(y)} = \cancel{2.284} \times 10^{-7}$ 2·276
$g_y = g_{PA(y)} + g_{PB(y)}$ 2·276
$= 13.34 \times 10^{-7} + \cancel{2.284} \times 10^{-7}$
$= 15.62\cancel{4} \times 10^{-7}$ m s^{-2} (1 mark)
Step 10: Add the two vectors g_x and g_y by joining the arrows head to tail. Draw in the resultant vector, g_P. Solve for the resultant, g_P. Calculate the angle, ϕ. (1 mark for "Provides correct mathematical reasoning")

14
$\phi = \tan^{-1}\left(\frac{3.4\cancel{26} \times 10^{-7}}{15.62\cancel{4} \times 10^{-7}}\right)$
12·3 $= \cancel{12.4}°$ (1 mark) 16.0 x 10 $^{-7}$
Step 11: Give your answer to an appropriate number of significant figures, in this case 3 s.f. Use the correct units. Make sure you include the direction. (1 mark for "Provides correct answer")
The gravitational field at P is ~~16.0~~ m s^{-2} (3 s.f.) at an angle of ~~12.4°~~ towards B from the line joining A and P. (1 mark)
12·3

Note also: The first line in Step 11 should read "The gravitational field at P is 16.0 × 10^{-7} ms^{-1} (3 s. f.) …….</td>
<td>No 6.326</td>
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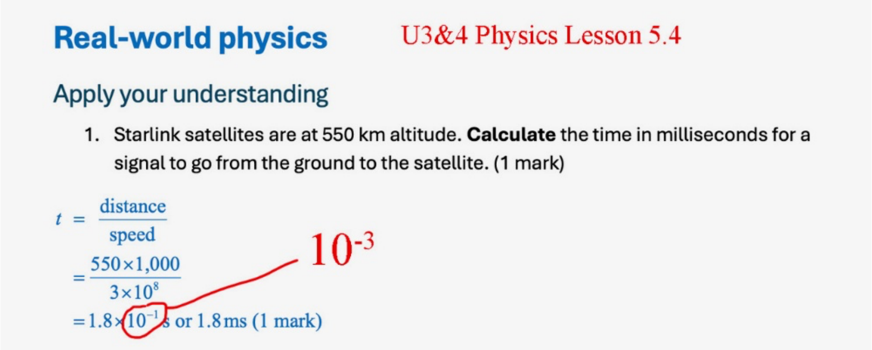
<td>5.4 Answers</td>
<td>
Real-world physics U3&4 Physics Lesson 5.4
Apply your understanding
1. Starlink satellites are at 550 km altitude. **Calculate** the time in milliseconds for a signal to go from the ground to the satellite. (1 mark)
$t = \frac{\text{distance}}{\text{speed}}$
$= \frac{550 \times 1{,}000}{3 \times 10^8}$
$= 1.8 \times 10^{-1}$ s or 1.8 ms (1 mark)
10^{-3}</td>
<td>No 6.3.26</td>
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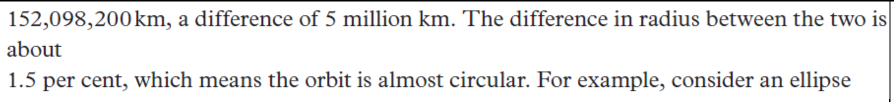
<tr>
<td>5.4 p 198, print copy only</td>
<td>
152,098,200 km, a difference of 5 million km. The difference in radius between the two is about
1.5 per cent, which means the orbit is almost circular. For example, consider an ellipse

Remove space between "about" and "1.5 per cent"</td>
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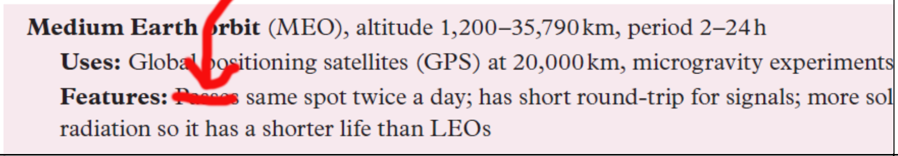
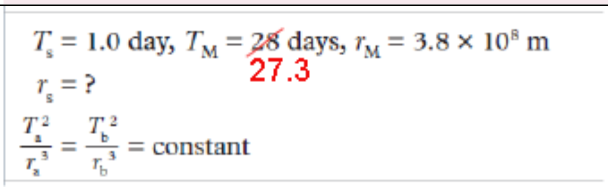
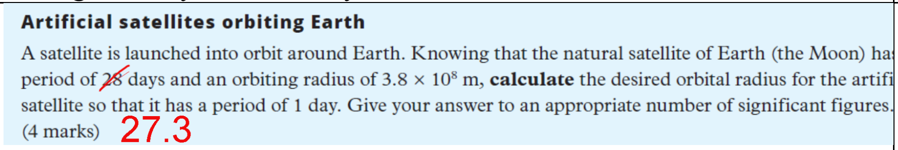
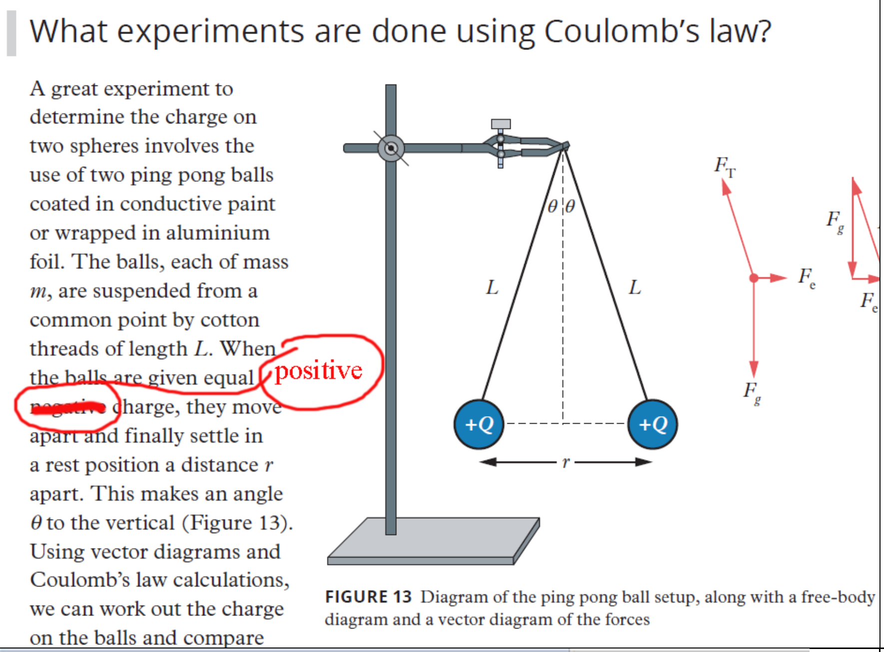
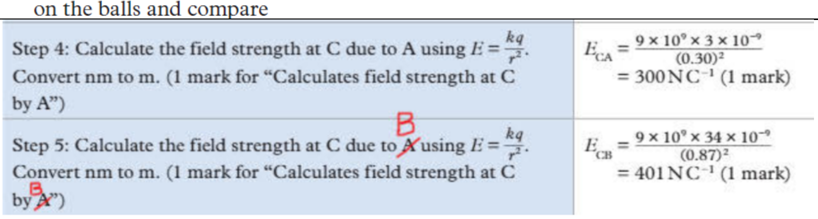
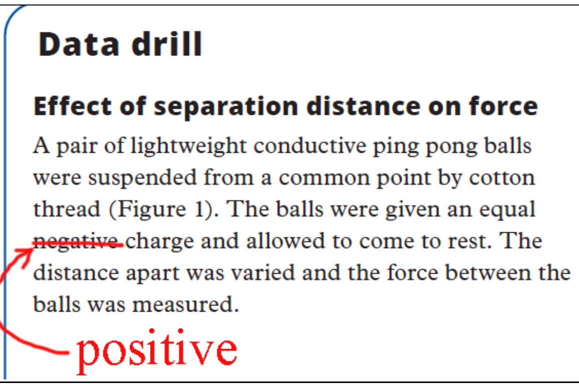
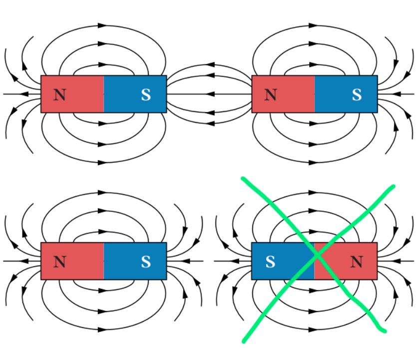
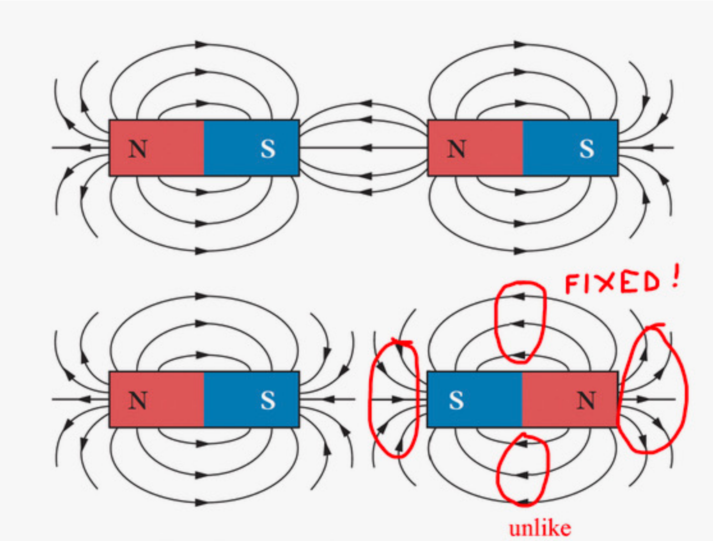
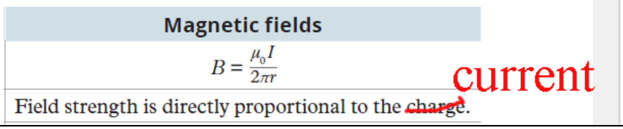
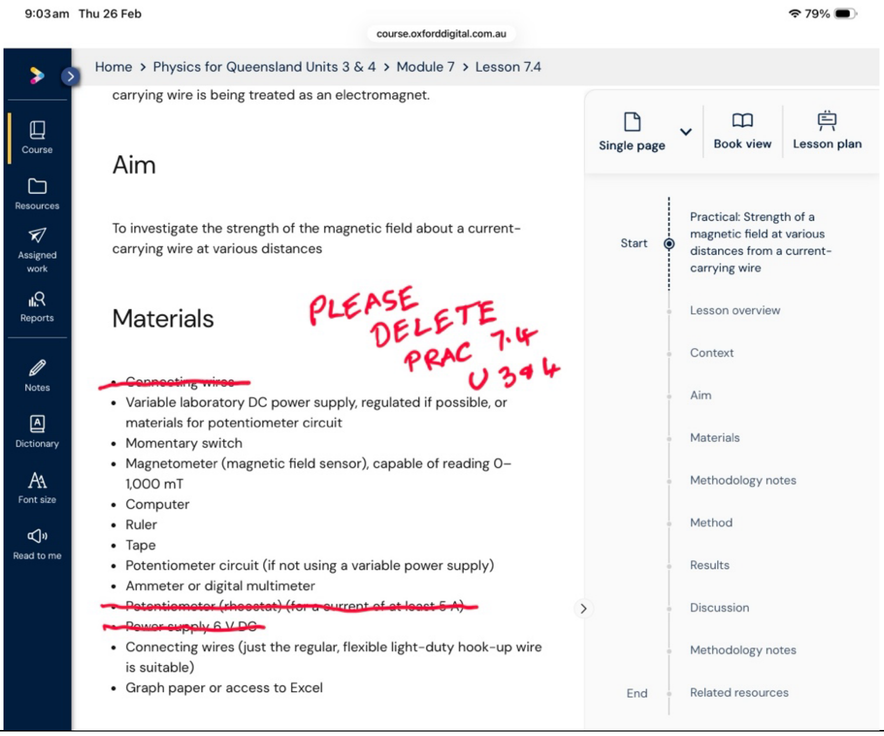
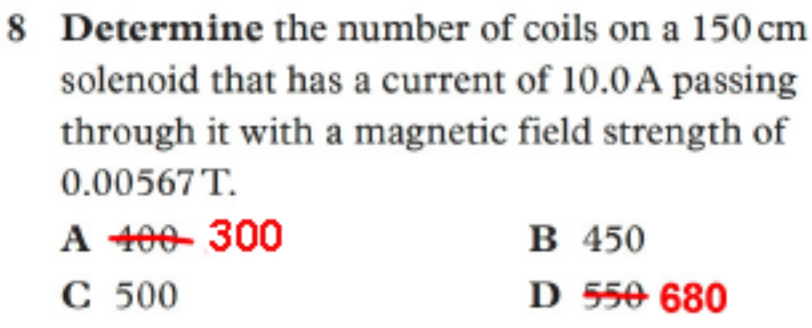
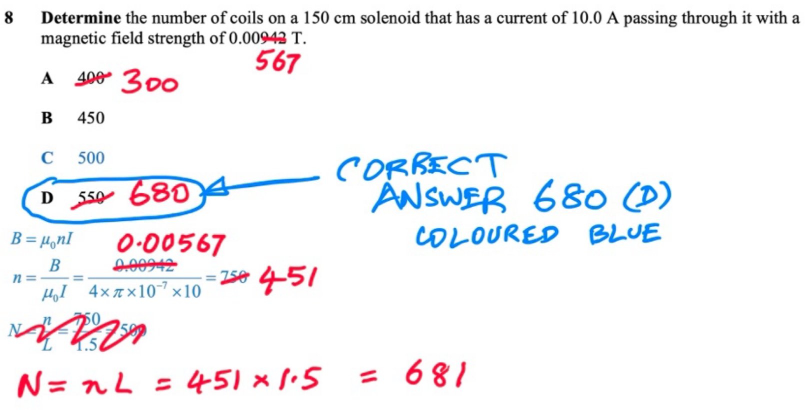
5.4 Real World P207	Most pass the  **Medium Earth orbit** (MEO), altitude 1,200–35,790 km, period 2–24 h **Uses:** Global positioning satellites (GPS) at 20,000 km, microgravity experiments **Features:** ~~Passes~~ same spot twice a day; has short round-trip for signals; more sol radiation so it has a shorter life than LEOs	No 6.3.26
5.4 WE 5.4B Step 2, Page 203	 T_s = 1.0 day, T_M = ~~28~~ days, $r_M = 3.8 \times 10^8$ m 27.3 r_s = ? $\frac{T_a^2}{r_a^3} = \frac{T_b^2}{r_b^3}$ = constant Change 28 days to 27.3 days	no 10.1.26
5.4 WE5.4B page 203	 **Artificial satellites orbiting Earth** A satellite is launched into orbit around Earth. Knowing that the natural satellite of Earth (the Moon) ha period of ~~28~~ days and an orbiting radius of 3.8×10^8 m, **calculate** the desired orbital radius for the artifi satellite so that it has a period of 1 day. Give your answer to an appropriate number of significant figures. (4 marks) 27.3 …change 28 days (line 3) to 27.3 days	no 10.1.26
6.1 page 232	 What experiments are done using Coulomb's law? A great experiment to determine the charge on two spheres involves the use of two ping pong balls coated in conductive paint or wrapped in aluminium foil. The balls, each of mass *m*, are suspended from a common point by cotton threads of length *L*. When the balls are given equal ~~negative~~ positive charge, they move apart and finally settle in a rest position a distance *r* apart. This makes an angle *θ* to the vertical (Figure 13). Using vector diagrams and Coulomb's law calculations, we can work out the charge on the balls and compare **FIGURE 13** Diagram of the ping pong ball setup, along with a free-body diagram and a vector diagram of the forces	no 10.1.26
6.2 WE6.2D	 Step 4: Calculate the field strength at C due to A using $E = \frac{kq}{r^2}$. Convert nm to m. (1 mark for "Calculates field strength at C by A") $E_{CA} = \frac{9 \times 10^9 \times 3 \times 10^{-9}}{(0.30)^2} = 300\,NC^{-1}$ (1 mark) Step 5: Calculate the field strength at C due to ~~A~~ B using $E = \frac{kq}{r^2}$. Convert nm to m. (1 mark for "Calculates field strength at C by ~~A~~ B") $E_{CB} = \frac{9 \times 10^9 \times 34 \times 10^{-9}}{(0.87)^2} = 401\,NC^{-1}$ (1 mark)	no 6.3.26
6.5 Data Drill page 270	 **Data drill** **Effect of separation distance on force** A pair of lightweight conductive ping pong balls were suspended from a common point by cotton thread (Figure 1). The balls were given an equal ~~negative~~ charge and allowed to come to rest. The distance apart was varied and the force between the balls was measured. positive	no 10.1.26

7.1 Fig 3	 Change the diagram in the bottom right (above) to look like this (below). Note that the arrow heads have been corrected.  **FIGURE 3** Field lines around two magnets with ~~like~~ unlike poles facing, and with ~~un~~like poles facing	No 6.3.26
7.2 Table 1 page 284	 **Magnetic fields** $B = \frac{\mu_0 I}{2\pi r}$ Field strength is directly proportional to the ~~charge~~ current.	no 6.3.26

7.4 Experiment	 carrying wire is being treated as an electromagnet. **Aim** To investigate the strength of the magnetic field about a current-carrying wire at various distances **Materials** PLEASE DELETE 7.4 PRAC U3&4 • ~~Connecting wires~~ • Variable laboratory DC power supply, regulated if possible, or materials for potentiometer circuit • Momentary switch • Magnetometer (magnetic field sensor), capable of reading 0–1,000 mT • Computer • Ruler • Tape • Potentiometer circuit (if not using a variable power supply) • Ammeter or digital multimeter • ~~Potentiometer (rheostat) (for a current of at least 5 A)~~ • ~~Power supply 6 V DC~~ • Connecting wires (just the regular, flexible light-duty hook-up wire is suitable) • Graph paper or access to Excel	
7.6E Your turn (after worked solution to 7.6E)	YOUR TURN Existing answer (to be replaced) $q = 3.2\times10^{-19}\ \text{C},\ v = 1.8\times10^{7}\ \text{m s}^{-1},\ B = 345\ \mu\text{T} = 3.45\times10^{-4}\ \text{T},\ \theta = 35^\circ$ to the $F = qvB\sin\theta$ $= 3.2\times10^{-19}\times1.8\times10\times3.45\times10^{-4}\times\sin35^\circ\ \ (1\ \text{mark})$ $= 1.139\times10^{-7}\ \text{N}\ \ (1\ \text{mark})$ $= 1.1\times10^{-7}\ \text{N}\ \ (1\ \text{mark})$ NEW ANSWER $v = 1.8\times10^{7}\ \text{m s}^{-1},\ B = 345\ \mu\text{T} = 3.45\times10^{-4}\ \text{T}$ $q = 3.2\times10^{-19}\ \text{C}\ \ (1\text{mark})$ $\theta = 90^\circ$ to the field $(1\ \text{mark})$ $F = qvB\sin\theta$ $= 3.2\times10^{-19}\times1.8\times10^{7}\times3.45\times10^{-4}\times\sin90^\circ\ \ (1\ \text{mark})$ $= 1.99\times10^{-15}\ \text{N}$ $= 2.0\times10^{-15}\ \text{N}\ \ (1\ \text{mark})$	

7.9A MCQ Q8 page 316	 8 **Determine** the number of coils on a 150 cm solenoid that has a current of 10.0 A passing through it with a magnetic field strength of 0.00567 T. **A** ~~400~~ 300 **B** 450 **C** 500 **D** ~~550~~ 680	Advised 7.3.26
7.9A MCQ Q8 answer	 8 **Determine** the number of coils on a 150 cm solenoid that has a current of 10.0 A passing through it with a magnetic field strength of 0.00~~942~~ 567 T. **A** ~~400~~ 300 **B** 450 **C** 500 **D** ~~550~~ 680 CORRECT ANSWER 680 (D) COLOURED BLUE $B=\mu_0 nI$ $n=\frac{B}{\mu_0 I}=\frac{\cancel{0.00942}\ 0.00567}{4\times\pi\times10^{-7}\times10}=\cancel{750}\ 451$ $\cancel{N=\frac{n}{L}=\frac{750}{1.5}=500}$ $N=nL=451\times1.5=681$	Advised 7.3.26
7.9 CYL7.9 Q11	Change answer to option A (not B) and replace the answer with the one below. NEW ANSWER **A** To the right [correct answer] **B** To the left **C** Down the page **D** Up the page The field at Z due to X, B_{ZX}, is down the page (using the right-hand rule for wires) so the force on Z due to X, F_{ZX}, is repulsive (to the right, using Fleming's right-hand rule for solenoids, or the right-hand palm rule). The field at Z due to Y, B_{ZY}, is up the page (using the right-hand rule for wires) so the force on Z due to Y, F_{ZY}, is attractive (to the left, using Fleming's right-hand rule for solenoids, or the right-hand palm rule). The net force on Z is to the left. This is because the distance from Y to Z is shorter that X to Z making the effect of Y greater than that of X.	Advised 7.3.26
8.4 Your turn (after 8.4C page 351) change to answers	Change answers to Your Turn as shown in red: **a** ~~No change~~ positive to the left (1 mark) **b** ~~positive to right~~ no change (1 mark) **c** positive to the right (1 mark) **d** positive to the left (1 mark)	Advised 7.3.26

8.5D Your turn after WE 8.5D	**Correct the question as shown below** **Your turn** A square coil with a side of 20 cm contains 6,500 turns. It is placed in a uniform magnetic field of 0.80 T with the plane of the loop perpendicular to the field. **Calculate** the frequency in revolutions per second (rps) that will generate a desired average EMF of 167.5 V. Express your answer to an appropriate number of significant figures. (4 marks)	Advised 7.3.26
8.5D Your turn after WE 8.5D	**Replace question and answer as shown below** **Your turn** A square coil with a side of 20 cm contains 6,500 turns. It is placed in a uniform magnetic field of 0.80 T with the plane of the loop perpendicular to the field. **Calculate** the frequency in revolutions per second (rps) that will generate a desired average EMF of 167.5 V. Express your answer to an appropriate number of significant figures. (4 marks) $\phi = BA\cos\theta,\ emf = -N\frac{\Delta\phi}{\Delta t}$ Since the angle goes from 90° to 0°, the change in flux depends on the cos component of the angle which goes from 0 to 1. $emf = \frac{-N\times BA(\cos 0^\circ - \cos 90^\circ)}{\Delta t}$ (1 mark) $\Delta t = \frac{-N\times BA(\cos 0^\circ - \cos 90^\circ)}{emf}$ $= \frac{6,500\times 0.80\times 0.20\times 0.20(1-0)}{167.5}$ $= 1.2418\text{ s}$ (1 mark) This is the time for one-quarter of a revolution (90°), so the time for 1 revolution (360°): $\Delta t = 4\times 1.2481 = 4.967\text{ s}$ (1 mark) Frequency, $f = \frac{1}{\Delta t} = \frac{1}{4.967} = 0.20$ rps (1 mark)	Advised 7.3.26