Level 2 Physics: Mechanics – Motion Answers

Question	Evidence	Achievement	Merit	Excellence
2020(1) (a)	$v_f = v_i + at$ $v_f = 0 + (4.2 \times 0.6) = 2.5$ m s^{-1}	This is a show question.		
(d)	Converts speeds to m s^{-1} 50 km h^{-1}=13.89 m s^{-1} 20 km h^{-1} = 5.56 m s^{-1} Distance travelled in 2.3 s: $d = \frac{v_i + v_f}{2}t = \frac{13.89 + 5.56}{2} \times 2.3 = 22.4$ m This is more than 15 m. So can't slow down in time OR $v_f^2 = v_i^2 + 2ad$ $5.56^2 = 13.89^2 + (2 \times a \times 15)$ $a = -5.40$ m s^{-2} $v_f = v_i + at$ In order to slow to 20 km h^{-1} in 15 m, it would take t = 1.5 s. This is too short a time forsafe braking. Therefore, it is not possible.	ONE correct calculation that could lead to a correct solution, e.g. correctlychanges both speeds to m s^{-1}.	ONE error.	Correct answer with explanation / interpretation.

2019(1) (a)	$v_{vertical}$ = 22 sin 30°	Substitution shown correctly		
(b)	The (only) force experienced is the weight force / gravity (vertically downwards). The ball decelerates until it reaches its maximum height, where its speed is 0, then accelerates downwards. The horizontal speed is constant. The path is parabolic (may be shown in diagram) (A only).	One bullet point.	Two different points, one of which must refer to force.	
(d)	Uses $v_f = v_i + at$, with $g = 9.8$ $t = \frac{11-0}{9.8} = 1.12$ s $t = 1.12$ s for vertical motion up. Total $t = 2 \times 1.12 = 2.24$ s Calculates $v_{horizontal}$ as $v_{horizontal} = 22 \cos 30° = 19.05$ $d = vt = 2.24 \times 19.05 = 42.67$ m This is less than 44 m, so the pass falls short.	Initial time calculated OR Horizontal velocity calculated.	Achieved plus Time doubled AND horizontal value of *v* calculated.	Complete answer, including interpretation of distance calculated.

2018(3) (a)	$v_{\text{horiz}} = \frac{d}{t} = \frac{21.0}{2.80} = 7.50 \text{ m s}^{-1}$	Correct answer.		
(b)	$v_{\text{i (horiz)}} = 7.50 \text{ m s}^{-1}$ (From (a) $\rightarrow$ allow carry errors) $v_{\text{f}} = v_{\text{i}} + at$ $v_{\text{i (vert)}} = v_{\text{f (vert)}} - at_{\text{(to top of flight)}}$ $v_{\text{i (vert)}} = 0 - (-9.8 \times 1.4) = 13.72 \text{ m s}^{-1}$ $v = \sqrt{v_{\text{horiz}}{}^2 + v_{\text{vert}}{}^2}$ $v = \sqrt{7.50^2 + 13.72^2} = 15.6 \text{ m s}^{-1}$	Correct $v_{\text{i (vert)}}$ OR Correct use of Pythagoras	Correct working and correct *v*.	

(c)	On Earth, the time to the top of flight is 1.4 seconds. On planet X, the time to the top of flight is longer (3.7 s). Assuming negligible air friction, with the same v_{horiz} of 7.5 m s^{-1}, will mean the range will be significantly increased (from 20.5 to 55.5 m).	Time of travel will increase (since *a* is a smaller value). OR (Goes higher) so travels further.	Correct answer with longer time, and therefore greater distance since ($d_H = v_H \times t$) (Time and range calculations not required.)	
(d)	$v_{i\,(vert)} = 10\tan 35 = 7.0\ \text{m s}^{-1}$ (SHOW) Time in air: $v = \frac{d}{t} \rightarrow t = \frac{d_{(horiz)}}{v_{(horiz)}} = \frac{12.5}{10.0} = 1.25\ \text{s}$ $d_{(vert)} = v_{i\,(vert)}t + \frac{1}{2}a_{(vert)}t^2$ $d_{(vert)} = (7 \times 1.25) + \frac{1}{2}(-9.8 \times 1.25^2)$ $d_{(vert)} = 1.094\ \text{m} \approx 1.1\ \text{m}$ So yes, Jimmy will have his hands in the correct position to catch the balloon. Alternative working: $t_{(to\ top\ of\ flight)} = \frac{v_f - v_i}{a} = \frac{0-7}{-9.8} = 0.714\ \text{s}$ $d_{(max\ height)} = v_i t + \frac{1}{2}at^2 = (7 \times 0.714) + \frac{1}{2}(-9.8 \times 0.714^2) = 2.5$ $d_{(travelled\ from\ top)} = v_i t + \frac{1}{2}at^2 = 0 + \frac{1}{2}(-9.8 \times (1.25 - 0.714)^2)$ $= 1.406\ \text{m}$ $d_{(height\ at\ 12.5\ m)} = 2.5 - 1.406 = 1.094\ \text{m} \approx 1.1\ \text{m}$	Correct v_i (vert).	Correct v_i (vert). AND One of: Correct time in air (1.25 s). OR Use of $d = v_i t + \frac{1}{2}at^2$ with omission. OR $d$max height OR Correct solution to second part without showing derivation of 7 m s^{-1}.	Full answer and correct working. AND Statement "Yes Jimmy can catch the balloon" or equivalent.

2017(2) (a)	$F = mg = 55.0 \times 9.8 = 539 = 540$ N (2SF). Single arrow pointing downwards.	Correct answer.		
(b)	$v_v = 8 \times \sin 70° = 7.5 \text{ m s}^{-1}$ $v_f = v_i + at \rightarrow 0 = 7.5 - 9.8t \rightarrow t = \frac{7.5}{9.8} = 0.77 \text{ s}$	V_V is calculated correctly. OR Incorrect V_V, but consequently correct time.	Correct V_V AND Correct time.	
2016(1) (a)	$v_f^2 = v_i^2 + 2ad$ $1.5^2 = 2 \times a \times 0.50$ $a = 2.3 \text{ m s}^{-2}$	Correct answer.		
2016(2) (a)	$v_v = 20 \times \sin 40° = 12.856$ $= 12.9 \text{ m s}^{-1}$	Correct working.		
(b)	$v_f = v_i + at$ $0 = 12.9 + -9.8 \times t$ $t = 1.32$ s (or 1.31 if unrounded v_v used)	Correct equation and correct substitution.	Correct answer.	
(c)	time of flight = $2t = 2 \times 1.32 = 2.64$ s (or 2.62 if unrounded) $v_H = 20 \times \cos 40° = 15.32 = 15.3 \text{ m s}^{-1}$ $d_H = v_H \times$ time of flight $= 15.3 \times 2.64$ $= 40.4$ m (or 40.2 if unrounded)	Correct total time. OR Correct horizontal velocity.	Correct answer.	

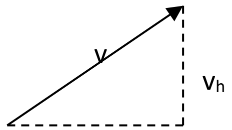
(d)	• Horizontal velocity remains constant, as there are no external forces in the horizontal direction, air resistance is negligible. • Going up, vertical velocity decreases/ball decelerates as the weight force/gravity acts downwards/in an opposite direction to the motion • Coming downwards, the vertical velocity increases/ball accelerates as the weight force/gravity is acting downwards/in the same direction as the motion.	ONE correct statement with correct reason. OR Correct description of both velocities.	TWO correct statements with correct reasons.	Comprehensive explanation.
2015(1) (a)	F_g pointing vertically down for C and G. Same size for both positions. Horizontal arrow v_H of the same size for both positions, B and H. Arrow v_V pointing vertically up at D and pointing vertically down at F, same length.	Two out of three correct.	All three correct including relative size of arrows.	
(b)	$V_h = 16\cos 42° = 11.89$ m s^{-1} (=12 m s^{-1}) $V_v = 16\sin 42° = 10.71$ m s^{-1} (= 11 m s^{-1})	Both correct.		
(c)	The vertical velocity of the ball is zero at the top, but the horizontal velocity will be 11.9 m s^{-1}. There are no horizontal forces. Gravity acts vertically down.	Vertical velocity is zero. AND Horizontal velocity is constant. OR One correct velocity with correct explanation.	Complete answer giving reasons why horizontal velocity is constant (no horizontal force) but vertical velocity decreases to zero (gravity).	

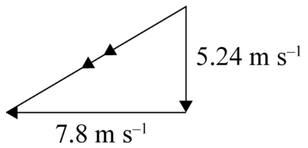
(d)	Time taken to reach maximum height: $v_f = v_i + at$ $0 = 10.71 - 9.8t$ t = 1.09 s Total time = 2 × 1.09 = 2.18 s Range = $d = vt$ $d = 11.89 \times 2.18$ = 26 m	Correct time of 1.09 s	Correct total time or one error in calculation. OR Two correct steps.	Correct answer.
2014(2) (c)	$v_f^2 = v_i^2 + 2ad$ $22.0^2 = 2.0^2 + 2a \times 72$ $a = 3.33 \text{ m s}^{-2}$ $F = ma$ $F = 1100 \times 3.33$ $F = 3666 \text{ N}$ $F = 3700 \text{ N}$	Correct acceleration OR ONE error in calculation.	Correct acceleration and force.	

Question	Achievement	Merit	Excellence
2013(2) (d)	$v_{horizontal}$ = 6.5 cos60 = 3.25 m s^{-1} OR $v_{vertical}$ = 5.63 m s^{-1} ***Watch out for values being swapped around.*	$v_{horizontal}$ = 6.5 cos60 = 3.25 m s^{-1} AND $v_{vertical}$ = 5.63 m s^{-1} AND $t = \frac{d}{v} \rightarrow \frac{3.0}{3.25} = 0.923\text{ s}$ OR Time to reach max height = 0.57s, so max height =1.6m, so will go only 1.85 m across and so will not go through hoop.	$d = v_i t + \frac{1}{2}at^2$ $d = 5.63 \times 0.923 - 0.5 \times 9.8 \times 0.923^2$ $d = 1.02m$ This is less than 1.35 m hence ball will not go through hoop. OR Vertical velocity at 1.35 m height v = 2.29 ms-1 Time taken for v_f to reach 2.29ms^{-1} $v_f = v_i + at$ $\pm 2.29 = 5.63 - 9.8t$ $t = \frac{5.63 \pm 2.29}{9.8} = 0.808\text{ s } or\ 0.34\text{ s}$ Horizontal distance travelled in 0.808s or 0.34 s or 1.12 m This is less than 3.00 m, so ball will not go through the hoop.

2013(1) (c)	$v_f = v_i + at$ $0 = v_i - 2.5 \times 4.2$ $v_i = 10.5 ms^{-1}$	Added (44.1 +22.05) to get incorrect answer of **66.15 m** **circle + sign* *OR* *Assumed v_i =0 and worked out answer.*	$d = v_i t + \frac{1}{2}at^2$ $d = 10.5 \times 4.2 - \frac{1}{2} \times 2.5 \times 4.2^2$ d = 44.1 – 22.05 d = 22.05 m OR $d = \frac{v_f - v_i}{2}t$ $d = \frac{10.5+0}{2} \times 4.2$ $d = 22.05$ m
2012(2) (c)	$v_v = 15 \sin 70^\circ$ $v_v = 14.095$	$v_f = v_i + at$ $0 = 14.095 - 9.8t$ $t = \frac{14.095}{9.8}$ $t = 1.4$ s	
(d)	Horizontal velocity is 5.1 m s^{-1} to the right. OR Her vertical velocity is zero.	Horizontal velocity is 5.1 m s^{-1} to the right. AND Her vertical velocity is zero. OR One reason to support either 5.1 m s^{-1} or 0 m s^{-1}.	Horizontal velocity is 5.1 m s^{-1} to the right. AND Her vertical velocity is zero. AND There is no horizontal force acting on her, so her horizontal velocity is constant. OR She is constantly being accelerated at 9.8m s^{-2} downwards. hence her vertical velocity at the top is 0 m s^{-1}.

Question	Evidence	Achievement	Merit	Excellence
2011(1) (a)	$v_f = v_i + at \Rightarrow v_f = 0 + 1.2 \times 14 \Rightarrow v_f = 16.8\ \text{ms}^{-1}$	[2]Correct answer. (*must show in some way that v_i = 0)*		
2011(3) (c)	Horizontal component = 24 cos36° = 19.4 m s^{-1} Vertical component = 24 sin 36° = 14.1 m s^{-1} Time taken to travel 35 m = 35/19.4 = 1.80 s $d = (14.1 \times 1.80) - (1/2 \times 9.8 \times 1.80^2)$ d = 9.5 m The ball will go over Ernie's head.	[1]Calculates horizontal and vertical components. OR Calculates horizontal component of velocity and time to travel 35 m.	[2]Calculates time taken to travel 35 m. AND Calculates initial vertical velocity correctly.	[2]Calculates height of ball at 35 m range. AND States the ball goes over Ernie's head.
2010(2) (a)	As it rises, kinetic energy changes to gravitational potential energy. As it falls, gravitational potential energy is converted to kinetic energy. As it rolls, kinetic energy is converted to heat.	[1]Correct except for one error.	[1]Description all correct.	
(b)	Downwards 9.8 m s^{-2}	[1]Both correct. Must have size AND direction. Accept 10 m s^{-2}.		

(c)	 Consider vertical motion $v_f = v_i + at$ $0 = v_i - 9.8 \times \frac{2.4}{2}$ $v_i = 11.76$ $\sin 37° = \frac{11.76}{v}$ $v = 19.5$ ms-1	[2]Calculates speed using t = 2.4 s. v = 23.52ms^{-1} OR Used an incorrect value for time.	[2]Correct vertical component OR used v =23.52 to calculate v (v = 39.5 m s^{-1})	[2]Correct working and answer.
(d)	• If there is a lift force, the total force **downwards is smaller**. • So the downward **acceleration is smaller**. • So the discus is in the air for a **longer time**. • So the range is **greater.** OR The lift force allows discus to **fly higher** and hence it is in **the air for longer**. Since **horizontal velocity is constant**, then a greater distance is travelled in greater time. Hence **range is greater**.	[1]Greater range.	[1]Greater range because the discus is in the air for a longer time.	[1]Full explanation. (accept either reason 1 OR reason 2) OR a combination of 1 and 2 so long as they have 4 bullet points.

2009(2) (c)	On its way up, the velocity keeps decreasing at a constant rate of 9.8 m s^{-2} until it reaches zero. Once its velocity is zero it goes no higher but starts falling down again with increasing velocity at the rate of 9.8 m s^{-2} until it hits the ground. The acceleration is constant throughout its motion and acts in a downward direction at 9.8 m s^{-2}. Speed at start is equal to speed at stop, assuming that these positions are the same vertical height.	[1]Describes decreasing velocity going up OR Describes increasing velocity on its way down OR Describes constant acceleration downwards.	[1]Describes constant acceleration downward OR Speed at start equal to speed at stop assuming the vertical height is the same. AND Either decreasing velocity on its way up OR Increasing velocity on its way down.	[1]Describes constant acceleration downward AND Decreasing velocity on its way up AND Increasing velocity on its way down AND Speed at start equal to speed at stop assuming the vertical height is the same.
(d)	$v_h = 7.8 \text{ m s}^{-1}, d = 1.4 \text{ m}$ $v_i = 0, a = -9.8 \text{ m s}^{-2}$ $v_f^2 = v_i^2 + 2ad$ $v_f^2 = 0 - 2 \times 9.8 \times 1.4$ $v_f = 5.24 \text{ m s}^{-1}$  Resultant velocity = $\sqrt{5.24^2 + 7.8^2}$ $v = 9.40 \text{ m s}^{-1}$ Direction = $\tan^{-1}\left(\frac{5.24}{7.8}\right) = 34°$	[2]Calculates final vertical velocity. **NA →if they have used 7.8 m s^{-1} as initial velocity v_i.	[2]Achievement plus calculates resultant velocity without direction.	[2]Correct answer including direction of resultant.

2008(1) (a)	$d = \frac{(v_f + v_i)}{2}$ $d = \frac{(6+8)}{2} \times 3$ $d = 21\,\text{m}$ OR valid alternative. *d = 20 to 1 s.f.*	[2]Correct answer. [1]1 sig. fig.		
(b)	Kinetic → Heat (+ Sound)	[1]Correct answer.		
(c)	$E_K = ½ mv^2$ $E_K = ½ \times 65 \times 8.0^2$ $E_K = 2080$ J	[2]Correct answer.		
2008(2) (m)	The ball lands in the same place relative to Rua. The ball has an initial horizontal velocity. There are no horizontal forces acting on the ball in flight so it keeps moving at the same horizontal speed as the trolley and lands where it left.	[1]Lands in same place "relative to" Rua.	[1]Lands in same place because it keeps moving horizontally at the same/constant speed as Rua. OR Lands in same place because there are no horizontal forces acting on Rua or the ball	[1]Lands in same place because it keeps moving horizontally at the same/constant speed as Rua as there are no horizontal forces acting on Rua or the ball.
(n)	$v_f = v_i + at$ $-9.8 = 9.8 - 9.8t$ $t = 2.0$ s	[2]Correctly determines the time to maximum height.	[2]Correct working and answer.	

2007(1) (d)	a = (25 – 80) / 8 = – 6.875 a = – 6.9 m s^{-2} OR a = 6.9 m s^{-2} in opposite direction to velocity.	[2]Calculates acceleration using (initial – final) **OR** Correct working BUT the stated direction is inconsistent with the sign.	[2]Correct working (using change = final – initial), and final answer is a valid physics statement with respect to sign and direction if stated.	
(d)	2 s.f.	[1]2s.f. (any correctly rounded answer)		
2007(3) (d)	F = 25cos 40° = 19.15 N $W = Fd$ W = 19.15 × 0.80 ***W* = 15.32 J**	[2]Calculated work done **without** using the horizontal component of the force (20 Nm). OR Calculate horiz. force component only. OR Calculates work using an incorrect force component.	[2]Correct answer.	
2006(1) (a)	$a = \frac{\Delta v}{\Delta t}$ a = 0.90 m s^{-2}	[2]Correct answer.		
	2 sf (regardless of answer to 1a)	[1]Correct significant figures.		

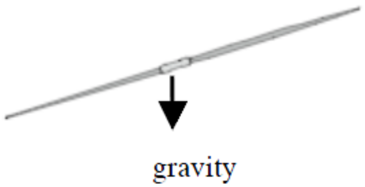
(b)	$d = \frac{(v_i + v_f)t}{2}$ $d = \frac{(4.5 + 0) \times 5.00}{2}$ $d = 11.25$ m **OR** $v_f^2 = v_i^2 + 2ad$ $d = \frac{v_f^2 - v_i^2}{2a}$ $d = \frac{4.5^2 - 0^2}{2 \times 0.9} = 11.25$ m $d = 11.25$ m **OR** $d = \frac{1}{2}at^2$ $d = \frac{1}{2} \times 0.90 \times 5^2$ $d = 11.25\ (11)$ m $d = \frac{v_f + v_i}{2}$ $d = \frac{(4.5 + 0) \times 5.00}{2}$ $d = 11.25$ m **OR** $v_f^2 = v_i^2 + 2ad$	[2]Correct answer.		

(c)	$P=\frac{W}{t}=\frac{F\times d}{t}=\frac{mad}{t}=\frac{120\times 0.9\times 11.25}{5}$ $P=\frac{1215}{5}$ $P=243\text{ W}$ **OR** $P=\frac{W}{t}=\frac{F\times d}{t}=mav_{ave}$ $v_{ave}=\frac{4.5}{2}=2.25$ $P=m\times a\times v_{ave}=120\times 0.9\times 2.25$ $P=243\text{ W}$ **OR** $P=\frac{W}{t}=\frac{E_K}{t}=\frac{\frac{1}{2}mv^2}{t}=\frac{0.5\times 120\times 4.5^2}{5}$ $P=\frac{1215}{5}$ $P=243\text{ W}$	[2]Calculates the force only. (F = 108 N) **OR** Calculate average velocity only. (v_{ave} = 2.25 ms^{-1}) **OR** Shows awareness that Power can be calculated by considering the E_K gained. Combines power and E_k formula, but unable to solve.	[2]Correctly calculates the work done (W = 1215 J) **OR** Calculates the force AND the average velocity but is unable to combine to calculate Power. **OR** Correctly calculates the kinetic energy (E_K = 1215J)	[2]Correct working and answer.
	W OR watts OR Js^{-1} OR Nms^{-1} (regardless of answer to 1c)	[1]Correct unit.		

(d)	Friction (and drag) opposes the motion. Therefore, Steve must do extra work to overcome the work done by friction. Hence as Power is the rate at which work is done the Power that he produces must be greater than calculated in part c. **OR** Friction causes some energy to be wasted as heat. Hence not all the energy Steve puts in is transformed into kinetic energy. Therefore, as Power is the rate at which energy is changed the Power he produces will be greater than the Power output calculated in part c.	[1]Recognises the effect of fiction on Steve's motion / Friction does work against the boat. **OR** Some energy wasted as heat (and sound).	[1]**Achieved plus** Links applied forces to work done by Steve. **OR** **Achieved plus** Links $E_{IN} = E_K + E_{HEAT}$	[1]**Merit plus …** Links the rate of work done to power. **OR** **Merit plus …** Links the rate of change of energy to power.
(e)	Net force = zero	[1]Correct answer.		
2006(3) (a)	$V_H = 6.4 \cos 20$	[2]Correct working.		
(b)	$V_V = 6.4 \sin 20$	[2]Correct working.		

(c)	$v_f = v_i + at$ $0 = 2.2 - 9.8 \times t$ $t = 0.22$ s total time = 0.44 s $d_h = v_h \times t = 6.0 \times 0.44$ **d_h = 2.69 m** Accept calculation using g =10ms^{-2} so d_h = 2.64 m	[2]Calculates time to highest point.	[2]Calculates total time OR Correctly uses $d = vt$ but with time to max height.	[2]Correct working and answer.
(d)	**9.8 ms^{-2}, downwards** (accept 10 down). Do not accept – 9.8 down.	[1]Correct answer.		
(e)	As friction is negligible there are no other forces acting horizontally. A zero net force means Marama will not experience any acceleration.	[1]Horizontal net force is zero. **OR** The only force acting on Marama is in the vertical plane **OR** Just quotes Newton's 1st or 2nd law but doesn't apply.	[1]Clearly applies Newton's 1st or 2nd law to the idea of a zero net force horizontally on Marama.	
2005(3) (a)	The forces are equal in size because the balloon is rising at a steady speed, thus there is no unbalanced force acting on it.	[1]Forces are equal.	[1]Achievement plus constant speed means no unbalanced force.	

(b)	Vertically $v_i = 0$ $a = 10$ $d = 320$ $d = v_i t + \frac{1}{2}at^2$ $320 = 0 + \frac{1}{2} \times 10 \times t^2$ $64 = t^2$ $t = 8$ Horizontally $d = vt = 25 \times 8 = 200$ m	[2]Correct calculation of time to ground.	[2]Correct answer	
2004(1) (a)	$v_{av} = \frac{d}{t} = \frac{400}{65} = 6.154$ $= 6.2 \text{ m s}^{-1}$	[2]Correct answer		
(b)	$v_f = v_i + at$ $6.0 = 0 + a \times 2.2$ $a = \frac{6.0}{2.2}$ $= 2.7 \text{ m s}^{-2}$	[2]Correct answer		
(c)	$d = v_i t + \frac{1}{2}at^2$ $d = 0 + \frac{1}{2} \times 2.73 \times 2.2^2$ $= 6.6$ m	[2]Correct answer		

(d)	$E_K = \frac{1}{2}mv^2 = \frac{1}{2} \times 55 \times 6.5^2$ $= 1200\ \text{J}$	[2]Correct answer		
	Unit: joules	[1] joules (accept J or Nm)		
(e)	$t = \frac{d}{v} = \frac{40}{15} = 2.67$ $P = \frac{W}{t} = \frac{F \times d}{t}$ $F = \frac{P \times t}{d} = \frac{6000 \times 2.67}{40}$ $= 400\ \text{N}$ OR $P = \frac{W}{t} = \frac{F \times d}{t} = F \times v$ $Hence\ F = \frac{P}{v} = \frac{6000}{15} = 400\ \text{N}$	[2]Calculation of t = 2.67 s	[2]Calculation of W = Pt = 6000 x 2.67 = 16000 J [2]Derivation of F = Pv	[2]Correct answer for force. [2]Correct answer for force.
2004(2) (a)	Parabola	[1]Parabola (parabolic)		
(b)	 Arrow not necessarily touching	[1]One force **only**, vertically downwards, labelled gravity or weight force. Arrow must be below javelin & near centre.		

(c)	$v_{horiz} = v\cos\theta = 30\cos 40°$		[2]Correct working.	
(d)	$v_{vert} = v\sin\theta = 30\sin 40° = 19.3$ $vf = vi + at$ $0 = 19.3 - 10.0t$ $t = 1.93$ s $Total\ t = 3.86$ $Range = vt = 88$ m	[2]Calculation of v_{vert} = 19.3 m s^{-1}	[2]Calculation of time of flight = 3.86 s *Or* Complete calculation without doubling *t*.	[2]Correct answer. (Note: accept use of either rounded or unrounded data.)

The Mess that is NCEA Assessment Schedules….

Level 2 Physics: **AS 91171** replaced **AS 90255.**

In 90255, from **2003 to 2011**, there was an Evidence column with the correct answer and Achieved, Merit and Excellence columns explaining the required level of performance to get that grade. Each part of the question (row in the Assessment Schedule) contributed a single grade in either Criteria 1 (Explain stuff) or Criteria 2 (Solve stuff). From 2003 to 2008, the NCEA shaded columns that were not relevant to that question.

In 91171, from **2012 onwards**, the answers/required level of performance are now within the Achieved, Merit and Excellence columns. Each part of a question contributes to the overall Grade Score Marking of the question and there are no longer separate criteria. There is no shading anymore. There is no spoon. At least their equation editor has stopped displaying random characters over the units.

And **in 2013**, with 91171, we still have no Evidence column with the correct answer and Achieved, Merit and Excellence columns explaining the required level of performance to get that part – even though the other two Level 2 Physics external examinations do!!

And now in **2014 - 2017**, we have the Evidence column back……