Pearson

Mark Scheme (Final)

January 2026

International Advanced Level in Mechanics M1

WME01A

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

EDEXCEL IAL MATHEMATICS
General Instructions for Marking

1. The total number of marks for the paper is 75.

2. The Edexcel Mathematics mark schemes use the following types of marks:

   - **M** marks: Method marks are awarded for 'knowing a method and attempting to apply it', unless otherwise indicated.
   - **A** marks: Accuracy marks can only be awarded if the relevant method (M) marks have been earned.
   - **B** marks are unconditional accuracy marks (independent of M marks)

   Marks should not be subdivided.

3. Abbreviations

   These are some of the traditional marking abbreviations that will appear in the mark schemes and can be used if you are using the annotation facility on ePEN:

   - bod – benefit of doubt
   - ft – follow through
     - the symbol $\surd$ will be used for correct ft
   - cao – correct answer only
   - cso – correct solution only. There must be no errors in this part of the question to obtain this mark
   - isw – ignore subsequent working
   - awrt – answers which round to
   - SC – special case
   - oe – or equivalent (and appropriate)
   - d… or dep – dependent
   - indep – independent
   - dp – decimal places
   - sf – significant figures
   - $*$ – The answer is printed on the paper or ag- answer given
   - $\llcorner$ or d… – The second mark is dependent on gaining the first mark

4. All A marks are ‘correct answer only’ (cao), unless shown, for example, as A1 ft to indicate that previous wrong working is to be followed through. After a misread however, the subsequent A marks affected are treated as A ft, but manifestly absurd answers should never be awarded A marks.

5. For misreading which does not alter the character of a question or materially simplify it, deduct two from any A or B marks gained, in that part of the question affected. If you are using the annotation facility on ePEN, indicate this action by ‘MR’ in the body of the script.

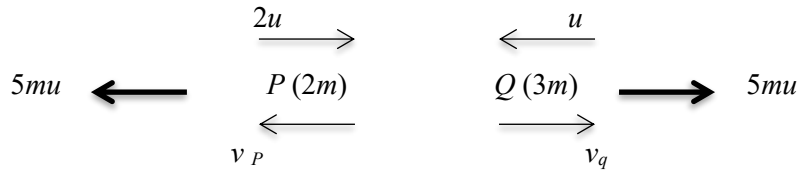
6. If a candidate makes more than one attempt at any question:
   a) If all but one attempt is crossed out, mark the attempt which is NOT crossed out.
   b) If either all attempts are crossed out or none are crossed out, mark all the attempts and score the highest single attempt.

7. Ignore wrong working or incorrect statements following a correct answer.

General Principles for Mechanics Marking

*(**N.B.** specific mark schemes may sometimes override these general principles)*

- Rules for M marks:
  - correct number of terms
  - dimensionally correct
  - all terms that need resolving (i.e. *multiplied* by cos or sin) are resolved
  - only terms that need resolving are resolved
  - +/– errors are condoned
  - sin/cos confusion is condoned
- Omission or extra *g* in a resolution is an accuracy error not method error.
- Omission of mass from a resolution is a method error.
- Omission of a length from a moments equation is a method error.
- Omission of units or incorrect units is not (usually) counted as an accuracy error.
- DM indicates a dependent method mark, i.e. one that can only be awarded if a previous specified method mark(s) has been awarded.
- Any numerical answer which comes from use of $g = 9.8$ should be given as a decimal to 2 or 3 SF.
- Use of $g = 9.81$ should be penalised once per (complete) question.
  - N.B. Over-accuracy or under-accuracy of correct answers should only be penalised *once* per complete question. However, premature approximation should be penalised every time it occurs.
- Marks must be entered in the same order as they appear on the mark scheme.
- In all cases, if the candidate clearly labels their working under a particular part of a question i.e. (a) or (b) or (c)…then that working can only score marks for that part of the question.
- Accept column vectors in all cases.
- Misreads – if a misread does not alter the character of a question or materially simplify it, deduct two from any A or B marks gained, bearing in mind that after a misread, the subsequent A marks affected are treated as A ft

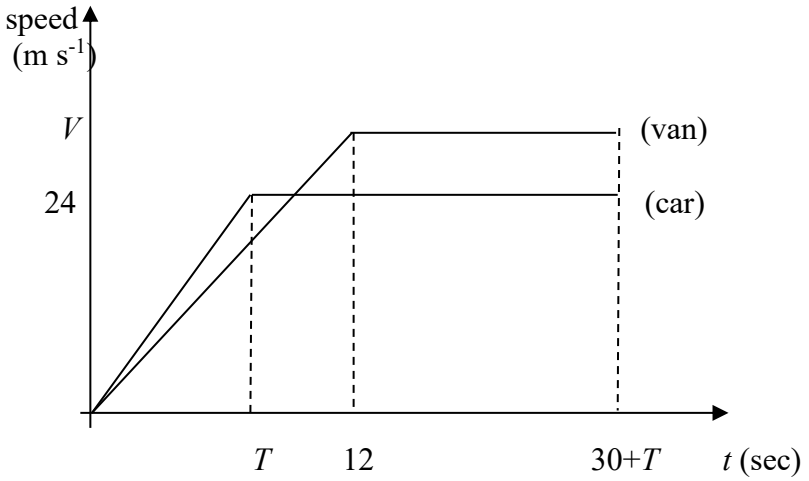
Question Number	Scheme	Marks
1(a)		
	$5mu = 2m(v_P - -2u)$ or $5mu = 2m(-v_P - -2u)$	M1 A1
	Speed of P is $\frac{1}{2}u$	A1
		(3)
(b)	Reversed	B1
		(1)
(c)	$5mu = 3m(v_Q - -u)$ or $5mu = 3m(-v_Q - -u)$	M1 A1
	Speed of Q is $\frac{2}{3}u$	A1
		(3)
	OR	
	$2m2u - 3mu = -2m\frac{1}{2}u + 3mv_Q$ or $2m2u - 3mu = -2m\frac{1}{2}u - 3mv_Q$	M1 A1
	Speed of Q is $\frac{2}{3}u$	A1
		(3)
		7
	Notes	
(a)		
M1	Complete method to find an equation in v_P, m and u only: Use of $5mu$ = change in momentum of P (must have $2m$ in both terms so allow with $2m$ outside the bracket even if it changes after the brackets are removed) (M0 if *clearly* adding momenta) but condone sign errors. **N.B.** they could find v_Q first and then use CLM	
A1	Correct equation for *their* v_P	
A1	$\frac{1}{2}u$ oe (A0 if –ve)	
(b)		
B1	cao; **only** allow if $\frac{1}{2}u$ or $-\frac{1}{2}u$ has been correctly obtained in (a). Allow: '(Yes) it has' but NOT just 'Yes' nor 'has been changed' nor just "opposite"	

(c)		
M1	Complete method to find an equation in v_Q, m and u only: Use of $5mu$ = change in momentum of Q (must have $3m$ in both terms so allow with $3m$ outside the bracket even if it changes after the brackets are removed) but condone sign errors.	
A1	Correct equation	
A1	$\frac{2}{3}u$; Accept $0.67u$ or better. (A0 if –ve)	
	OR	
M1	Complete method to find an equation in v_Q, m and u only: Use of CLM with correct no. of terms and correct pairings and their v_P (M0 for CLM with 2 unknowns) but condone sign errors.	
A1	Correct equation for their v_Q	
A1	$\frac{2}{3}u$; Accept $0.67u$ or better. (A0 if –ve)	

Question Number	Scheme	Marks
2.	$T\cos 70^\circ + R = 40g$	M1 A1
	$T\cos 20^\circ = F$	M1 A1
	$F = \frac{3}{4}R$	B1
	Eliminate R and solve for T	**d**M1
	$T = 250$ (N) or 246 (N)	A1
		7
	Notes	
M1	Resolving vertically with usual rules i.e. correct no. of terms, condone sin/cos confusion, condone sign errors.	
A1	Correct equation.	
M1	Resolving horizontally with usual rules i.e. correct no. of terms, condone sin/cos confusion, condone sign errors.	
A1	Correct equation.	
B1	For $F = \frac{3}{4}R$ seen (could be on a diagram). **N.B.** R does not need to be substituted.	
dM1	Dependent on previous two M marks	
A1	246 (N) or 250 (N).	
	N.B. For a clear misread where they have the suitcase being dragged up an inclined plane, leading to: $R = 40g\cos 20^\circ$ $T - F - 40g\sin 20^\circ = 0$ $F = \frac{3}{4}R$ (leads to $T = 410.3$ (N) if done correctly) Can score MAX: M1A0M1A0B1dM0A0 (apply usual rules for M marks)	

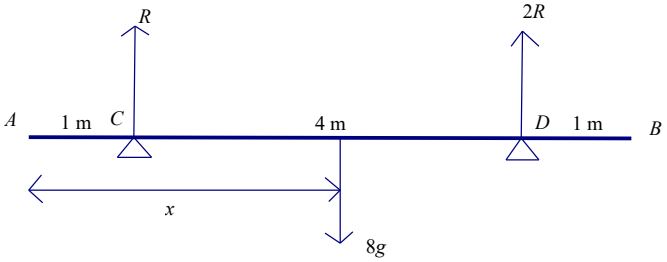
Question Number	Scheme	Marks
3(a)		
	$22.5 = 5V - \frac{1}{2} \times g \times 5^2$	M1A1
	$(h =)$ 22.5 or 23	A1
		(3)
(b)	$v^2 = u^2 + 2as$ (or cons. of energy)	
	First ball: $V^2 = 20^2 + 2 \times g \times 22.5$ **OR** $V = -20 + (5 \times g)$ **OR** $22.5 = 5V - \frac{1}{2} \times g \times 5^2$	M1A1
	$(V^2 = 841)$ $V = 29$	
	Second ball: $\left(\frac{3}{4} \times '29'\right)^2 = w^2 + 2 \times g \times '22.5'$	M1A1**ft** (their V and their h)
	$w^2 = \frac{9}{16} \times 841 - 2 \times 9.8 \times 22.5$	
	$w = 5.66$ or 5.7	A1
		(5)
		8
	Notes	
(a)		
M1	Complete method to find an equation in h only: $s = ut + \frac{1}{2}at^2$: Must be using 5 and 20 but condone slips in substitution, condone sign errors. Alternatives will use time and distance to top (2.0408.. s and 20.408.. m) or speed at ground (29 m s^{-1})	
A1	Correct equation in h or s only **N.B.** Allow premature approximation	
A1	22.5 or 23 only. Ignore units. Must be positive. **N.B.** $\frac{45}{2}$ is A0	
(b)		
M1	First ball: Use of *suvat* to find an equation in V or V^2, using their h. (this may have been done in (a)), condone sign errors.	
A1	Correct unsimplified equation.	
M1	Second ball: Use of *suvat* to find an equation in w only, using $\frac{3}{4}\times$ their V, condone sign errors	
A1ft	Correct equation in w only using their V and their h	
A1	5.66 or 5.7 only. Ignore units. Alternatives will use the time (1.64519 s)	

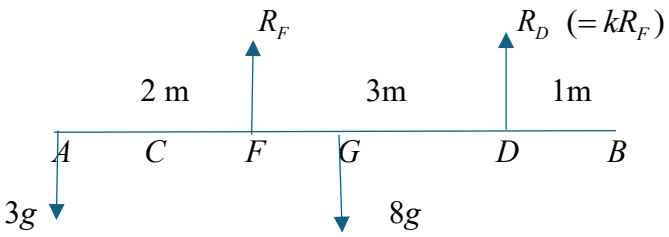
Question Number	Scheme	Marks
	Allow use of column vectors throughout.	
4(a)	$\tan\alpha = 1/3 \quad \Rightarrow \quad \alpha = 18.4^{\circ}$	M1 A1
	Bearing is $288°$ (nearest degree)	A1
		(3)
(b)	$(21\mathbf{i}+5\mathbf{j})+t(-6\mathbf{i}+2\mathrm{j})$	B1
		(1)
(c)	$21-6t=-(5+2t)$	M1 A1
	$t=6.5$	A1
		(3)
		7
	Notes	
(a)		
M1	An equation in a relevant angle. e.g. $\tan\theta=\pm\frac{2}{6}$ or $\pm\frac{6}{2}$ or $\sin\theta=\pm\frac{2}{\sqrt{2^2+6^2}}$	
A1	A correct angle from their equation e.g. $\pm 18.4^{o}$, $\pm\ 71.6^{o}$, $\pm 108.4^{o}$, ...	
A1	288^{o} (nearest degree)	
(b)		
B1	$(21\mathbf{i}+5\mathbf{j})+t(-6\mathbf{i}+2\mathrm{j})$ oe	
(c)		
M1	M1 for $21-6t=\pm(5+2t)$ or equivalent if they have a wrong answer to (b). Must be in t only.	
A1	A correct equation in t only.	
A1	6.5 oe	

Question Number	Scheme	Marks
5(a)		B1 shape of either B1 shape of second (must cross first and end at the same time) B1 V, 24, 12, T, $30+T$ Allow with their values of V and T. **N.B**. if they don't end at the same time, allow the 3rd B1, if they have $30+T$ at the end of one of them.
		(3)
(b)	CAR: Using Areas: $\frac{1}{2}(T+30+30)\times 24=816$ **or** $\frac{1}{2}\times T\times 24+(24\times 30)=816$ Using *suvat*: $816-(24\times 30)=96$ $24^2=2a\times 96\Rightarrow a=3$ $24=3T$ or $96=\frac{1}{2}\times 3T^2$	M1A1
	$T=8$	A1
		(3)

(c)	VAN: Using Areas: $\frac{1}{2}\left(\left('8'+30\right)+\left('8'+18\right)\right)V=816$ **or** $\frac{1}{2}\times 12V+V(18+'8')=816$ Using *suvat*: $12\times('8'+18)a+\frac{1}{2}a\times 12^2=816 \Rightarrow a=2.125$ $V=12\times'2.125'$	M1A1**ft**
	$V=25.5$	A1
		(3)
		9
	Notes	
(a)	**N.B.** If graphs are on separate axes, can score Max B1B0B0	
B1	Correct shape of either graph. **N.B.** B0 ONCE if there is a continuous vertical line at the end.	
B1	Correct shape of second graph which must cross the first graph and end at the same time.	
B1	V, 12, 24, T and $T+30$ placed correctly	
	N.B. All 3 marks can be earned if they have $V<24$ and $T>12$ on their graph.	
(b)		
M1	Complete method to find an equation in *T only* using 816 distance travelled by CAR, using either areas with *correct structure* (ignore what they have on their diagram) or *suvat*.	
A1	A correct unsimplified equation in T only.	
A1	8	
	N.B. M0 if they assume that the total time is 30 or 42 when setting up the equation.	
(c)		
M1	Complete method to find an equation in *V only* using 816 distance travelled by VAN, using either areas with *correct structure* (ignore what they have on their diagram) or *suvat*.	
A1ft	A correct unsimplified equation in V only, using their T	
A1	25.5 oe	
	N.B. M0 if they assume that the total time is 30 or 42 when setting up the equation.	

Question Number	Scheme	Marks
6(a)	Trailer: $-100-T=600\times(-4)$	M1 A1
	2300 (N)	A1
		(3)
6(b)	System: $6500+100+200=4(M+600)$	M1 A1
	$M=1100$	A1
	OR	
	Car: $6500+200-'2300'=4M$	M1 A1
	$M=1100$	A1
		(3)
6(c)	$s=vt-\frac{1}{2}at^2$: $40.5=\frac{1}{2}.4.t^2$ **OR** $0=u^2-2\times4\times40.5$ (u = 18) then $0=18-4t$ or $40.5=18t-\frac{1}{2}\times4t^2$	M1 A1
	$t=4.5$ s	A1
		(3)
		9
	Notes	
	N.B. In (a) and (b), use the mass in the '*ma*' term to decide which part of the system is being considered.	
(a)		
M1	Complete method to find an equation in T only. Correct terms but condone sign errors.	
A1	Correct equation in T only. (allow $-100+T=600\times(-4)$ oe)	
A1	Correct answer (must be positive)	
(b)		
M1	Complete method to find an equation in M only using an equation of motion for: the Whole System, correct terms but condone sign errors. **OR** the Car, correct terms (including their T) but condone sign errors.	
A1	Correct equation in M only.	
A1	Correct answer.	
(c)		
M1	Complete method, using *suvat*, to find an equation in t only They may find u(18) first. **N.B.** Clear use of $s=ut+\frac{1}{2}at^2$ with u = 0 and a = 4 is M0 e.g. $40.5=-2t^2$ from no working is M0A0	
A1	Correct equation in t only.	
A1	Correct answer.	

Question Number	Scheme	Marks
	N.B. Consistent omission of g in both parts of this question can score all of the marks (as can consistent use of $g = 9.81$ as it cancels) but for inconsistent omission, mark as per the scheme.	
7(a)		
	Possible equations: Resolve vertically: $3R = 8g$ M(C): $8g(x-1) = 4\times 2R$ M(D): $8g(5-x) = 4R$ M(A): $8gx = 5\times 2R + 1\times R$ M(B): $8g(6-x) = 1\times 2R + 5\times R$	 M1A1 M1A1
	N.B. Their equations may not be in x, if they've clearly defined a different distance, and can score the A1 in each case.	
	$x = \frac{11}{3}$ *	**d**M1A1*
	Special Case: M(G): $R(x-1) = 2R(5-x)$	M2A2
	$(x-1) = 2(5-x)$ $x = \frac{11}{3}$ *	**d**M1 A1*
	N.B. If R and $2R$ are consistently reversed, can score max M1A1 (if vert res is used)M1A0**d**M1A0* **N.B.** If a decimal approximation is used can score max 5/6	
		(6)

Question Number	Scheme	Marks
7(b)		
	Possible equations: Resolve vertically: $R_F + R_D = 11g$ M(A): $2R_F + 5R_D = 8g \times \frac{11}{3}$ M(B): $4R_F + R_D = 8g \times \frac{7}{3} + 3g \times 6$ M(D): $3R_F = 8g \times \frac{4}{3} + 3g \times 5$ M(F): $3R_D + 3g \times 2 = 8g \times \frac{5}{3}$ M(G): $\frac{5}{3}R_F = 3g \times \frac{11}{3} + \frac{4}{3}R_D$ M(C): $(R_F \times 1) + 4R_D + 3g \times 1 = 8g \times \frac{8}{3}$	M1A1 M1A1
	$k = \frac{R_D}{R_F} = \frac{22}{77} = \frac{2}{7}$	**d**M1A1
		(6)
		12
	Notes	
	N.B. For both (a) and (b), enter marks for the equations on ePEN in the order in which the equations appear.	
(a)		
M1	Resolve or take moments, correct no. of terms, condone R and $2R$ interchanged and sign errors to give first equation.	
A1	Correct equation	
M1	Resolve or take moments, correct no. of terms, condone R and $2R$ interchanged and sign errors to give second equation.	
A1	Correct equation	
dM1	Eliminate R to produce an equation in x only, dependent on both M's	
A1*	Given answer correctly obtained.	

	Special Case:	
M2	Moments about G, condone R and $2R$ interchanged.	
A2	Correct equation	
dM1	Eliminate R to produce an equation in x only, dependent on both M's	
A1*	Given answer correctly obtained.	
(b)	**N.B.** No marks if they use their answer(s) from (a).	
M1	Resolve or take moments with correct no. of terms,but condone sign errors to give first equation.	
A1	Correct equation	
M1	Resolve or take moments with correct no. of terms, but condone sign errors to give second equation.	
A1	Correct equation	
dM1	Eliminate R_D and R_F and solve to give a numerical value of k, dependent on both M's. **N.B.** Can be scored even if it leads to $k < 0$.	
A1	Accept 0.29 or better (0.285714….)	
	N.B. If R and kR are consistently reversed, can score max M1A1 (if vert res is used) M1A0**d**M1A0	

Question Number	Scheme	Marks
8(a)	$R = mg; F = 0.5R$	B1; B1
	For Q: $4mg - T = 4ma$	M1 A1
	For P: $T - F = ma$	M1 A1
	(whole system: $4mg - F = 5ma$)	
	Eliminate a and solve for T	**d**M1
	$T = 1.2mg$	A1
		(8)
8(b)	$v^2 = 2 \times 0.7gh \Rightarrow v = \sqrt{1.4gh}$ *	M1 A1*
		(2)
8(c)	$\pm 0.5mg = ma' \Rightarrow a' = \pm\ 0.5g$	M1 A1
	$0^2 = 1.4gh - 2 \times 0.5g \times d$	M1 A1
	$d = 1.4h$	A1
	Hence, length of string is greater than $1.4h + h = 2.4h$ *	A1 *
		(6)
		16
	Notes	
(a)		
B1	$R = mg$ seen (on a diagram possibly) seen or implied	
B1	$F = 0.5R$ seen (on a diagram possibly) seen or implied	
	N.B. Both B marks can be implied by $0.5mg$ appearing in an equation.	
M1	Equation of motion for Q, with all terms, condone sign errors.	
A1	Correct equation.	
M1	Equation of motion for P, with all terms, condone sign errors.	
A1	Correct equation.	
	N.B. Condone use of $4mg - F = 5ma$ for either equation Allow $-a$ instead of a in both equations	
dM1	Eliminate a and solve for T, dependent on both M marks.	
A1	Accept any equivalent	
	N.B. If they have different tensions, can score Max B1B1M1A1M1A0 dM0A0	
(b)		
M1	Complete method to obtain an equation in v and h using their a (not g) from part (a).	
A1*	Given answer correctly obtained. **N.B.** Must have '$v =$'	
(c)		
M1	Equation of motion with correct terms.	
A1	Correct equation	
M1	Complete method to obtain an equation in d and h **ONLY**, condone sign errors.	

	N.B. Must have found a new acceleration from a new equation of motion. **N.B.** M0 if using their a from part (a).	
A1	Correct equation	
A1	Correct d in terms of h	
A1*	Given answer correctly obtained – their answer must reflect the inequality	