

Moments - Edexcel Past Exam Questions **MARK SCHEME**

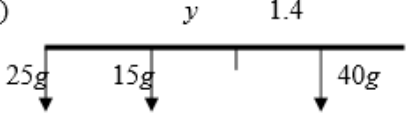
Question 1: Jan 05 Q2

Question Number	Scheme	Marks
(a)	$R(\uparrow): T + 3T = 40g + 20g$ $T = 15g$, so tension at C is <u>45g or 441 N or 440 N</u>	M1 A1 (2)
(b)	$M(B) \quad 15g \times 3 + 45g \times d = 40g \times 1.5$ Solve: $d = \underline{1/3 \text{ or } 0.33 \text{ or } 0.333 \text{ m}}$	M1 A2,1,0✓ ↓ M1 A1 (5)

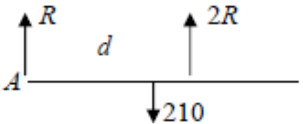
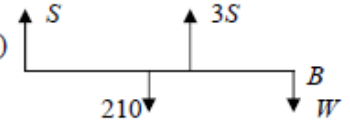
Question 2: June 05 Q6

Question Number	Scheme	Marks
(a)	$M(A): 12g \times 1.5 = R \times 2$ $R = \underline{9g \text{ or } 88.2 \text{ N}}$	M1 A1 A1 (3)
(b)		
	$R(\uparrow) \quad 2S = 48g + 12g$ $S = 30g$ $M(A): S \times 2 = 12g \times 1.5 + 48g \times x$ Sub for S and solve for x : $x = \underline{7/8 \text{ or } 0.875 \text{ or } 0.88 \text{ m}}$	M1 A1 M1 A1 M1 A2,1,0 ↓↓ M1 A1 (7)

Question 3: Jan 06 Q3

Question Number	Scheme	Marks
(a)	$M(C): 25g \times 2 = 40g \times x$ $x = \underline{1.25 \text{ m}}$	M1 A1 A1 (3)
(b)	Weight/mass acts at mid-point; or weight/mass evenly distributed (o.e.)	B1 (1)
(c)	 $M(C): 40g \times 1.4 = 15g \times y + 25g \times 2$ Solve: $y = \underline{0.4 \text{ m}}$	M1 A1 ↓ M1 A1 (4)
		8

Question 4: June 06 Q5

(a)	 $R + 2R = 210 \Rightarrow R = \underline{70 \text{ N}}$	M1 A1 (2)
(b)	e.g. $M(A): 140 \times 90 = 210 \times d$ $\Rightarrow d = 60 \Rightarrow AB = \underline{120 \text{ cm}}$	M1 A1√ ↓ M1 A1 (4)
(c)	 $4S = 210 + W$ e.g. $M(B): S \times 120 + 3S \times 30 = 210 \times 60$ Solve $\rightarrow (S = 60 \text{ and}) W = \underline{30}$	M1 A1 ↓ M1 A2,1,0 ↓ M1 A1 (7)
<p>Note that they can take moments legitimately about many points</p> <p>(a) M1 for a valid method to get R (almost always resolving!)</p> <p>(b) 1st M1 for a valid moments equation 2nd M1 for complete solution to find AB (or verification)</p> <p>Allow 'verification', e.g. showing $140 \times 90 = 210 \times 60$ M1 A1 1260 = 1260 QED M1 A1</p> <p>(c) In both equations, allow whatever they think S is in their equations for full marks (e.g. if using $S = 70$). 2nd M1 A2 is for a moments equation (which may be about any one of 4+ points!) 1st M1 A1 is for a second equation (resolving or moments) If they have two moments equations, given M1 A2 if possible for the best one 2 M marks only available <i>without</i> using $S = 70$.</p> <p>If take mass as 210 (hence use 210g) consistently: treat as MR, i.e. deduct up to two A marks and treat rest as ft. (Answers all as given = 9.8). But allow full marks in (b) (g's should all cancel and give correct result).</p>		

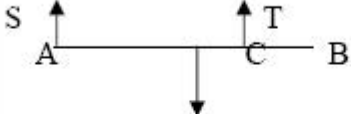
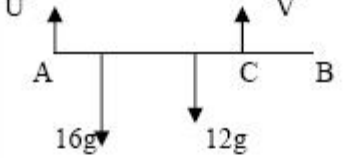
Question 5: Jan 07 Q2

(a)	$M(C) \quad 80 \times x = 120 \times 0.5$ $x = 0.75 \quad *$	cso	M1 A1 A1 <u>3</u>
(b)	Using reaction at $C = 0$ $M(D) \quad 120 \times 0.25 = W \times 1.25$ $W = 24 \quad (N)$	ft their x	B1 M1 A1 A1 <u>4</u>
(c) i	$X = 24 + 120 = 144 \quad (N)$	ft their W	M1 A1ft <u>2</u>
(d)	The weight of the rock acts precisely at B .		B1 <u>1</u> 10

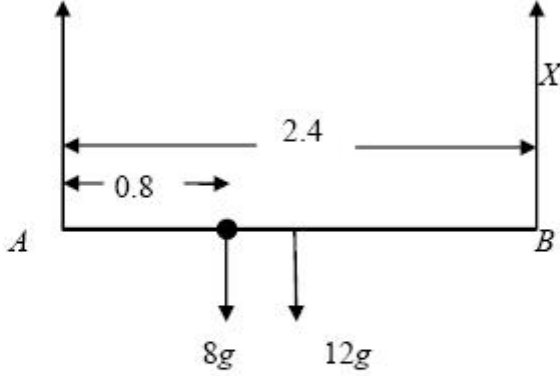
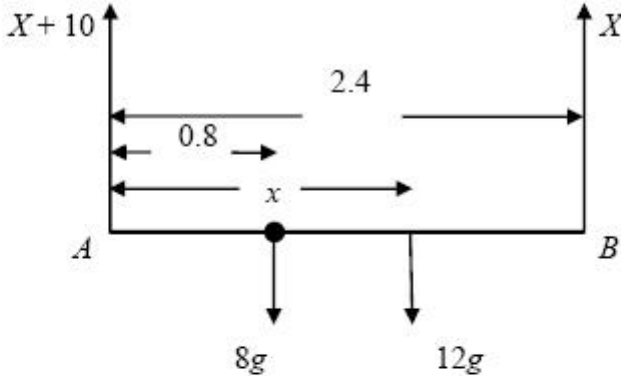
Question 6: June 07 Q3

Question Number	Scheme	Marks
(a)	$M(C) \quad 8g \times (0.9 - 0.75) = mg(1.5 - 0.9)$ $\text{Solving to } m = 2 \quad *$	cso M1 A1 DM1 A1 (4)
(b)	<div style="text-align: center;"> </div> $M(D) \quad 5g \times x = 8g \times (0.75 - x) + 2g(1.5 - x)$ $\text{Solving to } x = 0.6 \quad (AD = 0.6 \text{ m})$	M1 A2(1, 0) DM1 A1 (5) [9]

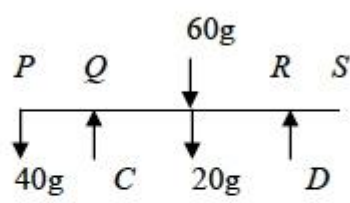
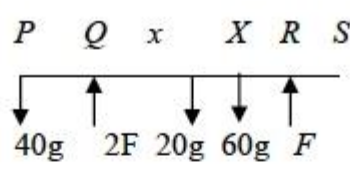
Question 7: Jan 08 Q5

Question Number	Scheme	Marks
(a)	 $M(A): T \times 4 = 12g \times 2.5$ $T = \underline{7.5g \text{ or } 73.5 \text{ N}}$ $R(\uparrow) S + T = 12g$ $\Rightarrow S = \underline{4.5g \text{ or } 44.1 \text{ N}}$	<p>M1 A1 A1 M1 A1 (5)</p>
(b)	 $M(A) V \times 4 = 16g \times y + 12g \times 2.5$ $V = \underline{4gy + 7.5g \text{ or } 39.2y + 73.5 \text{ N}}$	<p>M1 A1 A1 (3)</p>
(c)	$V \leq 98 \Rightarrow 39.2y + 73.5 \leq 98$ $\Rightarrow y \leq 0.625 = 5/8$ <p>Hence "load must be no more than 5/8 m from A" (o.e.)</p>	<p>M1 DM1 A1 (3) 11</p>

Question 8: June 08 Q6

Question Number	Scheme	Marks
(a)	 <p> $M(A) \quad 8g \times 0.8 + 12g \times 1.2 = X \times 2.4$ $X \approx 85 \text{ (N)}$ </p> <p style="text-align: right;">accept $84.9, \frac{26g}{3}$</p>	<p>M1 A1</p> <p>DM1 A1 (4)</p>
	<p>(b)</p>  <p> $R(\uparrow) \quad (X+10) + X = 8g + 12g$ $(X = 93)$ </p> <p> $M(A) \quad 8g \times 0.8 + 12g \times x = X \times 2.4$ $x = 1.4 \text{ (m)}$ </p> <p style="text-align: right;">accept 1.36</p>	<p>M1 B1 A1</p> <p>M1 A1</p> <p>A1 (6)</p> <p>(10 marks)</p>

Question 9: Jan 09 Q4

Question Number	Scheme	Marks
(a)	 <p style="margin-left: 100px;"> $C + D = 120g$ $M(Q), 80g \cdot 0.8 - 40g \cdot 0.4 = D \cdot 1.6$ solving $C = 90g; D = 30g$ </p>	<p>M1 A1 M1 A1 M1 A1 A1 (7)</p>
(b)	 <p style="margin-left: 100px;"> $2F + F = 40g + 20g + 60g$ $M(Q), 60gx + 20g \cdot 0.8 = 40g \cdot 0.4 + F \cdot 1.6$ solving $QX = x = \frac{16}{15} m = 1.07m$ </p>	<p>M1 A1 M1 A1 M1 A1 (6) [13]</p>

Question 10: June 09 Q7

Question Number	Scheme	Marks
(a)	$M(Q), 50g(1.4 - x) + 20g \times 0.7 = T_p \times 1.4$ $T_p = 588 - 350x \quad \text{Printed answer}$	M1 A1 A1 (3)
(b)	$M(P), 50gx + 20g \times 0.7 = T_Q \times 1.4 \quad \text{or} \quad R(\uparrow), T_p + T_Q = 70g$ $T_Q = 98 + 350x$	M1 A1 A1 (3)
(c)	$\text{Since } 0 < x < 1.4, \quad 98 < T_p < 588 \text{ and } 98 < T_Q < 588$	M1 A1 A1 (3)
(d)	$98 + 350x = 3(588 - 350x)$ $x = 1.19$	M1 DM1 A1 (3) [12]

Question 11: Jan 10 Q4

(a)		
	$M(A) \quad W \times 1.5 + 20 \times 3 = Y \times 1.8$ $Y = \frac{5}{6}W + \frac{100}{3} \quad *$	M1 A2 (1, 0) A1 (4) cso
(b)	$\uparrow \quad X + Y = W + 20$ $X = \frac{1}{6}W - \frac{40}{3}$	or equivalent M1 A1 A1 (3)
(c)	$\frac{5}{6}W + \frac{100}{3} = 8\left(\frac{1}{6}W - \frac{40}{3}\right)$ $W = 280$	M1 A1 ft A1 (3) [10]
	Alternative to (b) $M(C) \quad X \times 1.8 + 20 \times 1.2 = W \times 0.3$ $X = \frac{1}{6}W - \frac{40}{3}$	M1 A1 A1

Question 12: June 10 Q4

Question Number	Scheme	Marks
	<p> $M(B)$, $500x + 500 \cdot 2x + 200 \times 3 = Rx5 + Sx1$ (or any valid moments equation) </p> <p> $(\downarrow) R + S = 500 + 500 + 200 = 1200$ (or a moments equation) </p> <p>solving for x; $x = 1.2$ m</p>	<p>M1 A1 A1</p> <p>M1 A1</p> <p>M1 A1 cso</p> <p>[7]</p>

Question 13: Jan 11 Q3

Question Number	Scheme	Marks
(a)	<p> Taking moments about B: $5 \times R_C = 20g \times 3$ $R_C = 12g$ or $60g/5$ or 118 or 120 </p> <p> Resolving vertically: $R_C + R_B = 20g$ $R_B = 8g$ or 78.4 or 78 </p>	<p>M1A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>(5)</p>
(b)	<p> Resolving vertically: $50g = R + R$ </p> <p> Taking moments about B: $5 \times 25g = 3 \times 20g + (6 - x) \times 30g$ $30x = 115$ $x = 3.8$ or better or $23/6$ oe </p>	<p>B1</p> <p>M1 A1 A1</p> <p>A1</p> <p>(5)</p> <p>[10]</p>

