Lesson S3 Review Questions

Moments and the Principle of Moments



Answer every question in your jotter. Show your working. Tap a question below to go to it. Tap **Show answer** under a question to mark it.

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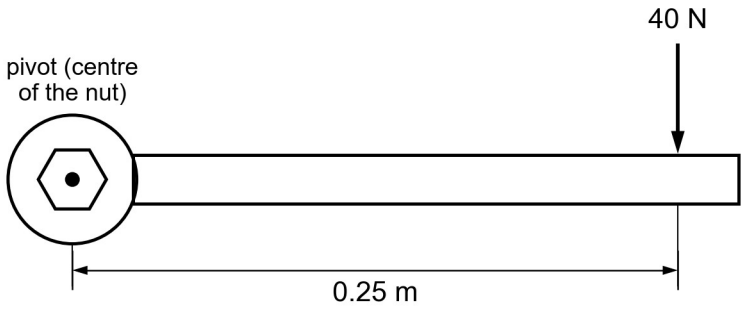
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Questions

Exam-style question (not from a past paper)

1. A spanner is used to tighten a nut, as shown below. **2**

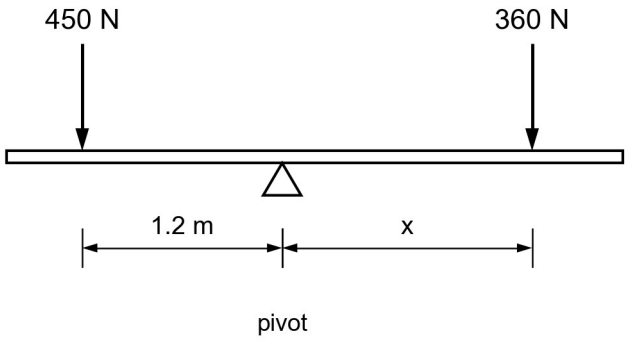


Calculate the moment applied to the nut.

Show answer ›

Exam-style question (not from a past paper)

2. A balance beam is level. The forces acting on it are shown below. **3**



Calculate distance x, by taking moments about the pivot.

Show answer ›

2019 Section 2 Question 11 (b)

3. State the term used to describe when forces acting on a structure are balanced.

_____

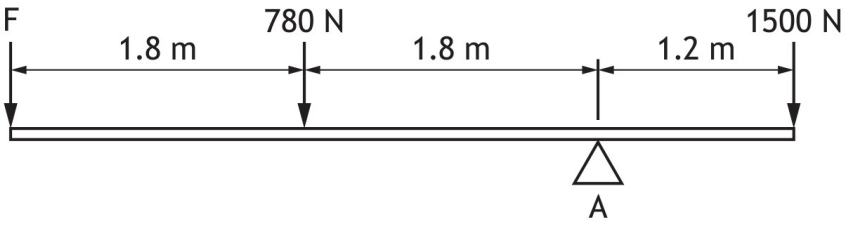
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4. A television camera and crane are shown.



A simplified free body diagram for the camera and crane is shown below.



(a) State the name given to a group of forces that act on an object but do not meet at a single point, such as is shown on the free body diagram.

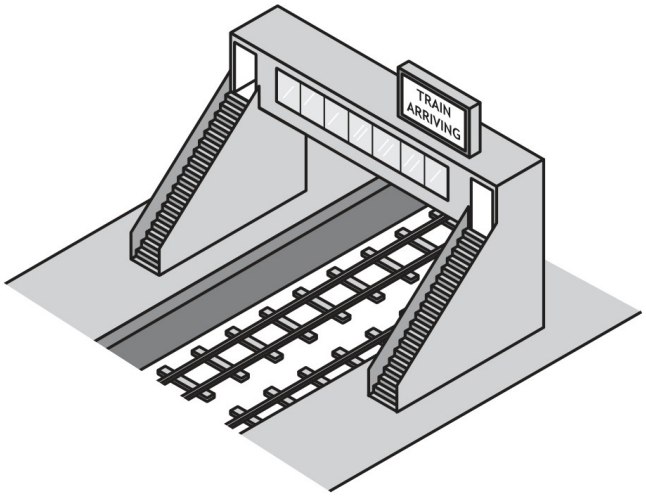
_____

(b) Calculate the force F by taking moments about point A.

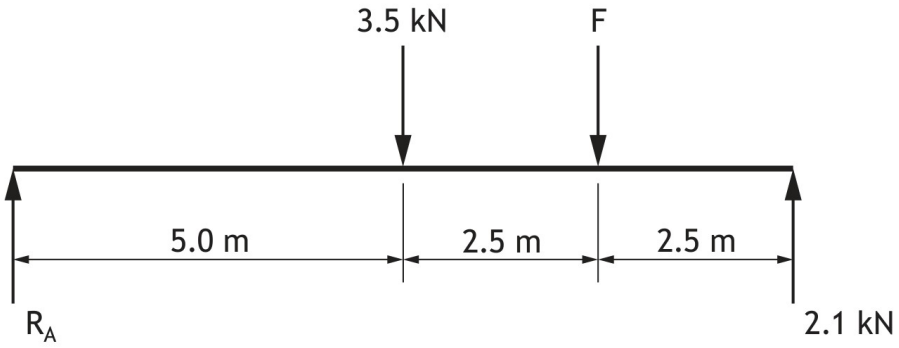
Show answer ›

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5. A walkway linking two railway platforms is shown.



A simplified freebody diagram of the walkway and sign (force F) is shown below.



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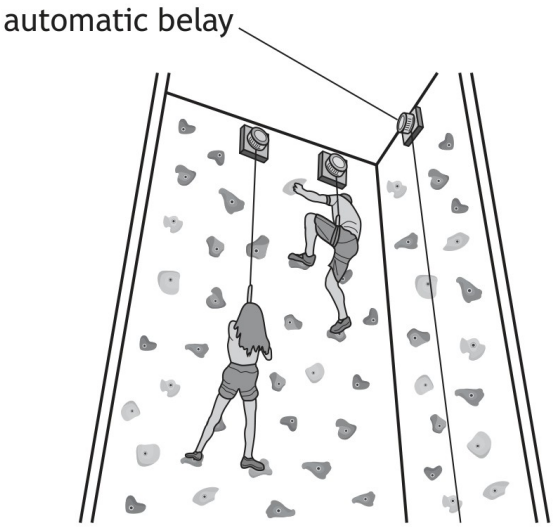
(a) (i) Calculate the **force F** by taking moments about R_A.

(ii) Calculate the reaction force R_A. **2**

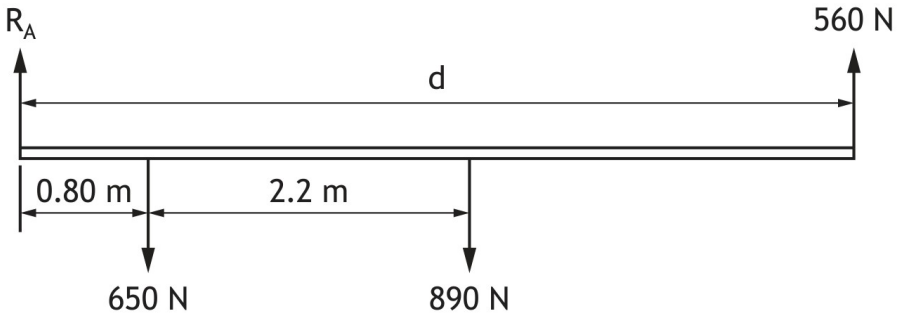
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6. Automatic belays on a climbing wall are used to safely lower climbers back to the ground as shown.



A simplified diagram of a beam that is used to support two automatic belays as two climbers are lowered is shown below.



(a) State the name of the diagram shown above. **1**

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(b) Calculate the **length d** by taking moments about R_A. **3**

(c) Calculate the force R_A. **2**

Show answer ›

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Answers

Check your understanding (booklet)

1 Forces that act on an object but do not meet at a single point.

2 The newton metre (Nm).

3 When an object is balanced, the sum of the clockwise moments = the sum of the anticlockwise moments.

4 Use a bigger force; apply the force further from the pivot.

Answer to question 1

Exam-style question (not from a past paper)

Marking (MI style)

Expected answer(s)	Max mark	Additional guidance
M = Fx = 40 × 0.25 (1)	2	1 mark for substitution.
M = 10 Nm (1)		1 mark for the answer with its unit.

‹ Back to question 1

Answer to question 2

Exam-style question (not from a past paper)

Marking (MI style)

Expected answer(s)	Max mark	Additional guidance
ΣCWM = ΣACWM: 360 × x = 450 × 1.2 (1)	3	1 mark for substitution.
x = 540 ÷ 360 (1)		1 mark for transposition.
x = 1.5 m (1)		1 mark for the answer with its unit.

‹ Back to question 2

Answer to question 3

2019 Section 2 Question 11 (b)

Marking instructions

Question	Expected response	Max mark	Additional guidance
(b)	Equilibrium.	1	Ignore additional description

‹ Back to question 3

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Answer to question 4

2026 Section 2 Question 11 (a), (b)

Marking instructions

Question			Expected response	Max mark	Additional guidance
11.	(a)		Non-concurrent/parallel (forces)	1	
	(b)		ΣCWM = ΣACWM (1500 x 1.2) = (780 x 1.8) + (F x 3.6) 1800 = 1404 + (F x 3.6) 1800 – 1404 = (F x 3.6) $F = \frac{396}{3.6}$ **F = 110 N (2 sf)**	3	**1 mark** for substitution. **1 mark** for transposition. **1 mark** for correct answer from given working with unit.

‹ Back to question 4

Answer to question 5

2022 Section 2 Question 11 (a)(i), (a)(ii)

Marking instructions

Question			Expected response	Max mark	Additional guidance
11.	(a)	(i)	ΣCWM = ΣACWM $(3.5 \times 5) + (F \times 7.5) = (2.1 \times 10)$ $17.5 + (F \times 7.5) = 21$ $F = \frac{3.5}{7.5}$ F = 0.4666666667 F = **0.47 kN (2 sf)**	3	1 mark for substitution. 1 mark for transposition. 1 mark for correct answer from given working with unit.
		(ii)	$\Sigma F_{vertical} = 0$ $3.5 + 0.47 = R_A + 2.1$ $R_A = 3.97 - 2.1$ $R_A = 1.87$ R_A = **1.9 kN (2 sf)**	2	1 mark for substitution. Allow FTE from part a(i). 1 mark for correct answer from given working with unit.

‹ Back to question 5

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Answer to question 6

2025 Section 2 Question 13 (a), (b), (c)

Marking instructions

Question			Expected response	Max mark	Additional guidance
13.	(a)		Free body (diagram)	**1**	
	(b)		$\Sigma CWM = \Sigma ACWM$ $(650 \times 0.8) + (890 \times 3) = 560 \times d$ $d = \frac{3190}{560}$ $d = 5.696428571$ **d = 5.7 m (2 sf)**	**3**	1 mark for substitution. 1 mark for transposition. 1 mark for correct answer from given working with unit.
	(c)		$\Sigma F_v = 0$ $R_A + 560 = 650 + 890$ $R_A = 1540 - 560$ **R_A = 980 N (2 sf)**	**2**	1 mark for substitution. 1 mark for correct answer from given working with unit.

Note: On a screen the drawing is not true size. On the printed paper: Force A measures 82 mm. 82 × (100 ÷ 10) = 820 N.

‹ Back to question 6

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