FREE REVISION PACK

Moments

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.2

Easy | Medium | Hard | Multiple choice · past-paper questions

8	8	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Definition of a couple	AQA June 2022 · AS Paper 2 · Q23	1 mark
2	Easy	Is the bar in equilibrium?	AQA June 2017 · A-level Paper 1 · Q18	1 mark
3	Easy	Moment needed for equilibrium	AQA November 2020 · A-level Paper 1 · Q20	1 mark
4	Medium	Hinged beam and string	AQA June 2022 · AS Paper 2 · Q22	1 mark
5	Medium	Moments with springs	AQA June 2018 · A-level Paper 1 · Q21	1 mark
6	Medium	Rod on two wires	AQA June 2018 · AS Paper 2 · Q20	1 mark
7	Hard	Metre-rule balance	AQA June 2017 · AS Paper 2 · Q16	1 mark
8	Hard	Reaction at a support	AQA June 2019 · AS Paper 2 · Q24	1 mark

Key ideas to have ready

- **Moment** of a force about a point = force × *perpendicular* distance from the point to the force's line of action (N m).
- **Principle of moments:** for a body in equilibrium, the sum of clockwise moments about any point equals the sum of anticlockwise moments about the same point.
- **Couple:** a pair of equal, opposite, parallel forces that don't act along the same line. Moment of a couple = one force × perpendicular distance between the forces. A couple causes rotation but no translation.
- **Centre of mass:** the single point through which the weight of an object can be taken to act. A freely suspended object hangs with its centre of mass directly below the pivot.
- **Equilibrium:** resultant force = 0 *and* resultant moment = 0.

How to use this pack

1. The questions are grouped into levels (Easy, Medium and Hard). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–3

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2022 · AS Paper 2 · Q23

1 Which description of a couple and its unit is correct?

[1 mark]

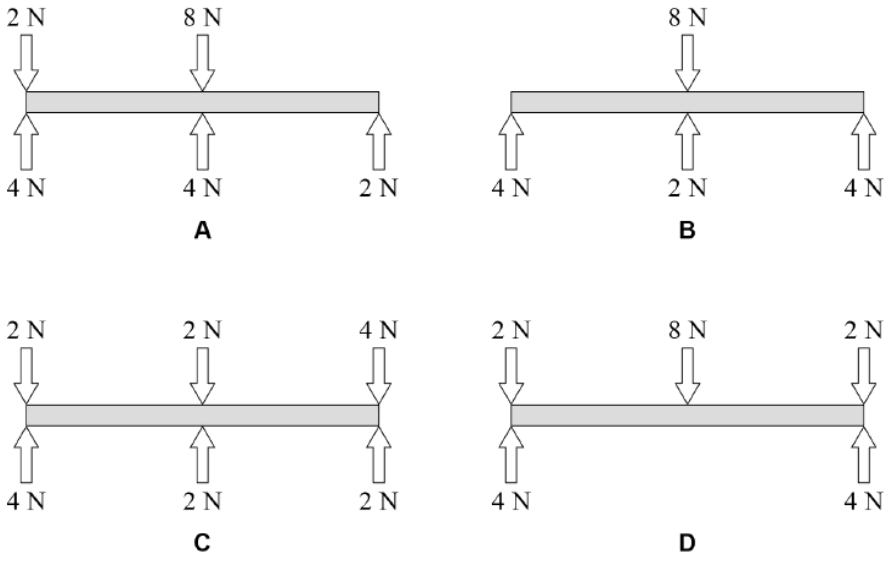
	Description	Unit	
A	consists of two equal parallel forces	$\mathrm{N\,m^{-1}}$	⬭
B	produces translational motion	$\mathrm{N\,m}$	⬭
C	consists of two equal and opposite forces	$\mathrm{N\,m}$	⬭
D	produces rotational motion	$\mathrm{N\,m^{-1}}$	⬭

AQA June 2017 · A-level Paper 1 · Q18

2 A light uniform rigid bar is pivoted at its centre. Forces act on the bar at its ends and at the centre.

Which diagram shows the bar in equilibrium?

[1 mark]



A ○

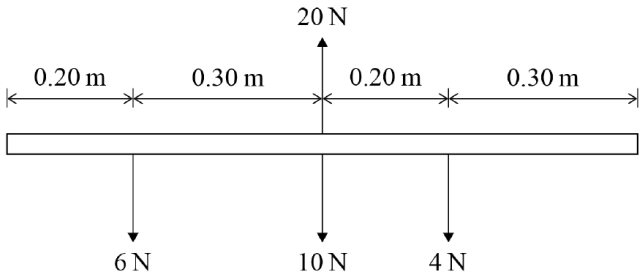
B ○

C ○

D ○

AQA November 2020 · A-level Paper 1 · Q20

3 The diagram shows the forces acting on a uniform rod.



Which statement is correct?

[1 mark]

A The rod is in equilibrium. ○

B For equilibrium, an anticlockwise moment of $1.0\ \text{N m}$ is needed. ○

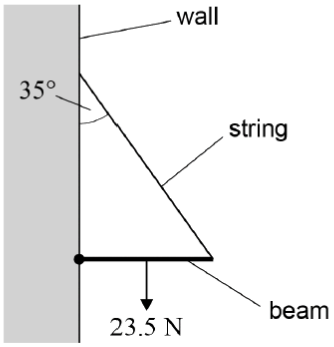
C For equilibrium, a clockwise moment of $1.0\ \text{N m}$ is needed. ○

D For equilibrium, the $10\ \text{N}$ force should be increased to $20\ \text{N}$. ○

Medium Two or three steps. Roughly a third to a half of students get these right. **Questions 4–6**

AQA June 2022 · AS Paper 2 · Q22

4 A uniform beam of weight 23.5 N is attached by a hinge to a vertical wall and supported by a string.
The string makes an angle of 35° to the wall.



What is the tension in the string?

[1 mark]

A 14 N ⬭

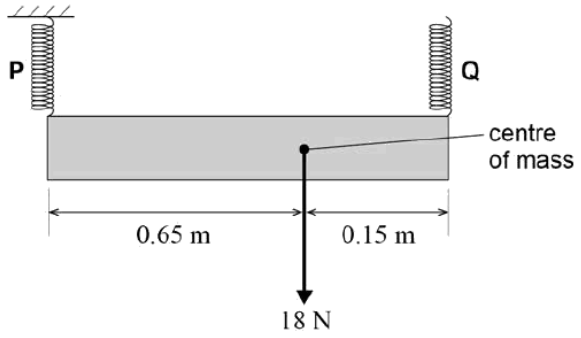
B 21 N ⬭

C 29 N ⬭

D 41 N ⬭

AQA June 2018 · A-level Paper 1 · Q21

5 A non-uniform sign is 0.80 m long and has a weight of 18 N
It is suspended from two vertical springs **P** and **Q**. The springs obey Hooke's law and the spring constant of each spring is 240 N m^{-1}



The top end of spring **P** is fixed and the top end of spring **Q** is adjusted until the sign is horizontal and in equilibrium.

What is the extension of spring **Q**?

[1 mark]

A 0.014 m ○

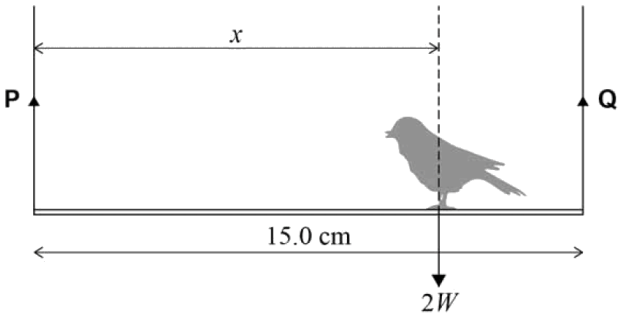
B 0.038 m ○

C 0.049 m ○

D 0.061 m ○

AQA June 2018 · AS Paper 2 · Q20

6 A bird sits on a uniform rod suspended from vertical wires **P** and **Q**.



not to scale

The rod has a weight W and is 15.0 cm long.
The weight of the bird is $2W$ and acts at a distance x from **P**.

What is the value of x when the tension in **P** is half the tension in **Q**?

[1 mark]

A 7.50 cm ○

B 10.0 cm ○

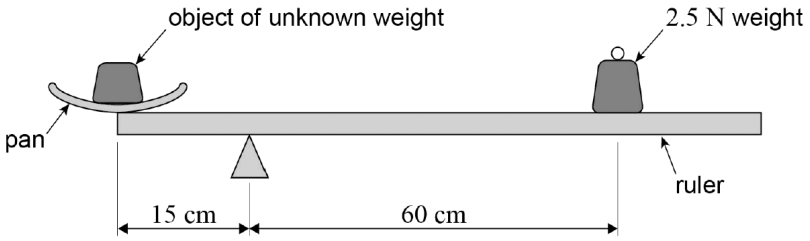
C 11.3 cm ○

D 15.0 cm ○

Hard Several steps, often with a trap built in. Fewer than 3 in 10 students get these right. **Questions 7–8**

AQA June 2017 · AS Paper 2 · Q16

7 The diagram shows a uniform metre ruler of weight 1.5 N pivoted 15 cm from one end for use as a simple balance.



A scale pan of weight 0.5 N is placed at the end of the ruler and an object of unknown weight is placed in the pan. The ruler moves to a steady horizontal position when a weight of 2.5 N is added at a distance of 60 cm from the pivot as shown.

What is the weight of the object?

[1 mark]

A 9.5 N ⬭

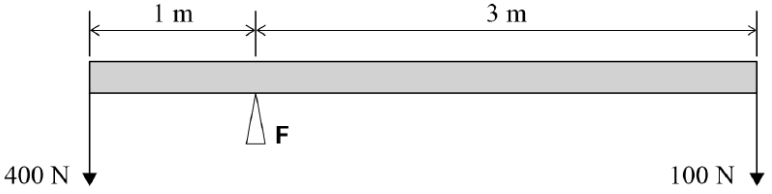
B 10.0 N ⬭

C 13.0 N ⬭

D 13.5 N ⬭

AQA June 2019 · AS Paper 2 · Q24

8 A uniform rod is balanced horizontally about a support **F**. Forces of 400 N and 100 N act at the ends of the rod, as shown.



What is the reaction force acting on the rod at support **F**?

[1 mark]

A 100 N ⬭

B 500 N ⬭

C 550 N ⬭

D 600 N ⬭

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**