Moments, levers and gears

Name _____ Class _____ Date _____

A force can make an object turn. The turning effect of a force is called a **moment**.

KEY EQUATION

$$M = F\,d$$

M = moment (N m)
F = force (N)
d = perpendicular distance from the pivot to the line of action of the force (m)

WORKED EXAMPLE

A 20 N force acts 0.3 m from a pivot.
M = 20 × 0.3 = **6 N m**

Section A · Recall and calculate

Grade 4–5

1 Calculate the moment when a 50 N force acts 0.4 m from the pivot. [2]

2 State the principle of moments. [2]

3 Why is it easier to open a door by pushing far from the hinge? [2]

Section B · Balance

Grade 5–6

4 A seesaw is balanced. A 300 N child sits 2.0 m to the left of the pivot. Where must a 400 N child sit on the right? [3]

5 A uniform 2 m plank is pivoted at its centre. A 60 N weight is placed 0.5 m to the left of the pivot. Calculate the weight needed 0.8 m to the right to balance it. [3]

Section C · Levers and gears

Grade 6–7+

6 Explain how a lever, such as a crowbar, acts as a force multiplier. [3]

7 A small gear with 10 teeth drives a large gear with 30 teeth. Describe how the speed and the moment of the large gear compare with the small gear. [2]

Exam-style question

AQA style

8 A wheelbarrow carries a load. The wheel acts as the pivot.

a The load weighs 600 N and acts 0.4 m from the pivot. The handles are 1.2 m from the pivot. Calculate the upward force needed on the handles to lift the load. [3]

b Explain why the load should be placed close to the wheel. [2]

Total: _____ / 22

How confident am I?	Not yet	Nearly	Got it
I can calculate moments using M = Fd	☐	☐	☐
I can use the principle of moments	☐	☐	☐
I can explain how levers and gears work	☐	☐	☐