AQA Physics
GCSE Checkpoint follow-up

Name .... **Class** .... **Date** ....

P8 Forces in balance – Aiming for Grade 6

> **Aims**
>
> To carry out a series of tasks to help you understand forces and how they can be used in everyday life to make jobs easier.

Learning outcomes

After completing these activities, you should be able to:

- draw a free body diagram
- explain what happens when the resultant force is zero
- explain what happens when the resultant force is non-zero
- resolve a force into its perpendicular components
- calculate the moment of a force and use the principle of moments
- explain how force multipliers work.

Task

There are four stations placed around the room. For each station answer there are questions on this sheet. You can complete the sheet in any order.

Station A

1 Draw a free body diagram for each of the examples at station A.

   a the magnets (2)   **b** mass on a spring (2)

   c the book (2)   **d** the floating cork (2)

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2 None of these objects are moving. Explain why using your force diagrams. (2)

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Station B

Use the Newtonmeter to hold the trolley in place on the slope. Measure the force needed to keep the trolley still as you increase the angle of the slope.
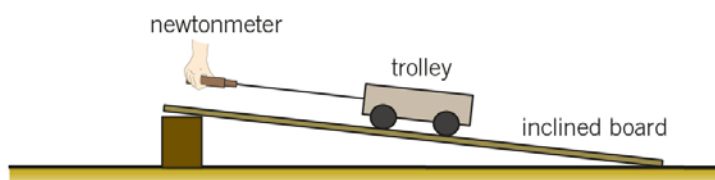
1 Describe the relationship between the angle of the slope and the size of the force. (1)

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2 Explain the relationship between the angle of the slope and the size of the force. (2)

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3 Draw a free body diagram for the forces acting on the toy car as it accelerates. (1)

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4 Use your free body diagrams to help you explain why the objects accelerate. (2)

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Station C

1 Who is the strongest? Link the Newtonmeters together and ask your partner to pull on the other Newtonmeter. Explain the result. (2)

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2 A hammer hits a nail into a piece of wood with a force of 50 N.

a State the size and direction of the force on the nail. (1)

....

b State the size and direction of the force on the hammer. (1)

....

3 A car starts to pull a caravan with a force of 100 N. The caravan pulls back on the car with an equal and opposite force of 100 N. Explain how the car is able to make the caravan move. (2)

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Station D

All the machines at this station are designed to magnify forces.

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To do:

1   For each machine at the station calculate the maximum load if the effort applied was 20 N. (2 marks each)

Remember:

* moment = force × perpendicular distance from line of action of the force
* if an object is in equilibrium
* clockwise moments = anticlockwise moments
* look carefully at each of the machines and identify where the load, effort, and pivot are. Approximate the distances between the load and the pivot and effort and the pivot.