MR SULLY UNFOLDS PHYSICS ANSWERS

Forces, vectors and resultant forces

AQA 4.5.1
Forces · Paper 2
Foundation & Higher

Name _____ Class _____ Date _____

A force is a push or pull caused by an interaction between two objects. Forces are **vectors**: they have size and direction.

KEY IDEAS

- **Scalar**: magnitude only (speed, distance, mass, energy). **Vector**: magnitude and direction (velocity, displacement, force, acceleration).
- **Contact forces**: friction, air resistance, tension, normal contact force. **Non-contact**: gravitational, electrostatic, magnetic.
- The **resultant force** is the single force with the same effect as all the forces acting together.

Section A · Recall

Grade 4–5

1 Sort these into scalars and vectors: speed, velocity, mass, force, distance, displacement. [3]

Scalars: speed, mass, distance

Vectors: velocity, force, displacement

2 Give two contact forces and two non-contact forces. [2]

Contact: friction, air resistance

Non-contact: gravity, magnetic

3 What is meant by a resultant force? [1]

A single force that has the same effect as all the forces acting together.

Section B · Calculate

Grade 5–6

4 Calculate the resultant force in each case and give its direction. [4]

a 40 N to the right and 15 N to the left

25 N to the right

b 20 N up and 20 N down

0 N (balanced)

c A car with a 3000 N driving force and 1200 N of drag

1800 N forwards

d 10 N and 6 N both acting to the left

16 N to the left

5 A book rests on a table. Name the two vertical forces acting on the book and explain why it doesn't move. [3]

Weight (down) and normal contact force (up).

They are equal in size and opposite in direction,

so the resultant force is zero.

Section C · Stretch

Grade 7+

6 A force of 50 N acts at 30° above the horizontal. Use a scale drawing to find its horizontal and vertical components. (Higher) [3]

Horizontal ≈ 43 N, vertical = 25 N

Accurate scale drawing (1); horizontal component (1); vertical component (1).

Exam-style question

AQA style

7 A skydiver of weight 700 N is falling. At one moment the air resistance on her is 500 N.

a Draw a free body diagram showing the forces on the skydiver. [2]

Weight 700 N down (1); air resistance 500 N up, shorter arrow (1).

b Calculate the resultant force and give its direction. [2]

700 – 500 = 200 N downwards

c Describe how her motion is changing at this moment. [1]

She is accelerating (speeding up) downwards.

Total: _____ / 21

How confident am I?	Not yet	Nearly	Got it
I can tell scalars from vectors	☐	☐	☐
I can name contact and non-contact forces	☐	☐	☐
I can calculate resultant forces	☐	☐	☐