Resultant forces: adding arrows

Student activity • observation and reasoning

YEAR 10 / LESSON 4 / PHYSICS + SCIENCE (DOUBLE AWARD)

The question

What does the combined force tell us—and what does it not tell us?

Use paper arrows and short scenarios to calculate resultant forces without treating zero resultant force as proof of rest.

Equipment

- Booklet, ruler and reusable force-arrow cards

Paper and diagram activity only. No pushing pupils, stretched cords or moving trolleys are required.

Course coverage: Shared Physics / Double Award: 1.11, 1.15. Resultant forces along a line.

Plan, model or apparatus sketch

Draw a labelled setup or force diagram; include the measured quantities.

Method and reasoning

Read the whole sequence before starting

YEAR 10 / LESSON 4 / PHYSICS + SCIENCE (DOUBLE AWARD)

1. Choose rightward as positive. Draw two arrows on one object: 8 N right and 3 N left. Calculate the signed sum and state its direction.

2. Repeat for 6 N right and 6 N left, then for 2 N left and 5 N left. Use an explicit scale such as 1 cm for 1 N.

3. Match each result to a possible change in motion. A nonzero resultant causes acceleration; the object may speed up, slow down or change direction depending on its velocity.

4. For the zero-resultant case, draw two possible situations: an object at rest and an object moving at constant velocity in a straight line.

5. Analyse a vehicle moving right with a net force to the left. Explain why it initially slows down rather than instantly moving left.

6. Check all diagrams for the chosen object, arrow directions, units and the distinction between force and velocity.

Cleanup

- Return reusable cards and keep corrected diagrams.

Record your evidence

Blank spaces are for your own work

YEAR 10 / LESSON 4 / PHYSICS + SCIENCE (DOUBLE AWARD)

Reference and task data

The resultant is the vector sum of the forces on one object. For forces along one line, choose a positive direction and add signed values. Zero resultant means zero acceleration, not necessarily zero velocity. Equal and opposite interaction partners on different objects must not be added into one object's force diagram.

Forces on one object	Resultant / N and direction	Possible motion
8 N right; 3 N left		
6 N right; 6 N left		
2 N left; 5 N left		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

YEAR 10 / LESSON 4 / PHYSICS + SCIENCE (DOUBLE AWARD)

1. Find the resultant of 8 N right and 3 N left.

2. Find the resultant of 2 N left and 5 N left.

3. What is the resultant of 6 N in opposite directions?

4. Can a moving object have zero resultant force?

5. A right-moving car has a leftward resultant: what initially changes?

6. Why specify the chosen object?