AQA Physics
GCSE Bump up your grade student

P8, Topic **8.3**

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

What is the resultant force?
Summing forces acting on objects

Specification reference:

- P5.1.4 Resultant forces

Aims

In this exercise, you will look at free-body diagrams and use them to work out the resultant force on a runner.

Learning outcomes

After completing this activity, you should be able to:

- label a diagram showing several forces acting on an object
- calculate a resultant force from two parallel forces acting in opposite directions
- describe the effect of zero and non-zero resultant forces on the motion of moving and stationary objects.

Task

Answer the following questions on free-body diagrams.

Questions

1 This question is about the photo of a runner in the photo support sheet. Look at the horizontal forces acting on the runner and then answer the questions.

    a Label the two forces acting on the runner in the diagram with a suitable name. (*2*)

    b Describe the forces acting on the runner.

       ....

       .... (*2*)

    c Calculate the resultant force on the runner in this situation.

       .... (*1*)

    d Explain the effect of this resultant force on the runner's motion.

       ....

       ....

       .... (*2*)

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2 These questions are about the effects of unbalanced forces.

a When the runner hears 'Go!', her muscles apply a forward force of 80 N on her body. Calculate the resultant force in this situation, if the backward force remains at 40 N.

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.... (*1*)

b State the direction of this resultant force and describe its effect on the motion of the runner.

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.... (*2*)

c As the runner gains speed, air resistance increases the backward force on her body to 70 N, whilst the forward force remains at 80 N.

Calculate the new resultant force on the runner's body.
Describe and explain its effects on her motion.

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.... (*3*)

d When the runner has passed the finish line her muscles apply a force on the ground to increase her backward force.

Look at the image on the photo support sheet, and from this calculate the resultant force.
Describe and explain any change to the motion.

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.... (*3*)