

Force and Acceleration Practice

- 1 Answer these questions, completing sentences where needed.
 - (a) When the forces on an object are balanced, we say that there is zero _____.
 - (b) What happens to a stationary object with balanced forces?
 - (c) What happens to a moving object with balanced forces?
 - (d) Why would you expect a 3 N force to have more effect on a pencil than a suitcase?
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- 2 The diagram above shows a 10 kg school bag and a 4 kg PE bag.
 - (a) Calculate the resultant force on each bag.
 - (b) Calculate the resultant force on each kilogram for each bag.
 - (c) Which bag will accelerate more rapidly?
 - 3 Using your answers to Q2 state
 - (a) the acceleration of the school bag,
 - (b) the acceleration of the PE bag.
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- 4 Complete the word equations.
 - (a) Acceleration =
 - (b) Resultant Force =
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- 5 Complete these equations using symbols.
 F is the resultant force, m is the mass and a is the acceleration.
 - (a) $F =$
 - (b) $a =$
 - (c) $m =$

- 6 Use your understanding of force and acceleration (including the formulae) to calculate
- (a) The resultant force needed to give a 60 kg cheetah a 5 m/s^2 acceleration.

(b) The acceleration when a 20 kg cycle with a 70 kg rider is pedalled with a 450 N resultant force.

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- 7 A 2.4 kg motion trolley is pulled with a 9 N force on a desk where there is 3 N of friction.
- (a) Calculate the resultant force on the trolley.

(b) Calculate the acceleration of the trolley.

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- 8 A 0.1 kg apple and a 2 kg bag of flour fell from a high shelf at the same time. In this question, we work out which will hit the floor first. Remember: $\text{Weight} = \text{mass} \times g$.
- (a) Calculate the weight of the apple and also the weight of the bag of flour.

(b) Calculate the acceleration of the apple, assuming that there is very little drag.

(c) Calculate the acceleration of the bag of flour, assuming that there is very little drag.

(d) Which hits the floor first? Or is it a draw?

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- 9 Students do an experiment with two identical 0.1 kg lunchboxes. One is empty, the other is filled with 1.5 kg of sand. They drop both from the top of a stairwell after checking that there is no-one underneath. Because the boxes are the same size, they have the same drag force as each other at the same speed. Here we assume that both lunch boxes face a 0.2 N drag force as they fall.

(a) Calculate the weight of each box (including its contents).

(b) Calculate the resultant force on each box as it falls.

(c) Calculate the acceleration of each box as it falls.

(d) Which box will hit the ground first, or is it a draw? Explain why.