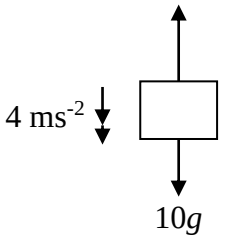
Section 2: Applying Newton's second law

Exercise level 1

1. Calculate the resultant force in Newtons required to produce the following accelerations.
   (i) A car of mass 1300 kg has acceleration 3 m s^{-2}
   (ii) A cheetah of mass 45 kg has acceleration 10 m s^{-2}
   (iii) An aircraft carrier of mass 3600 tonnes has an acceleration of 0.01 m s^{-2}
   (iv) An airliner with mass 380 tonnes brakes with a deceleration of 6 m s^{-2}
   (v) An amoeba of mass 10^{-9} g has an acceleration of 0.002 m s^{-2}

2. Calculate the acceleration in m s^{-2} in each case.
   (i) A resultant force of 200 N applied to a body of mass 5 kg
   (ii) A resultant force of 1200 N applied to a body of mass 23 kg
   (iii) A resultant force of 1400 N applied to a body of mass 2 tonnes
   (iv) A resultant force of 6 N applied to a body of mass 3 g
   (v) A resultant force of 75 kN applied to a body of mass 160 tonnes

3. In each force diagram, and find the quantities marked with a letter.

(i)


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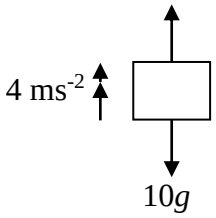
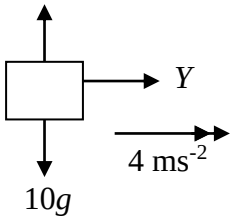
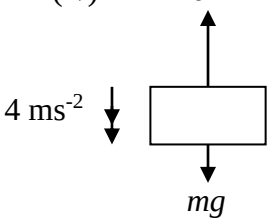


(iii)


(iv)


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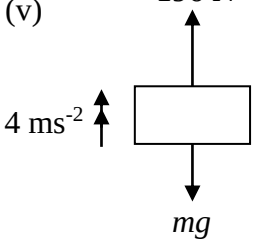
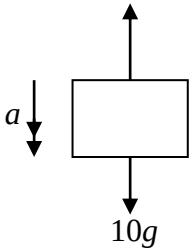
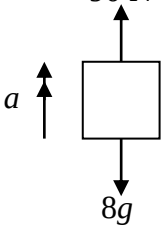


4. Find the acceleration of the block in each case.

(i)


(ii)


Edexcel AS Maths Force and Newton's laws 2

Exercise

5. A particle of mass 5 kg is moving with an acceleration of 3 ms^{-2}. Find the magnitude of the resultant force on the particle.

6. A mass of 45 kg is acted on by a single force of 9 N. Find the acceleration of the particle.

7. A resultant force of 40 N acting on a particle of mass *m* kg produces an acceleration of 2 ms^{-2}. Find the value of *m*.

8. A particle of mass 10 kg is pulled along a smooth horizontal plane by a horizontal string. Find the tension in the string when the particle is accelerating at 5 ms^{-2}.

9. A body of mass 2 kg lies on a smooth horizontal plane. A horizontal force of 10 N acts on the body in a direction due East, while a horizontal force of 14 N acts on the body in a direction due West. Find the resulting acceleration.

10. A package of mass 8 kg is lowered by means of a vertical cable with a downward acceleration of 2 ms^{-2}. Find the tension in the cable.