Answers Motion

Year 10 Science Chapter 9

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1 **Motion** is the process of moving or being moved. An object is in motion when it is continuously changing its position. For example, a car is in motion when it is moving from one place to another place.

2 **Instantaneous speed** is the speed at a certain instant. As a cyclist rides their bike to school, the instantaneous speed will change throughout the journey. The a**verage speed**, however, is a measure of the overall speed. The average speed ignores the variations in speed throughout the journey and only considers the overall distance and the overall time.

3 Average speed = $\frac{distance}{time}$

4 What is the average speed, in km/h, of a cyclist who travels 15 km in 30 minutes?

$$\text{Average speed} = \frac{distance}{time} = \frac{15\ km}{0.5\ h} = 30 \text{ km/h}$$

5 What is the average speed, in km/h, of a truck that travels 120 km in 90 minutes?

$$\text{Average speed} = \frac{distance}{time} = \frac{120\ km}{1.5\ h} = 80 \text{ km/h}$$

6 What is the average speed, in m/s, of a vehicle that covers 620 km in 9 hours?

$$\text{Average speed} = \frac{distance}{time} = \frac{620 \times 1000\ m}{9 \times 60 \times 60\ s} = 19.14 \text{ m/s}$$

On a calculator: 620x1000 ÷ (9x60x60)

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1 Average speed = $\frac{distance}{time}$

2 Copy and complete the following table:

Speed (m/s)	Speed (km/h)
10 m/s	36 km/h
20 m/s	72 km/h
13.89 m/s	50 km/h
27.78 m/s	100 km/h

3 Harry completes a walk of the 400 m athletic track in 76 s. Calculate Harry's speed in m/s and km/h.

$$\text{Average speed} = \frac{distance}{time} = \frac{400\ m}{76\ s} = 5.26 \text{ m/s}$$

$$\text{Average speed} = \frac{distance}{time} = \frac{400 \times 60 \times 60\ km}{1000 \times 76\ h} = 18.95 \text{ km/h}$$

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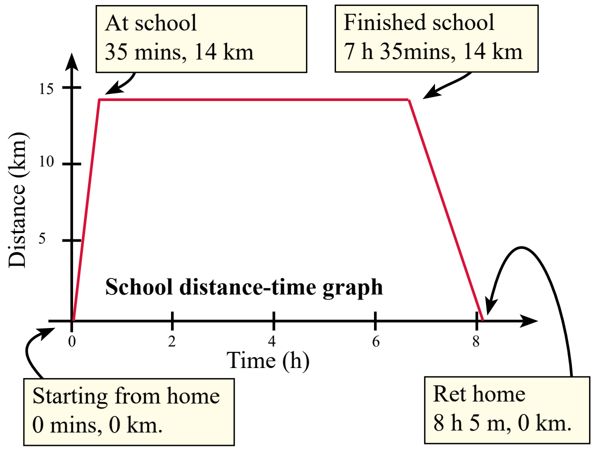
4 On a journey to school, Zara takes 35 minutes to bus the 14 km to school. Zara catches the bus home 7 hours later, and takes 30 minutes to get back home.



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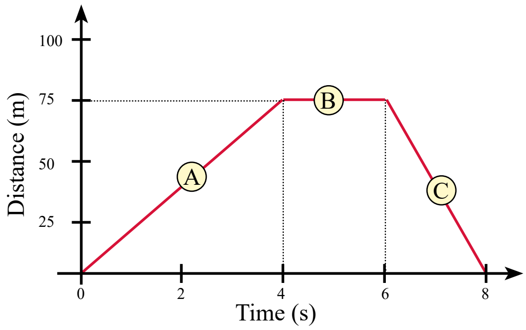
For each of the following distance-time graphs:

a) describe how the object moves.

b) calculate the speed of the object for each part of the journey.

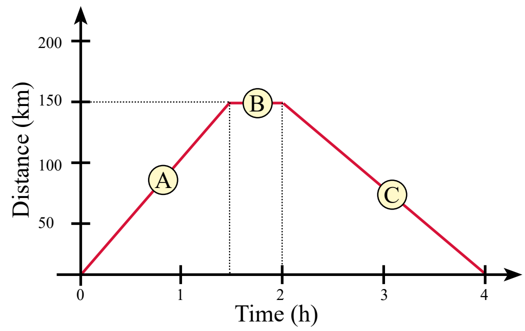
1 Section A, the object moves at a constant speed to be 75 m away from the origin after 4 seconds.
Section B, the object has been stationary for 2 seconds.
Section C, the object moves back to the origin covering the 75 m in 2 seconds.

Section A, average speed = 75 m/4 seconds = 18.75 m/s
Section B, average speed = 0 m/s
Section C, average speed = 75 m/ 2 seconds = 37.5 m/s



2 Section A, the object moves at a constant speed to be 150 m away from the origin after 1.5 seconds.
Section B, the object has been stationary for 0.5 seconds.
Section C, the object moves back to the origin covering the 150 m in 2 seconds.

Section A, average speed = 150 m/1.5 seconds = 100 m/s
Section B, average speed = 0 m/s
Section C, average speed = 150 m/ 2 seconds = 75 m/s



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3 In which sections of the following distance-time graph is the object travelling at a constant speed?
A constant speed on a distance-time graph is illustrated by a straight line.
Constant speeds are at section A and section D

4 Copy and complete the following table:

a) speed = distance/time = 50.2×1000 m ÷ (90×60) s = 9.30 m/s

b) distance = speed×time = 90 km × 1.25 h = 112.5 km

c) distance = speed×time = 20 m × 22 s = 440 m

d) time = distance ÷ speed = 18 m ÷ 32 m/s = 0.56 s

e) time = distance ÷ speed = 657 km ÷ 91 km/h = 7.22 h

Speed	Distance	Time
9.30 m/s	50.2 km	1 h 30 min
90 km/h	**112.5 km**	1 h 15 min
20 m/s	**440 m**	22 s
32 m/s	18 m	**0.56 s**
91 km/h	657 km	**7.22 h**

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1 Newton's first law of motion: An object is either at rest or moving with constant velocity unless another force is applied to it.

2 'At rest' means not moving.

3 Use Newton's first law of motion to explain why seatbelts save lives.
When a car suddenly stops, or crashes, the driver and passengers continue moving forward at the same speed as the car just before the sudden stop. Without seatbelts, the occupants of the car are likely to suffer serious injury or death as their inertia causes them to smash into the dashboard or windscreen of the car.

4 Use Newton's first law of motion to write a brief explanation of the following:
When the skateboard suddenly hits the obstacle, the rider continues moving forward at the same speed as the skateboard just before the sudden stop. Friction between the feet and the board slows the motion of the feet, meaning that the rider continues to move head first.

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1 Newton's second law of motion: Acceleration is produced when a force acts on a mass.

2 **Acceleration** happens when an object changes speed.

- Positive acceleration happens when an object is getting faster and faster.
- Negative acceleration happens when an object is getting slower and slower.

3 Use Newton's second law of motion to explain why a falling apple increases in speed.
Assuming no air resistance, a falling object becomes faster and faster as the force of gravity acts on the object.

4 Calculate the force of gravity that acts on a falling object of mass 5 kg (a = 9.8 m/s^2).
F = ma
F = 5 kg × 9.8 m/s^2
F = 49 N

5 Calculate the force of gravity that acts on a falling object of mass 10 kg (a = 9.8 m/s^2).
F = ma
F = 10 kg × 9.8 m/s^2
F = 98 N

6 Calculate the force of gravity that acts on a falling object of mass 750 g (a = 9.8 m/s^2).
F = ma
F = 0.75 kg × 9.8 m/s^2 {1000 g = 1 kg}
F = 7.35 N

p221	**1** Calculate the net force if a 6 kg block of wood accelerates at 1.4 m/s^2. F = mass × acceleration F = 6 kg × 1.4 m/s^2 F = 8.4 N **2** Calculate the net force if a 30 kg block of wood accelerates at 1.4 m/s^2. F = mass × acceleration F = 30 kg × 1.4 m/s^2 F = 42 N **3** Calculate the net force if a 120 g ball accelerates at 2.3 m/s^2. F = mass × acceleration F = 0.12 kg × 2.3 m/s^2 F = 0.276 N **4** Calculate the net force if a 635 g ball accelerates at 1.7 m/s^2. F = mass × acceleration F = 0.635 kg × 1.7 m/s^2 {1000 g = 1 kg} F = 1.08 N **5** Calculate the net force if a 1.1 tonne car accelerates at 3.6 m/s^2. F = mass × acceleration F = 1100 kg × 3.6 m/s^2 {1000 kg = 1 tonne} F = 3960 N **6** Calculate the net force if a 1.4 tonne car accelerates at 12.8 m/s^2. F = mass × acceleration F = 1400 kg × 12.8 m/s^2 {1000 kg = 1 tonne} F = 17 920 N **7** Calculate the net force in each of the following diagrams: **a)** Net force = 20 N − 15 N = 5 N {horizontally to the right} **b)** Net force = 30 N + 25 N − 18 N = 37 N {horizontally to the right} **c)** Net force = 5 N − 1 N = 4 N {parallel to the slope downwards}
p222	**1** Calculate the acceleration produced by a 750 N force acting on a 13 kg mass. Accceleration = $\frac{Force}{mass} = \frac{750N}{13kg}$ = 57.69 m/s^2 **2** Calculate the acceleration produced by a 6800 N force acting on a 1.3 t mass. Accceleration = $\frac{Force}{mass} = \frac{6800N}{1300kg}$ = 5.23 m/s^2 **3** Calculate the acceleration produced by a 35 N force acting on a 260 g mass. Accceleration = $\frac{Force}{mass} = \frac{35N}{0.26kg}$ = 134.62 m/s^2 **4** Calculate the net force and the acceleration in each of the following diagrams: **a)** Net force = 28 N − 19 N = 9 N {horizontally to the right} Accceleration = $\frac{Force}{mass} = \frac{9N}{13kg}$ = 0.69 m/s^2 **b)** Net force = 36 N + 25 N − 17 N = 44 N {horizontally to the right} Accceleration = $\frac{Force}{mass} = \frac{44N}{8kg}$ = 5.5 m/s^2

p222	**5** A force of 86 N results in a mass accelerating at 5.7 m/s². Calculate the mass. Mass $= \frac{Force}{acceleration} = \frac{86N}{5.7m/s^2}$ = 15.09 kg **6** A force of 12 N results in a mass accelerating at 2.9 m/s². Calculate the mass. Mass $= \frac{Force}{acceleration} = \frac{12N}{2.9m/s^2}$ = 4.14 kg **7** A force of 6800 N results in a mass accelerating at 4.3 m/s². Calculate the mass. Mass $= \frac{Force}{acceleration} = \frac{6800N}{4.3m/s^2}$ = 1581.40 kg or 1.58 t **8** Calculate the net force and the mass in the following diagram (The mass is accelerating at 1.6 m/s²): Net force = 98 N + 47 N − 31 N − 9 N = 105 N {horizontally to the right} Mass $= \frac{Force}{acceleration} = \frac{105N}{1.6m/s^2}$ = 65.63 kg
p223	**9** Mouse, travelling at 82 km/h, notices Kool Kat standing in the middle of the road. Assume Mouse takes 0.75 s to react and apply the brakes, and that the car has a mass of 1.2 t, and a braking force of 10 000 N. What is Mouse's total stopping distance? **Step 1**: Convert 82 km/h to m/s. 82 km/h $= \frac{82\ km}{1\ h} = \frac{82 \times 1000m}{60 \times 60\ s}$ = 22.78 m/s **Step 2**: How far does Mouse travel in 0.75 s? Reaction distance = speed × time = 22.78 m/s × 0.75 s = 17.09 m **Step 3**: Calculate the deceleration. deceleration $= \frac{Force}{mass} = \frac{10000\ N}{1200\ kg}$ = 8.33 m/s² **Step 4**: Calculate braking distance. Braking distance $= \frac{v^2}{2a}$ {Formula provided} $= \frac{22.78^2}{2 \times 8.33} m$ Braking distance 31.15 m Total stopping distance = 22.78 m + 31.15 m Total stopping distance = 54 m

p223 **Using a spreadsheet:**

Assuming reaction time of 1s

Speed (km/h)	Speed (m/s)	Reaction distance (m)	Deceleration (m/s^2)	Braking distance (m)	Total distance (m)
10	2.78	2.78	8.64	0.45	3.22
20	5.56	5.56	8.64	1.79	7.34
30	8.33	8.33	8.64	4.02	12.35
40	11.11	11.11	8.64	7.15	18.26
50	13.89	13.89	8.64	11.17	25.06
60	16.67	16.67	8.64	16.08	32.75
70	19.44	19.44	8.64	21.89	41.33
80	22.22	22.22	8.64	28.59	50.81
90	25.00	25.00	8.64	36.18	61.18
100	27.78	27.78	8.64	44.67	72.45
110	30.56	30.56	8.64	54.05	84.61
120	33.33	33.33	8.64	64.33	97.66

p225

1 State Newton's third law of motion.
For every action there is an equal and opposite reaction.

2 Briefly describe an example of Newton's third law of motion.

When you sit on your chair your gravitational force (weight) acts downwards while the chair exerts an upward force on your body. They are equal and opposite forces.
They are action and reaction forces.

3 Jack, standing on very slippery ice, throws a ball. Use Newton's third law of motion to explain why Jack moves backwards in the opposite direction of the ball.

When Jack throws the ball, the force on the ball is equal in size and opposite in direction to the force on the Jack. The force combined with the small mass of the ball results in a relatively large acceleration of the ball in the direction of the throw.

The same force combined with the larger mass of Jack, and no friction between Jack and the surface of the ice, results in a relatively small acceleration of Jack in the opposite direction. The greater the mass of the ball, the further back Jack is likely to move.

4 Use Newton's third and second law of motion to briefly explain why a bullet moves quickly and the gun moves slowly in the opposite direction.

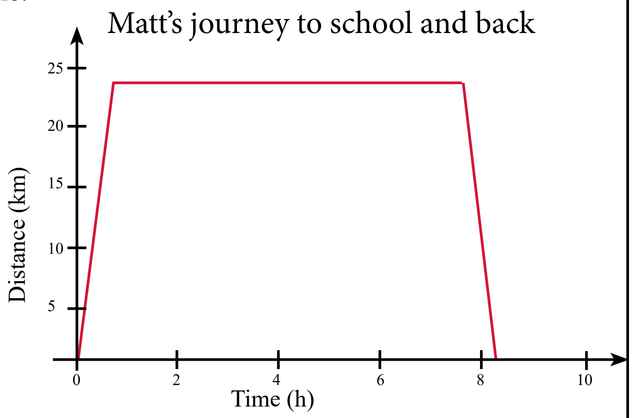
When a rifle is fired, the explosion forces a bullet down the barrel and at the same time the rifle is pushed back. This is a classic example of an equal and opposite reaction (Newton's third law of motion). The force on the bullet and the rifle is the same.

The bullet has a small mass and thus a large acceleration (F = ma).
The rifle, attached to a person's body, has a large mass and thus a small acceleration (F = ma).

The overall result is that the bullet moves at speed out of the barrel while the rifle has a relatively small movement.

5 Use Newton's third law of motion to write a brief explanation of the following:
The skateboard rider leans forward too far and unintentionally applies a force with his foot to the skateboard. The force pushes the relatively smaller mass backwards. The same force has little effect on the forward motion of the relatively larger mass of the skateboard rider. Without the board the skateboard rider braces his fall with his arms.

p227	**1** What is Newton's law of universal gravitation? Newton's law of universal gravitation indicates that any two objects in the universe exert a force of gravitational attraction on each other. **2** What force keeps the satellites in orbit around the Earth? The gravitational force of attraction between the Earth and the satellites keeps the satellites in orbit around the Earth and stops the satellites from flying off into space. **3** What force keeps the planets, asteroids, comets, etc in orbit around the Sun? The gravitational force of attraction between the Sun and the planets, asteroids, comets, etc keeps the planets, asteroids, comets, etc in orbit around the Earth and stops the planets, asteroids, comets, etc from flying off into space. **4** What is significant about a satellite that orbits the Earth in 24 hours? A satellite that orbits the Earth in 24 hours is able to stay above a fixed place on Earth because the Earth also completes a rotation in 24 hours.
p230	**1** **Motion** is the process of moving or being moved. An object is in motion when it is continuously changing its position. For example, a car is in motion when it is moving from one place to another place. **2** **Instantaneous speed** is the speed at a certain instant. As a cyclist rides their bike to school, the instantaneous speed will change throughout the journey. The a**verage speed**, however, is a measure of the overall speed. The average speed ignores the variations in speed throughout the journey and only considers the overall distance and the overall time. **3** Average speed = $\frac{distance}{time}$ **4** What is the average speed, in km/h, of a cyclist who travels 18 km in 30 minutes? Average speed = $\frac{distance}{time} = \frac{18\ km}{0.5\ h}$ = 36 km/h **5** What is the average speed, in km/h, of a truck that travels 180 km in 90 minutes? Average speed = $\frac{distance}{time} = \frac{180\ km}{1.5\ h}$ = 120 km/h **6** What is the average speed, in m/s, of a vehicle that covers 580 km in 8 hours? Average speed = $\frac{distance}{time} = \frac{580\times1000\ m}{8\times60\times60\ s}$ = 32.22 m/s **8** Convert 60 km/h to m/s. $\frac{60\times1000\ m}{1\times60\times60\ s}$ = 16.67 m/s **9** Convert 18 m/s to km/h. $\frac{18\times60\times60\ km}{1\times1000\ h}$ = 64.8 km/h **10** Convert 330 m/s to km/h. $\frac{330\times60\times60\ km}{1\times1000\ h}$ = 1188 km/h **11** Jess runs the 400 m athletic track in 81 s. Calculate Jess's speed in m/s and km/h. Average speed = $\frac{distance}{time} = \frac{400\ m}{81\ s}$ = 4.94 m/s Average speed = $\frac{distance}{time} = \frac{400\times60\times60\ m}{81\times1000\ s}$ = 17.78 km/h

p230	**12** On a journey to school, Matt takes 45 minutes to bus the 24 km to school. Matt catches the bus home 7 hours later, and takes 36 minutes to get back home. Draw a distance-time graph for the journey. 
p231	**1** In which sections of the following distance-time graph is the object travelling at a constant speed? A constant speed on a distance-time graph is illustrated by a straight line. Constant speeds are at section A and section D **2** If Rach travels at 90 km/h for 4 h 30 mins, how far has Rach travelled? distance = speed×time = 90 km × 4.5 h = 405 km **3** How long will it take for Karen to travel 482 km, travelling at an average speed of 96 km/h? time = distance ÷ speed = 482 km ÷ 96 km/h = 5.02 h = 5 h 1.2 s **4** Newton's first law of motion: An object is either at rest or moving with constant velocity unless another force is applied to it. **5** 'At rest' means not moving. **6** Use Newton's first law of motion to explain why people sink back into their seats when a plane takes off. When a plane accelerates, the people tending to remain at rest, feel the force of their seats moving forward. The effect is that they sink back into their seats. **7** Use Newton's first law of motion to write a brief explanation of the following: When the skateboard suddenly hits the obstacle, the rider continues moving forward at the same speed as the skateboard just before the sudden stop. Friction between the feet and the board slows the motion of the feet, meaning that the rider continues to move head first.
p232	**1** Newton's second law of motion: Acceleration is produced when a force acts on a mass. **2** **Acceleration** happens when an object changes speed. • Positive acceleration happens when an object is getting faster and faster. • Negative acceleration happens when an object is getting slower and slower. **3** Use Newton's second law of motion to explain why a falling apple increases in speed. Assuming no air resistance, a falling object becomes faster and faster as the force of gravity acts on the object. **4** Calculate the force of gravity that acts on a falling object of mass 5 kg ($a = 9.8\ m/s^2$). $F = ma$ $F = 5\ kg \times 9.8\ m/s^2$ $F = 49\ N$ **5** Calculate the force of gravity that acts on a falling object of mass 10 kg ($a = 9.8\ m/s^2$). $F = ma$ $F = 10\ kg \times 9.8\ m/s^2$ $F = 98\ N$ **6** Calculate the force of gravity that acts on a falling object of mass 750 g ($a = 9.8\ m/s^2$). $F = ma$ $F = 0.75\ kg \times 9.8\ m/s^2$ {1000 g = 1 kg} $F = 7.35\ N$

p232	**7** Calculate the net force if a 6 kg block of wood accelerates at 1.4 m/s^2. F = mass × acceleration F = 6 kg × 1.4 m/s^2 F = 8.4 N **8** Calculate the net force if a 635 g block of wood accelerates at 1.7 m/s^2. F = mass × acceleration F = 0.635 kg × 1.7 m/s^2 F = 1.08 N **9** Calculate the net force in each of the following diagrams: **a)** Net force = 23 N − 9 N = 4 N {horizontally to the right} **b)** Net force = 52 N + 18 N − 36 N = 34 N {horizontally to the right}
p233	**1** **The fox, goose and bag of beans puzzle**, in which a farmer must transport a fox, goose and bag of beans from one side of a river to the other side: • The boat can only hold one item in addition to the farmer. • The fox cannot be left alone with the goose. • The goose cannot be left alone with the beans. One solution: The farmer would need seven trips to ferry the beans, goose, and fox across the river. The farmer crosses the river with the goat and leaves the goose on the far shore, then returns alone to the near shore. The farmer brings the fox to the far shore and brings the goose back to the near shore. The farmer then brings the beans to the far shore and returns alone to the near shore. Finally, the farmer brings the goose to the far shore. **2** **The missionaries and cannibals problem**, in which three missionaries and three cannibals must cross from one side of a river to the other side: • The boat can hold a maximum of two people. • The cannibals must not outnumber the missionaries on either side of the river. Start: 0M , 0C River 3M , 3C 0M , 2C River 3M , 1C 0M , 1C River 3M , 2C 0M , 3C River 3M , 0C 0M , 2C River 3M , 1C 2M , 2C River 1M . 1C 1M , 1C River 2M , 2C 3M , 1C River 0M , 2C 3M , 0C River 0M , 3C 3M , 2C River 0M , 1C 3M , 1C River 0M , 2C 3M , 3C River 0M , 0C **3** A man and a woman of equal weight, together with two children, each half their weight, wish to cross from one side of a river to the other side. The boat can only carry the weight of one adult. Start: MWCC River MW River CC MWC River C MC River WC MCC River W M River WCC MC River WC C River WMC CC River WM River WMCC

p233

4 Complete the square, using the numbers 1, 3, 5, 6, 7, 8, so that every row, column, and diagonal sum to the same number.

6	1	8
7	5	3
2	9	4

5 Tracy and Tom have exactly the same amount of money. How much must Tom give to Tracy so that Tracy has $100 more than Tom?

Tom needs to give Tracy $50

p234

1 Calculate the acceleration produced by a 490 N force acting on a 29 kg mass.

$$\text{Accceleration} = \frac{Force}{mass} = \frac{490\ N}{29\ kg} = 16.90\ \text{m/s}^2$$

2 Calculate the acceleration produced by a 8500 N force acting on a 1.2 t mass.

$$\text{Accceleration} = \frac{Force}{mass} = \frac{8500\ N}{1200\ kg} = 7.08\ \text{m/s}^2$$

3 Calculate the acceleration produced by a 80 N force acting on a 760 g mass.

$$\text{Accceleration} = \frac{Force}{mass} = \frac{80\ N}{0.76\ kg} = 105.26\ \text{m/s}^2$$

4 Calculate the net force and the acceleration in the following diagram:

Net force = 26 N + 11 N − 15 N = 22 N {horizontally to the right}

$$\text{Accceleration} = \frac{Force}{mass} = \frac{22\ N}{92\ kg} = 0.24\ \text{m/s}^2$$

5 A force of 9300 N results in a mass accelerating at 2.5 m/s^2. Calculate the mass.

$$\text{Mass} = \frac{Force}{acceleration} = \frac{9300\ N}{2.5\ m/s^2} = 3720\ \text{kg or } 3.72\ \text{t}$$

6 Calculate the net force and the mass in the following diagram (The mass is accelerating at 1.2 m/s^2):

Net force = 59 N + 67 N − 32 N − 14 N = 80 N {horizontally to the right}

$$\text{Mass} = \frac{Force}{acceleration} = \frac{80\ N}{1.2\ m/s^2} = 66.67\ \text{kg}$$

1 State Newton's third law of motion.
For every action there is an equal and opposite reaction.

4 Use Newton's third and second law of motion to briefly explain why a bullet moves quickly and the gun moves slowly in the opposite direction.

When a rifle is fired, the explosion forces a bullet down the barrel and at the same time the rifle is pushed back. This is a classic example of an equal and opposite reaction (Newton's third law of motion). The force on the bullet and the rifle is the same.

The bullet has a small mass and thus a large acceleration (F = ma). The rifle, attached to a person's body, has a large mass and thus a small acceleration (F = ma). The overall result is that the bullet moves at speed out of the barrel while the rifle has a relatively small movement.

p235

1 For constant mass, the acceleration would be constant as in b). With decreasing mass, the accelerating would be increasing at a constant rate (assuming the mass is decreasing at a constant rate). Thus a)

2 b) The only one with the point (5 s, 49.0 m/s)

3 F = ma = 11 kg x 9.8 m/s^2 = 107.8 Thus d)

p236

1 Relate each of the following to either Newton's first, second, or third law of motion:

a) If you push on a wall, the wall will push back at you with equal force. **Third Law**

b) The object will move in the direction of the net force. **Second Law**

c) Objects have a tendency to resist changes in their state of motion. **First Law**

d) For a given force, the smaller the mass the greater the acceleration. **Second Law**

2 Eun-Young and Mark leave to go to work at the same time. Eun-Young travels at an average speed of 52 km/h to get to work which is 68 km away. Mark travels at an average speed of 33 km/h to get to work which is 41 km away. Who arrives at work first?

Eun-Young: time = distance ÷ speed = 68 km ÷ 52 km/h = 1.31 h

Mark: time = distance ÷ speed = 41 km ÷ 33 km/h = 1.24 h Mark arrives at work first.

3 The graph is obviously unrealistic. However, the following calculations use the data shown.

a) How far is it from the newsagency to the garden centre? 40-20 = 20 km

b) How long was the stay at the garden centre? 30-20 = 10 h

c) What was the average speed of the trip from the newsagency to the garden centre?
speed = distance/time
= 20 km / 5 h
= 4 km/h

d) On what part of the journey was the average speed the fastest?

The faster the speed, the steeper the slope.

Home to newsagency: speed = distance/time = 20 km/10 h = 2 km/h

Newsagency - Garden: speed = distance/time = 20 km/5 h = 4 km/h

Garden to Home: speed = distance/time = 40 km/10 h = 4 km/h

The fastest average speeds were from the newsagency to the garden centre and from the garden centre to home. Both at 4 km/h

4 Find the acceleration of the trolley in the following setup.

Net force = 23 N − 8 N = 15 N {horizontally to the right}

$$\text{Accceleration} = \frac{Force}{mass} = \frac{15\ N}{20\ kg} = 0.75\ \text{m/s}^2$$

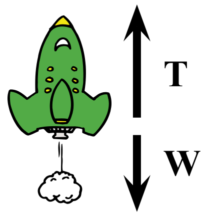
5 Find force that stops a 900 kg car travelling at 90 km/h or 25 m/s in 0.4 s

$$\text{Force} = \frac{(mv - mu)}{t}$$

$$= \frac{(900 \times 0 - 900 \times 25)}{0.4}$$

$= {}^{-}56{,}250$ N The crumple zone wil reduce the force of the collision from 225 000 N to 168 750 N (A reduction of 56 250 N)

p236 **6** A 0.26 kg model rocket accelerates at 38.2 m/s^2. Calculate the upward thrust (T) of the rocket ($g = 9.8\ m/s^2$).



Net Force up = mass x acceleration
= 0.26 kg x 38.2 m/s^2
= 9.93 N

Force of gravity W = mass x acceleration
= 0.26 kg x 9.8 m/s^2
= 2.55 N

Net force up = T – W
9.93 = T – 2.55
9.93 – 2.55 = T
7.38 N = T

7 Two masses are connected by a light string over a frictionless pulley. Calculate the acceleration of the two masses.

The 14 kg mass, being larger than the 8 kg mass, will move downwards due to gravitational attraction. The force of attraction on Earth gives an acceleration of 9.8 m/s^2.