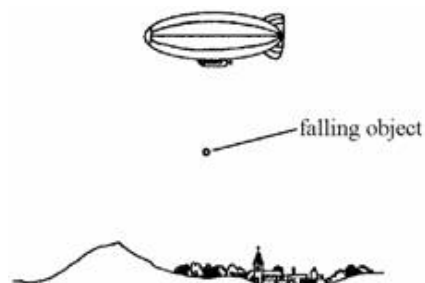


**Q1.** A small object falls out of a balloon.



Choose words from the list to complete the sentences below.

**friction**

**gravity**

**air pressure**

**accelerates**

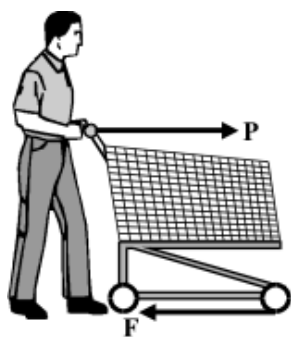
**falls at a steady speed**

**slows down**

- The weight of an object is the force of ..... which acts on it.
- When you drop something, first of all it .....
- The faster it falls, the bigger the force of ..... which acts on it.
- Eventually the object .....

**(Total 4 marks)**

**Q2.** (a) A shopping trolley is being pushed at a constant speed. The arrows represent the horizontal forces on the trolley.

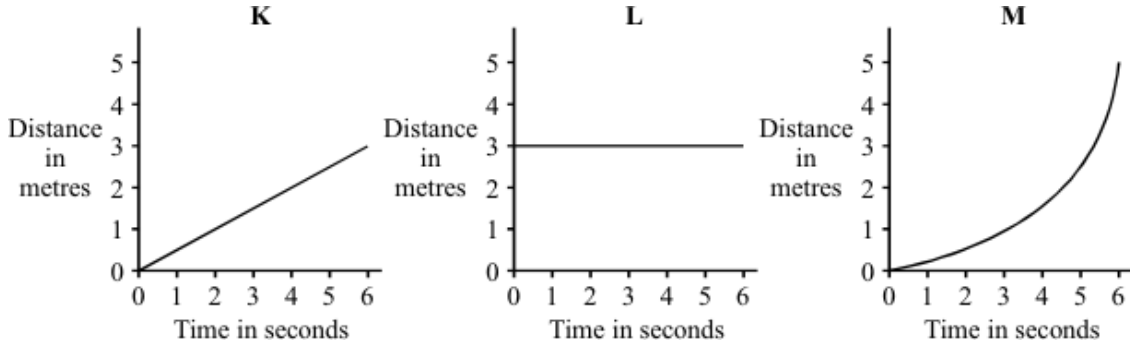


(i) How big is force **P** compared to force **F**?

.....

**(1)**

- (ii) Which **one** of the distance-time graphs, **K**, **L** or **M**, shows the motion of the trolley?  
Draw a circle around your answer.



(1)

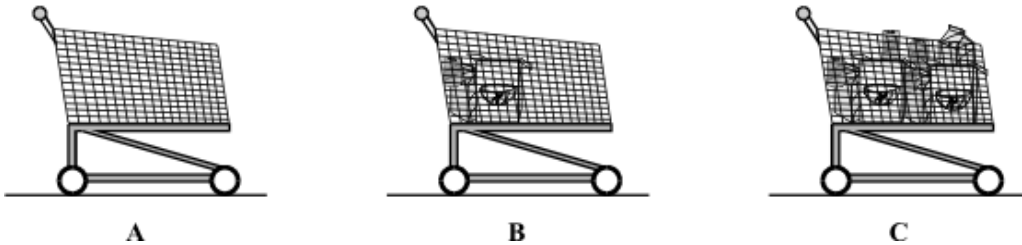
- (b) Complete the sentence by crossing out the **two** words in the box that are wrong.

Acceleration is the rate of change of

energy.
speed.
velocity.

(1)

- (c) Three trolleys, **A**, **B** and **C**, are pushed using the same size force. The force causes each trolley to accelerate.



Which trolley will have the smallest acceleration?

.....

Give a reason for your answer.

.....

(2)

(Total 5 marks)

**Q3.** (a) Two skydivers jump from a plane. Each holds a different position in the air.



**A**



**B**

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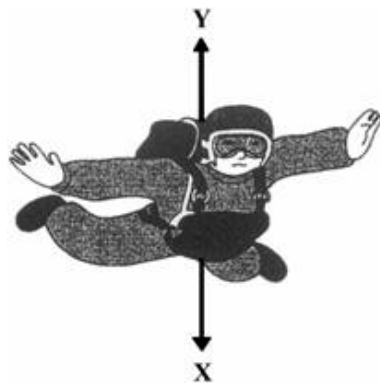
Complete the following sentence.

Skydiver ..... will fall faster because.....

.....  
.....

(2)

The diagram shows the direction of the forces acting on one of the skydivers.



*Adapted from Progress with Physics by Nick England, reproduced  
by permission of Hodder Arnold*

(b) In the following sentences, cross out in each box the **two** lines that are wrong.

(i) Force **X** is caused by 

air resistance
friction
gravity

 (1)

(ii) Force **Y** is caused by 

air resistance
gravity
weight

 (1)

(iii) When force **X** is bigger than force **Y**, the speed of the

skydiver will 

go up
stay the same
go down

 (1)

(iv) After the parachute opens, force **X**

goes up
stays the same
goes down

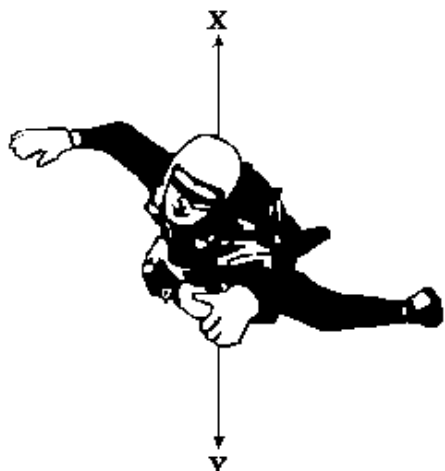
 (1)

(c) How does the area of an opened parachute affect the size of force **Y**?

.....  
.....

(1)  
(Total 7 marks)

**Q4.** The diagram shows a sky-diver in free fall. Two forces, **X** and **Y**, act on the sky-diver.



(a) Complete these sentences by crossing out the **two** lines in each box that are wrong.

(i) Force **X** is caused by 

friction
gravity
weight

 . (1)

(ii) Force **Y** is caused by 

air resistance
friction
gravity

 . (1)

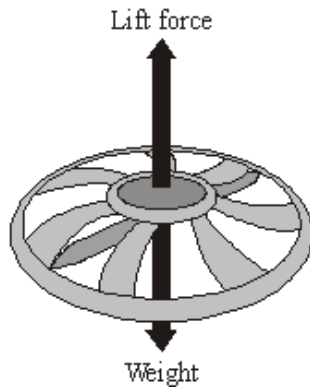
(b) The size of force **X** changes as the sky-diver falls. Describe the motion of the sky-diver when:

(i) force **X** is smaller than force **Y**,  
.....  
..... (2)

(ii) force **X** is equal to force **Y**.  
.....  
..... (1)

(Total 5 marks)

**Q5.** The diagram shows the forces on a small, radio-controlled, flying toy.



- (a) (i) The mass of the toy is 0.06 kg.  
Gravitational field strength = 10 N/kg

Use the equation in the box to calculate the weight of the toy.

$\text{weight} = \text{mass} \times \text{gravitational field strength}$
--

Show clearly how you work out your answer and give the unit.

.....  
 .....

Weight = .....

(3)

- (ii) Complete the following sentence by drawing a ring around the correct line in the box.

When the toy is hovering stationary in mid-air, the lift force is

bigger than the same as smaller than	the weight of the toy.
--	------------------------

(1)

- (b) When the motor inside the toy is switched off, the toy starts to *accelerate* downwards.

- (i) What does the word *accelerate* mean?

.....

(1)

- (ii) What is the direction of the resultant force on the falling toy?

.....

(1)

(iii) Does the momentum of the toy increase, decrease or stay the same?

.....

Give a reason for your answer.

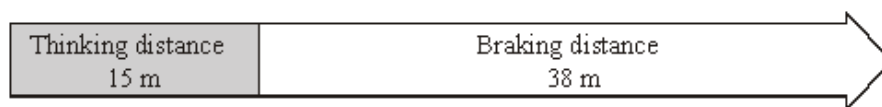
.....

(2)

(Total 8 marks)

**Q6.** (a) A car driver makes an emergency stop.

The chart shows the 'thinking distance' and the 'braking distance' needed to stop the car.



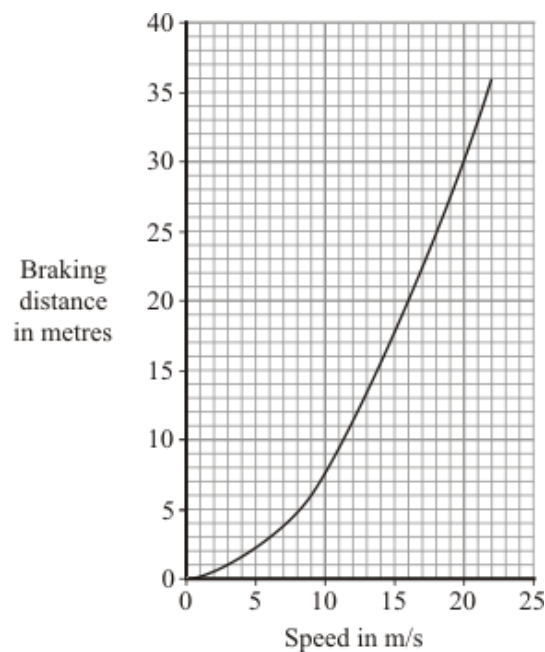
Calculate the total stopping distance of the car.

.....

Stopping distance = ..... m

(1)

(b) The graph shows how the braking distance of a car driven on a dry road changes with the car's speed.



The braking distance of the car on an icy road is longer than the braking distance of the car on a dry road.

(i) Draw a new line on the graph to show how the braking distance of the car on an icy road changes with speed.

(2)

- (ii) Which **two** of the following would also increase the braking distance of the car?

Put a tick (✓) next to each of your answers.

rain on the road

☐

the driver having drunk alcohol

☐

car brakes in bad condition

☐

the driver having taken drugs

☐

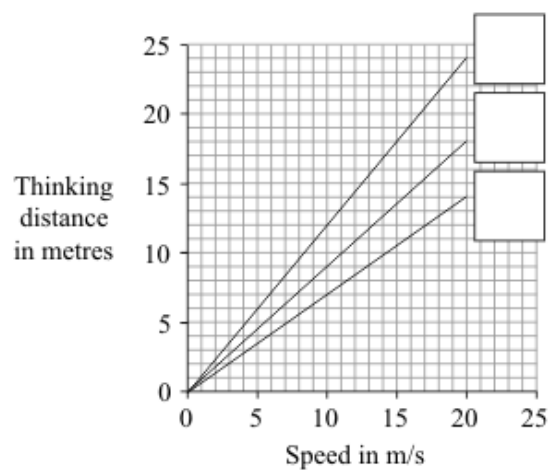
(2)

- (c) The thinking distance depends on the driver's reaction time.

The table shows the reaction times of three people driving under different conditions.

Car driver	Condition	Reaction time in seconds
<b>A</b>	Wide awake with no distractions	0.7
<b>B</b>	Using a hands-free mobile phone	0.9
<b>C</b>	Very tired and listening to music	1.2

The graph lines show how the thinking distance for the three drivers, **A**, **B** and **C**, depends on how fast they are driving the car.



- (i) Match each graph line to the correct driver by writing **A**, **B** or **C** in the box next to the correct line.

(2)



- (ii) The information in the table cannot be used to tell if driver **C**'s reaction time is increased by being tired or by listening to music.

Explain why.

.....

.....

.....

.....

(2)  
(Total 9 marks)

- (i) How many hours does it take for the count rate to fall from 300 counts per minute to 150 counts per minute?

Time = ..... hours

(1)

- (ii) What is the half-life of technetium-99?

Half-life = ..... hours

(1)  
(Total 7 marks)

**Q7.** The diagram shows the forces acting on a skydiver.



Draw a ring around the correct answer to complete the following sentences.

- (a) Force **J** is caused by

air resistance.  
friction.  
gravity.

(1)

(b) Force **K** is caused by

air resistance.  
gravity.  
weight.

(1)

(c) When the skydiver jumps from the aircraft, force **J** is

bigger than  
the same as  
smaller than

force **K** and the skydiver

accelerates downwards.  
accelerates upwards.  
falls at a steady speed.

(2)

(Total 4 marks)

**Q8.** (a) The diagram shows two forces acting on an object.



What is the resultant force acting on the object?

Tick (✓) **one** box.

8 N to the right

☐

8 N to the left

☐

4 N to the right

☐

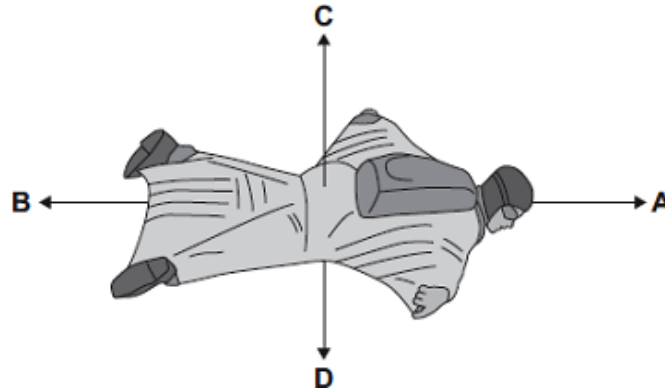
4 N to the left

☐

(1)

- (b) BASE jumpers jump from very high buildings and mountains for sport.

The diagram shows the forces acting on a BASE jumper in flight.  
The BASE jumper is wearing a wingsuit.



- (i) Draw a ring around the correct answer in the box to complete each sentence.

The BASE jumper accelerates forwards when force **A** is

smaller than  
equal to  
bigger than

force **B**.

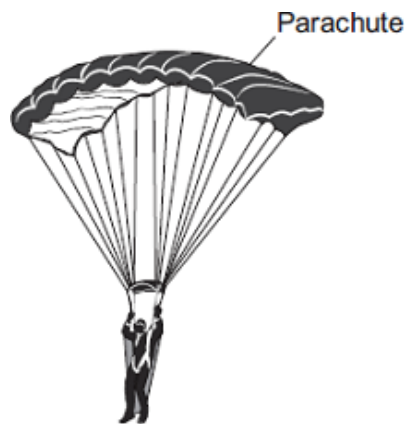
The BASE jumper falls with a constant speed when force **C** is

smaller than  
equal to  
bigger than

force **D**.

(2)

- (ii) To land safely the BASE jumper opens a parachute.



What effect does opening the parachute have on the speed of the falling BASE jumper?

.....

Give a reason for your answer.

.....

.....

(2)  
(Total 5 marks)

