

Resultant Forces

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.5 Forces
Sub-Topic	Resultant Forces
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: 53 minutes

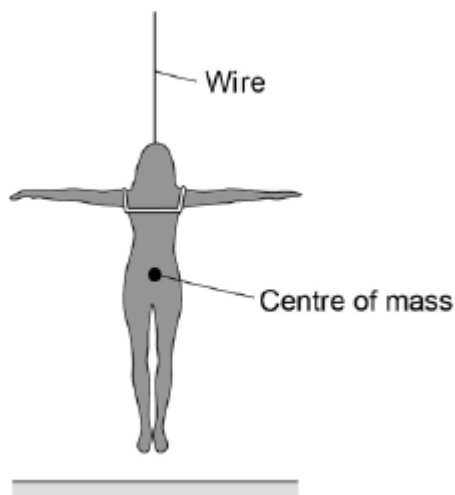
Score: /52

Percentage: /100

Grade Boundaries:

Q1. An actor is attached to a wire so that she can hang above the stage.

Look at the figure below.



(a) On The figure above draw two arrows to show the forces acting on the actor.

(2)

(b) Which **two** forces are acting on the actor?

Tick **two** boxes.

Air resistance force

☐

Electrostatic force

☐

Gravitational force

☐

Magnetic force

☐

Tension force

☐

(2)

(c) The actor hangs above the stage in a stationary position.

What is the resultant force on the actor?

Resultant force = N

(1)

- (d) The actor has a mass of 70 kg.

Gravitational field strength = 9.8 N / kg

Use the following equation to calculate the weight of the actor.

Weight = mass \times gravitational field strength

Give your answer to 2 significant figures.

.....
.....
.....

Weight of actor = N

(2)

- (e) A motor pulls vertically upwards on the wire with a force of 720 N.

Calculate the resultant force on the actor.

.....

Resultant force = N

(1)

- (f) Another actor has a mass of 65 kg.

This actor is attached to the wire and the motor pulls her vertically upwards.

The resultant force on the actor is 25 N.

Write down the equation that links acceleration, mass and resultant force.

Equation

(1)

- (g) Calculate the acceleration of the actor.

.....

.....

.....

Acceleration of actor = m / s²

(3)
(Total 12 marks)

- Q2.(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

☐

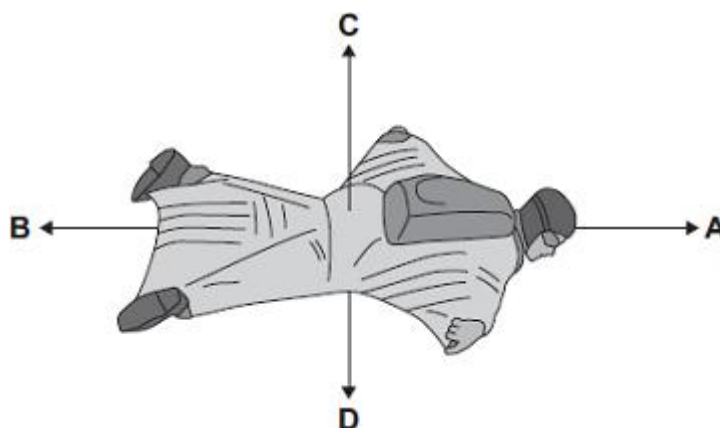
4 N to the left

☐

(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**.

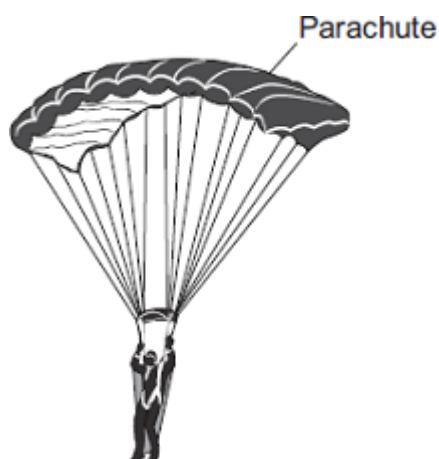
The BASE jumper falls with a constant speed when force **C** is

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.

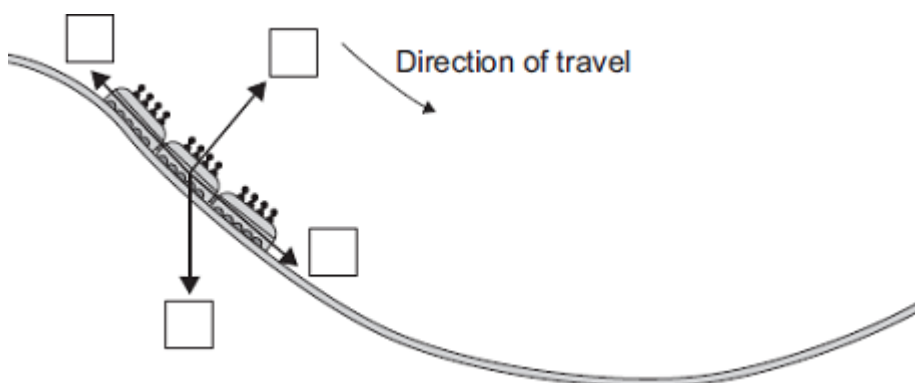
.....

.....

(2)
(Total 5 marks)

Q3. The diagram shows the passenger train on part of a rollercoaster ride.

- (a) Which arrow shows the direction of the resultant force acting on the passenger train?
Put a tick (✓) in the box next to your choice.



(1)

- (b) For part of the ride, the maximum gravitational field strength acting on the passengers seems 3 times bigger than normal.

Normal gravitational field strength = 10 N/kg

- (i) Calculate the maximum gravitational field strength that seems to act on the passengers during the ride.

.....

.....

Maximum gravitational field strength = N/kg

(1)

- (ii) One of the passengers has a mass of 75 kg.

Calculate the maximum weight this passenger seems to have during the ride.

Show clearly how you work out your answer.

.....

Maximum weight = N

(2)
 (Total 4 marks)

- Q4.(a)** The diagrams, **A**, **B** and **C**, show the horizontal forces acting on a **moving** car.

Draw a line to link each diagram to the description of the car's motion at the moment when the forces act.

Draw only **three** lines.



A

stationary



B

constant speed



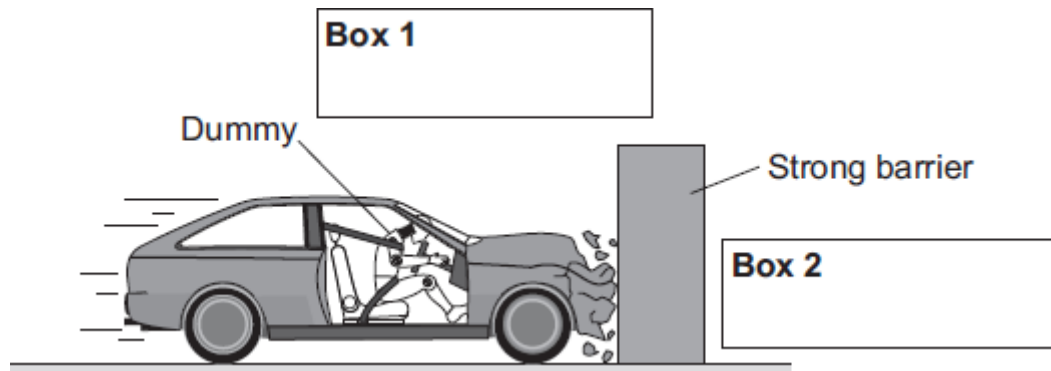
C

slowing down

accelerating forwards

(3)

- (b) The front crumple zone of a car is tested at a road traffic laboratory. This is done by using a remote control device to drive the car into a strong barrier. Electronic sensors are attached to a dummy inside the car.



- (i) Draw an arrow in **Box 1** to show the direction of the force that the car exerts on the barrier.

(1)

- (ii) Draw an arrow in **Box 2** to show the direction of the force that the barrier exerts on the car.

(1)

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

The car exerts a force of 5000 N on the barrier. The barrier does not move.
The force

exerted by the barrier on the car will be

more than
equal to
less than

5000 N.

(1)

- (iv) Which **one** of the following gives the most likely reason for attaching electronic sensors to the dummy?

Put a tick (✓) in the box next to your answer.

To measure the speed of the car just before the impact.

☐

To measure the forces exerted on the dummy during the impact.

To measure the distance the car travels during the impact.

(1)
(Total 7 marks)

Q5. The diagram shows an adult and a child pushing a loaded shopping trolley.



(a) (i) What is the *total force* on the trolley due to the adult and child?

.....

(1)

(ii) Which **one** of the terms in the box means the same as *total force*?

Draw a ring around your answer.

answer force	mean force	resultant force
--------------	------------	-----------------

(1)

(iii) The trolley is pushed at a constant speed for 80 metres.

Calculate the work done to push the trolley 80 metres.

Show clearly how you work out your answer.

.....

Work done =

(2)

- (b) Complete the following sentences by drawing a ring around the correct word in each of the boxes.

(i) The unit of work done is the	joule	.
	newton	
	watt	

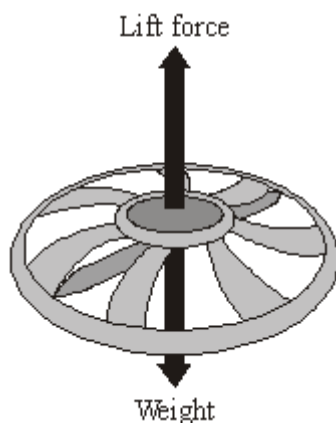
(1)

(ii) Most of the work done to push the trolley is transformed into	heat	.
	light	
	sound	

(1)

(Total 6 marks)

Q6. 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

Calculate the weight of the toy.

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)

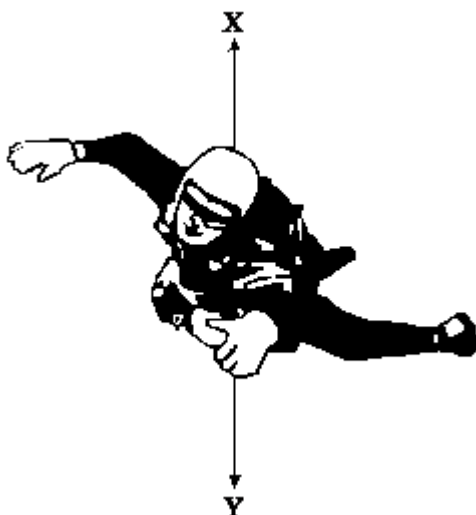
- (ii) What is the direction of the resultant force on the falling toy?

.....

(1)

(Total 6 marks)

- Q7.** 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)

Q8. (a) Two skydivers jump from a plane. Each holds a different position in the air.



A



B

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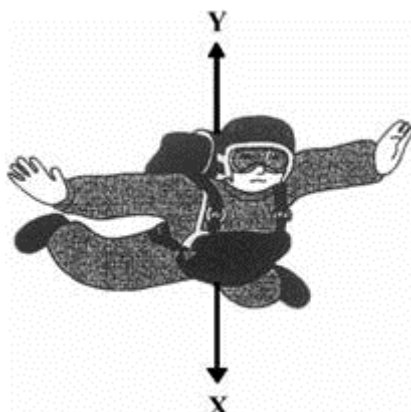
Complete the following sentence.

Skydiver will fall faster because.....

.....
.....

(2)

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



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(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)