

Contact and Non-Contact Forces

Question Paper

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

Time Allowed: 42 minutes

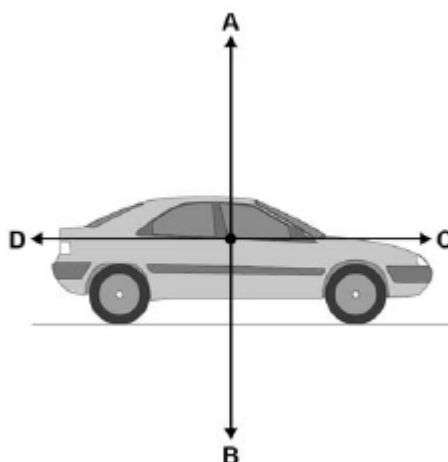
Score: /40

Percentage: /100

Grade Boundaries:

Q1.Figure 1 shows the forces acting on a car moving at a constant speed.

Figure 1



- (a) Which force would have to increase to make the car accelerate?

Tick **one** box.

A

☐

B

☐

C

☐

D

☐

(1)

- (b) The car travels a distance of 2040 metres in 2 minutes.

Use the following equation to calculate the mean speed of the car.

$$\text{mean speed} = \frac{\text{distance}}{\text{time}}$$

.....
.....

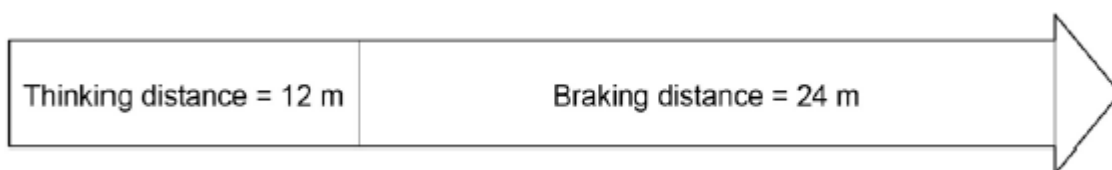
Mean speed = m / s

(2)

- (c) The car makes an emergency stop.

Figure 2 shows the thinking distance and braking distance of the car.

Figure 2



What is the stopping distance?

.....

(1)

- (d) The person driving the car is tired.

What effect will this have on the thinking distance and braking distance?

Tick **one** box for thinking distance.

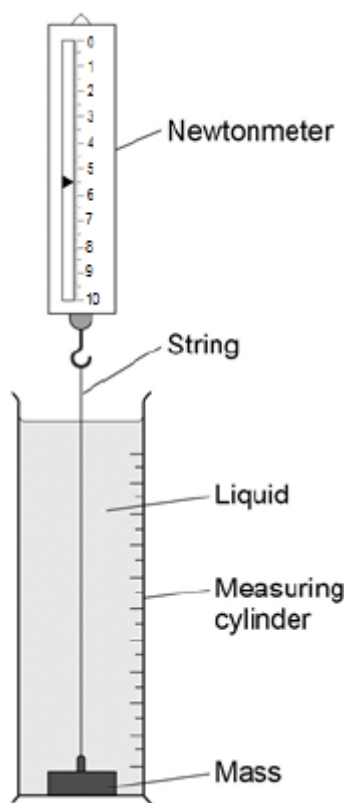
Tick **one** box for braking distance.

	decreases	increases	stays the same
thinking distance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
braking distance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(2)
(Total 6 marks)

Q2.A student investigated the force needed to raise a mass through different liquids at a constant speed.

She set up the apparatus shown in the figure below.



- (a) In the investigation there are several variables.

Draw **one** line from each variable to the correct description for this investigation.

Variable	Description
Control	Distance the mass was lifted
Dependent	Value of force on the newtonmeter
Independent	Mass
	Type of liquid

(3)

- (b) The table below shows the student's results.

Liquid	Force in N
--------	------------

Water	10.0
Washing up liquid	11.1
Glycerol	11.5
Syrup	13.8

What was the resolution of the newtonmeter?

Tick **one** box.

0.1 N

☐

0.5 N

☐

1 N

☐

10 N

☐

(1)

(c) The student wanted to display her results.

How should she display her results?

Tick **one** box.

A bar chart

☐

A line graph

☐

A pie chart

☐

(1)

(d) Give a reason for your answer to part **03.3**.

.....

(1)

- (e) A force of 13.8 N was used to lift the mass 30 cm vertically through the liquid.

Use the following equation to calculate the work done in lifting the mass.

Work done = force \times distance

Choose the correct unit from the box.

J	m / s	N
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.....

Work done =

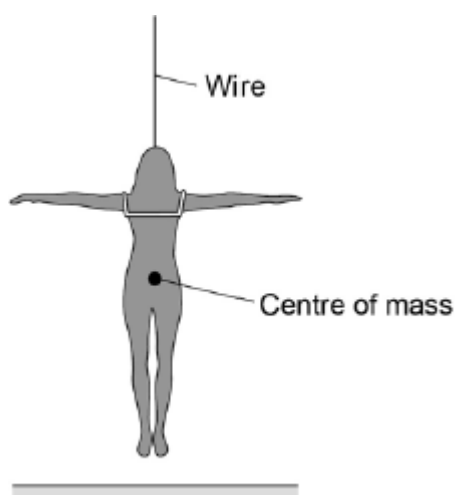
Unit =

(3)

(Total 9 marks)

Q3. 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.

.....

.....

.....

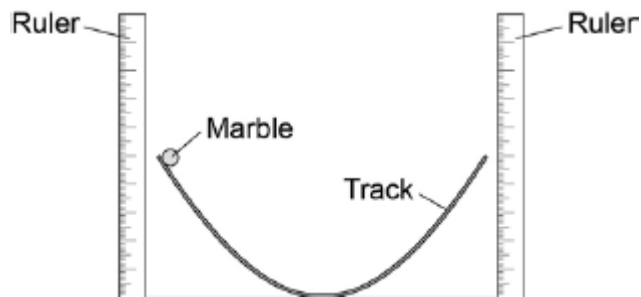
Acceleration of actor = m / s²

(3)

(Total 12 marks)

Q4.A student investigates rolling a marble down a track.

The figure below shows how he sets up the investigation.



The student lets go of the marble from different heights.

He records:

- the height from which he drops the marble (the drop height)
- the height the marble rolls up the other side (the roll height).

(a) What force causes the marble to fall down the track?

Tick **one** box.

Air resistance

☐

Friction

☐

Gravity

☐

Magnetism

☐

(1)

(b) What is one variable the student should control in the investigation?

Tick **one** box.

Length of ruler

☐

Length of track

☐

Mass of marble

☐

Roll height

☐

(1)

- (c) The table below shows the student's results.

Drop height in cm	Roll height in cm			
	Test 1	Test 2	Test 3	Mean
20	15	14	14	14
40	29	33	32	
60	47	19	46	46
80	65	61	63	63

What is the **independent** variable in the investigation?

Tick **one** box.

Drop height

☐

Length of track

☐

Mass of marble

☐

Roll height

☐

(1)

- (d) Calculate the mean roll height of the marble when it is dropped from 40 cm.

.....

Mean roll height = cm

(1)

- (e) The student calculated the mean roll height for a drop height of 60 cm.

He did not include the result for Test 2 in his calculation.

Why did the student leave out the result for Test 2?

.....
.....

(1)

- (f) Describe how the drop height of the marble affects the roll height.

.....
.....

(1)

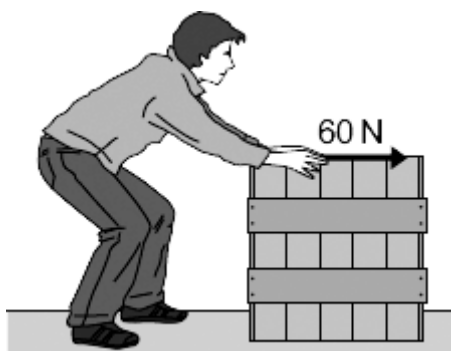
- (g) Why does the marble never roll up to the same height the student drops it from?

.....
.....

(1)

(Total 7 marks)

Q5. The diagram shows a worker using a constant force of 60 N to push a crate across the floor.



(a) The crate moves at a constant speed in a straight line

- (i) Draw an arrow on the diagram to show the direction of the friction force acting on the moving crate.

(1)

- (ii) State the size of the friction force acting on the moving crate.

..... N

Give the reason for your answer.

.....
.....

(2)

(b) Calculate the work done by the worker to push the crate 28 metres.

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

Choose the unit from the list below.

joule

newton

watt

.....
.....

Work done =

(3)

(Total 6 marks)