High Demand Questions QUESTIONSHEET 1

Josie is on a skiing holiday. When she is wearing her skis, she is able to stand on the snow without sinking.

(a) If she tries to stand on the snow without her skis, she sinks.
Explain why this happens.

.....

..... [1]

(b) (i) Each of Josie's skis has an area of 0.2 m^2
Each of Josie's boots has an area of 0.05 m^2
Josie weighs 500 N
Calculate the total pressure exerted by Josie's skis on the snow.

.....

.....

..... [3]

(ii) Calculate the total pressure exerted by Josie's boots on the snow when she is not wearing skis.

.....

.....

..... [2]

(iii) If Josie's weight increased to 600 N, what area would each ski have to have to exert the same pressure as before ?

.....

.....

.....

.....

..... [4]

www.chemactive.com

TOTAL / 10

High Demand Questions QUESTIONSHEET 2

Anand is riding his bicycle along a flat road. A cat crosses the road ahead of him and he uses his brakes to stop.

(a) Give three factors, which can affect the time it takes for Anand to stop.

1: ..... [1]

2: ..... [1]

3: ..... [1]

(b) (i) Anand's bigger brother, Bhavesh, borrows his bicycle.
Give a reason why his stopping time could be different from Anand's in the same situation.

.....

..... [1]

(ii) Bhavesh is travelling at 10 ms^{-1} when he applies the brakes.
Calculate his deceleration, if he takes 2.5 s to stop.

.....

.....

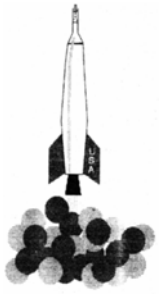
..... [3]

www.chemactive.com

TOTAL / 7

High Demand Questions QUESTIONSHEET 3

(a) A rocket is travelling through space at a constant velocity of 2000 ms^{-1}.



State what forces acting on it.

..... [1]

(b) The rocket's motor is fired in a direction opposite to that of its motion for 10 s.
Explain what happens to its velocity and explain why.

.....

.....

.....

..... [2]

(c) The force on the rocket is 20 kN.
If the mass of the rocket is 1000 kg, calculate its acceleration during the 10 s period.

.....

.....

.....

.....

..... [3]

(d) Calculate the final velocity of the rocket.

.....

.....

.....

.....

..... [4]

www.chemactive.com

TOTAL / 10

High Demand Questions QUESTIONSHEET 4

A bouncy castle has a volume of 55 m^3.
It is inflated to a pressure of 250 kPa.
Some children start to play on it and reduce its volume to 50 m^3.

(a) The relationship between pressure and volume is given by

$$\text{pressure}_2 = \frac{\text{pressure}_1 \times \text{volume}_1}{\text{volume}_2}$$

Calculate the new pressure in the bouncy castle.

.....

.....

.....

..... [2]

(b) The table below shows the volume of a gas at different pressures.

Pressure (Pa)	240	320	384	480	500	600
Volume (m^3)	20		12.5		9.6	

(i) Using the above equation, fill in the missing gaps in the table. [3]

(ii) Describe what happens to the volume of a gas as the pressure increases.

.....

..... [1]

(c) Give one other example of where air under pressure is useful.

..... [1]

www.chemactive.com

TOTAL / 7

High Demand Questions QUESTIONSHEET 5

Simon is sitting on his garden wall with a bag of toffees.
He drops one to the floor.

(a) Draw a labelled diagram to indicate the names and directions of the forces acting ion the toffee as it falls.

[2]

(b) Simon unwraps the toffee, then drops the toffee and wrapper at the same time.

(i) State which one hits the floor first, and why.

.....

..... [2]

(ii) The toffee has a mass of 10 g.
Calculate the force with which it hits the ground.
(Assume acceleration due to gravity is 10 ms^{-2})

.....

.....

..... [3]

(c) An astronaut on the moon performs the same experiment.

(i) Describe the motion of the sweet and wrapper.

.....

..... [2]

(ii) Why does this happen ?

.....

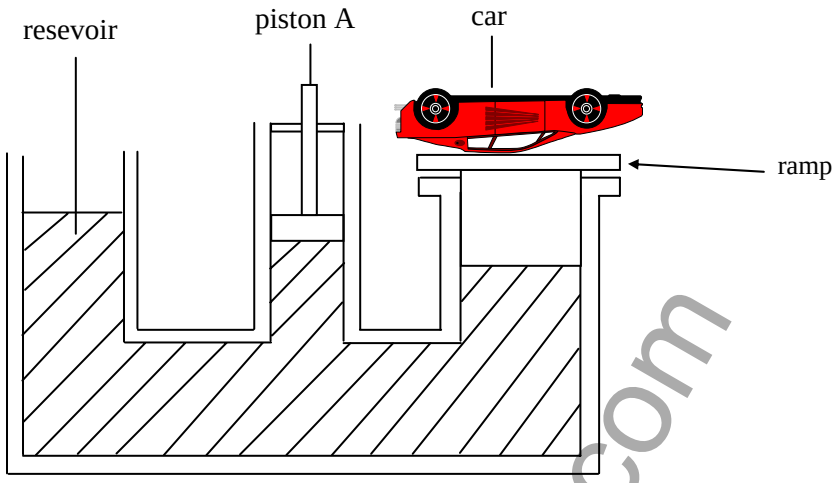
..... [1]

TOTAL / 10

www.cnemactive.com

High Demand Questions QUESTIONSHEET 6

The diagram shows a car ramp at a garage.
A force is applied to the liquid at point A.



(a) (i) What happens to the ramp ?

..... [1]

(ii) Why does this happen ?

.....

..... [1]

(b) The area of the piston at A is 0.001 m^2

(i) If a force of 2000 N is applied at A, calculate the pressure in the liquid.

.....

.....

.....

..... [3]

www.chemactive.com

TOTAL / 5

High Demand Questions QUESTIONSHEET 7

Two teams are having a tug o' war.

(a) If the marker is stationary, describe the forces on the teams.

.....[1]

(b) Team X exerts a force of 800 N and team Y exerts a force of 750 N.
What is the resultant force ?

.....

.....[2]

(c) The rope snaps suddenly.
What is the resultant force on team Y the moment it snaps ?

.....

.....[2]

(d) If team X has a total mass of 200 kg, calculate the size and direction of their acceleration at the moment the rope snaps.

.....

.....

.....

.....[3]

www.chemactive.com

TOTAL / 8

High Demand Questions QUESTIONSHEET 8

(a) Explain the difference between mass and weight.

.....

.....

..... [2]

(b) Near the surface of the earth, the pull of gravity is about 10 N on each kilogram.

(i) What is the name for the unit represented by N?

..... [1]

(ii) What is your weight if your body has a mass of 55 kg?

.....

.....

..... [2]

(iii) The pull of gravity on a beetle is 0.001N.
Calculate the mass of the beetle in grammes.

.....

.....

..... [3]

www.chemactive.com

TOTAL / 8

Medium Demand Questions QUESTIONSHEET 9

Three students took part in a 200 m race. Their times to complete the race are shown in the table.

student	Time (s)
Alice	26
Amber	30
Jessica	28

(a) Who won the race ?

..... [1]

(b) (i) Calculate the average speed with which Amber ran the race.

.....

.....

..... [3]

(ii) Calculate how long it would take her to run a 300 m race at the same speed.

.....

.....

..... [3]

(c) What extra information is needed to describe the velocity of the runners ?

..... [1]

www.chemactive.com

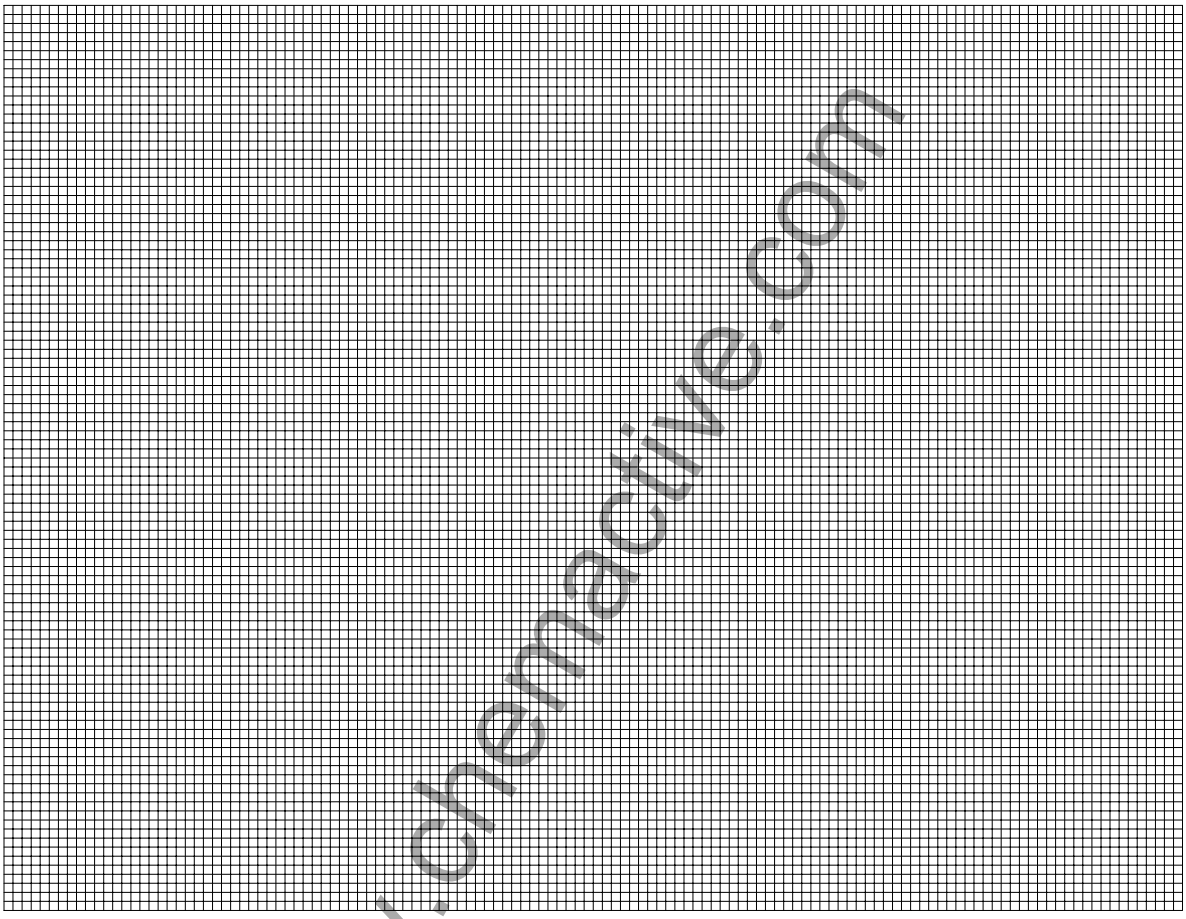
GCSE PHYSICS **FORCES IN ACTION**

Medium Demand Questions QUESTIONSHEET 10

A train is travelling along a straight track.
The table shows its change of speed when it leaves one station and travels to another.

Time (s)	0	50	100	150	200	250	300
Speed (ms^{-1})	0	5	10	15	15	7.5	0

(a) (i) Plot a graph of speed against time [3]



www.chemactive.com

(ii) What is the speed of the train after 80 s ?

..... [1]

(b) Calculate the acceleration of the train in the first 50 s of its journey.

.....

.....

..... [3]

(c) Describe the forces acting on the train when it is travelling at a constant speed.

.....

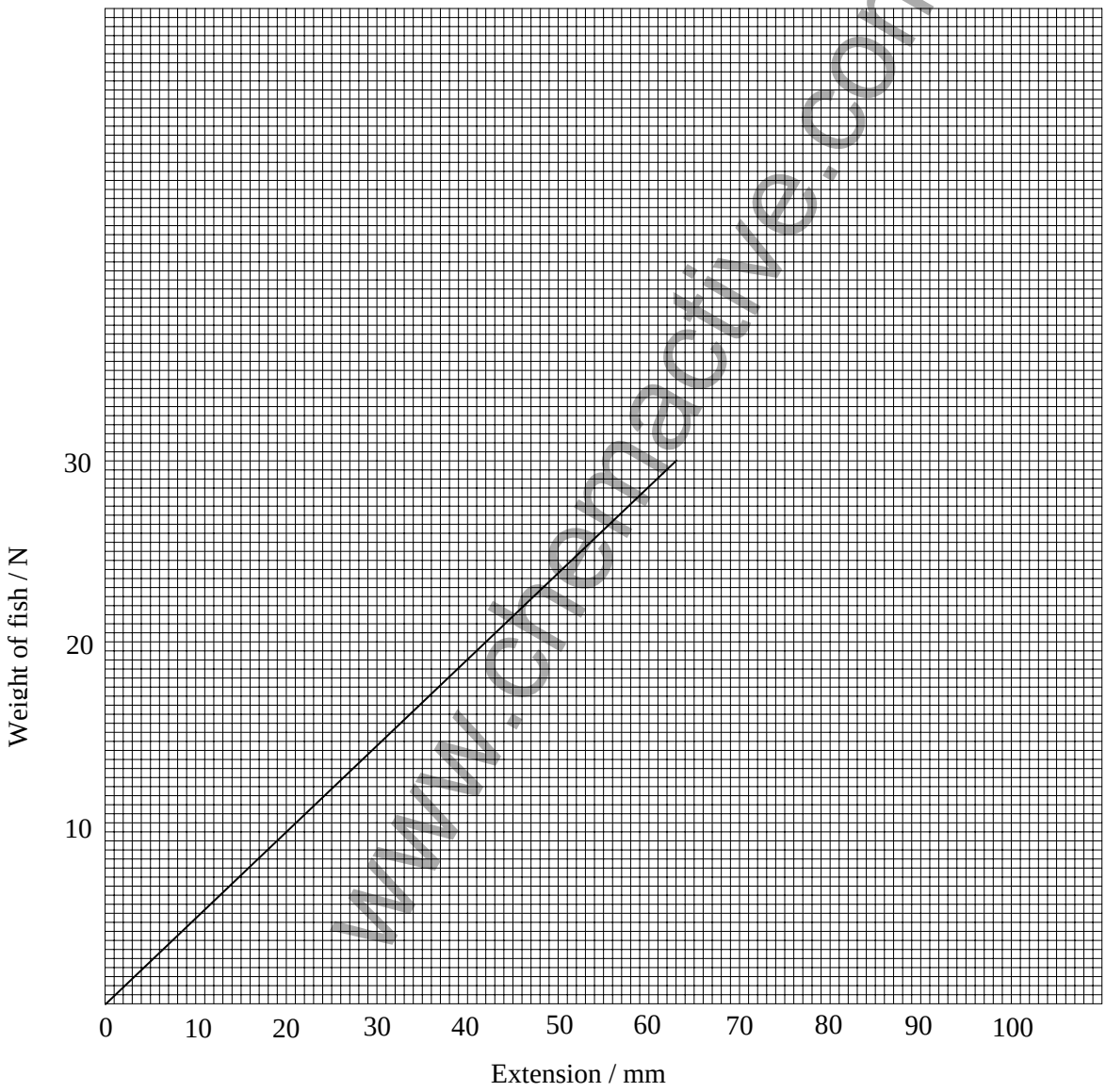
..... [1]

TOTAL / 8

Medium Demand Questions QUESTIONSHEET 11

Michael and Amer went fishing. They each weighed the fish they had caught on their own Newton balances. The extension of the spring inside each balance was also measured.

Michael's results are shown on the graph.



www.chemactive.com

(a) If Michael caught another fish, which gave an extension of 50 mm, what would be the weight of the new fish ?

..... [1]

(Continued...)

(b) The weights and extensions for Amer's fish are shown in the table below.

Weight of fish (N)	5.0	9.0	16.0	20.0	20.5
Extension (mm)	20	36	64	88	100

(i) Plot these points on the same axes. [3]

(ii) One of Amer's fish weighs 16 N.
What was its mass ?

..... [1]

(iii) Using the information in the graph, explain why Amer's Newton balance is unsuitable for weighing fish.

.....

.....

.....

..... [2]

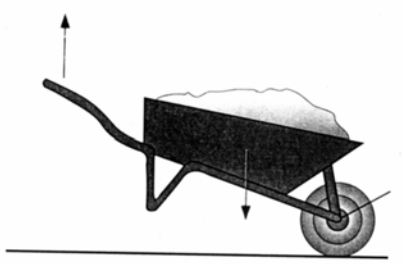
(iv) The type of balance Amer is using could be used to weigh other objects.
State the maximum weight, which could be reliably measured on this balance.

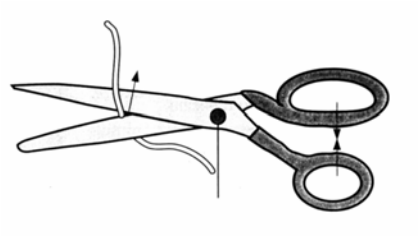
..... [1]

www.chemactive.com

Medium Demand Questions QUESTIONSHEET 12

(a) (i) On each of the diagrams of a wheelbarrow and a pair of scissors, mark the pivot (P), the load (L) and the effort (E).





[3]

(ii) How does the position of the pivot on a wheelbarrow differ from its position in a pair of scissors?

.....

.....

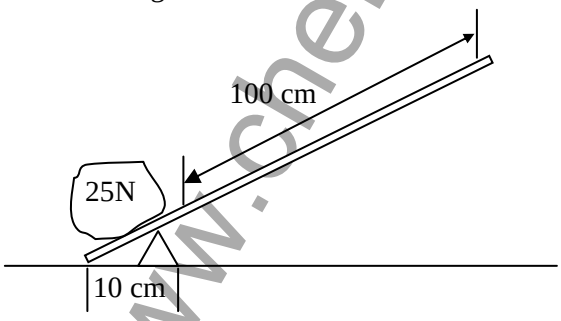
..... [2]

(b) Why is it best to use a long handled screwdriver to undo a tight screw?

.....

..... [2]

(c) The diagram shows a rock being lifted with a lever.



Calculate the effort needed at point A to lift the rock.

.....

.....

.....

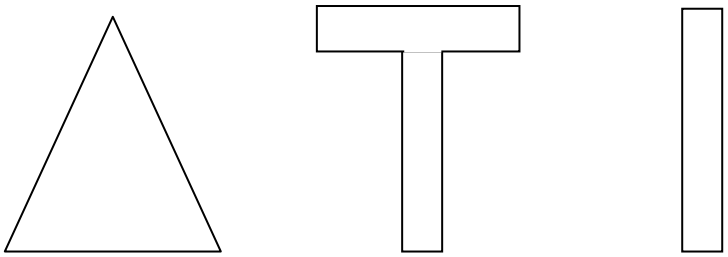
..... [3]

www.cnemactive.com

TOTAL / 10

Medium Demand Questions QUESTIONSHEET 13

Here is a diagram



A B C

(a) Look at the objects shown above.
List them in order of toppling, starting with the one most likely to fall.
Explain your answer.

.....

.....

..... [2]

(b) (i) Why does a self-righting toy continue to return to an upright position?

..... [1]

(ii) Explain the term ‘centre of gravity’.

.....

.....

..... [2]

(c) Describe an experiment you could do to find the balance point of piece of plywood of an irregular shape.

.....

.....

.....

.....

..... [5]

TOTAL / 10

www.chemactive.com

Medium Demand Questions QUESTIONSHEET 14

(a) Explain each of the following

(i) builders often use planks when walking on flat roofs

.....

..... [2]

(ii) Arctic explorers wear special snow shoes

.....

..... [2]

(iii) sharp knives cut better than blunt ones

.....

..... [2]

(b) A person wearing stiletto heels weighs 600 N.
Calculate the pressure on a heel, if they each have an area of 1 cm^2.

.....

.....

.....

..... [3]

www.chemactive.com

TOTAL / 9

(a) Tom weighs 400 N. He sits 2 metres from the pivot on a see-saw.
Dick weighs 300 N. He sits 2 metres from the pivot on the other side.
Harriet weighs 250 N. Where would she need to sit to exactly balance the see-saw?

.....

.....

.....

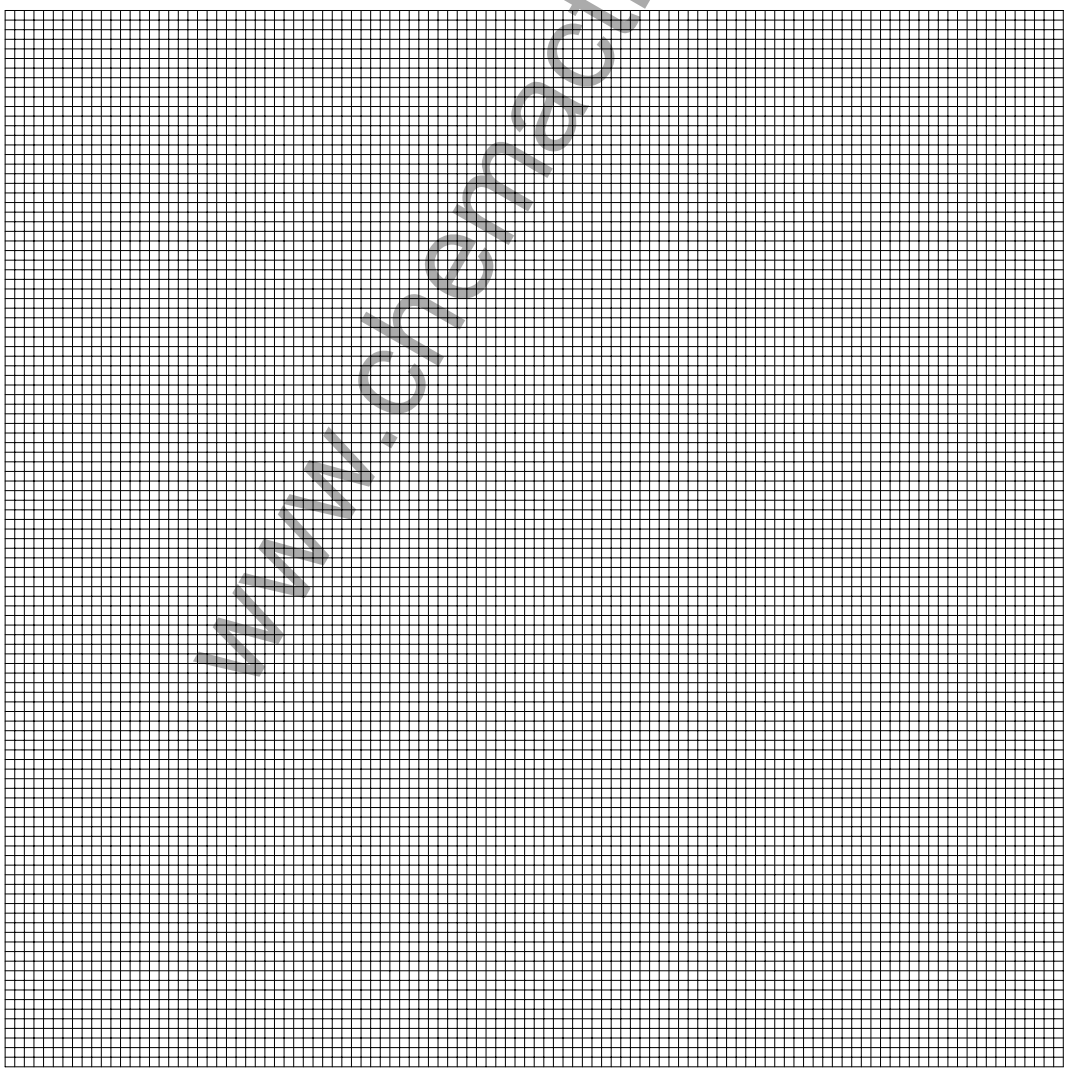
.....

..... [5]

(b) A crane can safely pick up different loads when it is extended different amounts.
The table shows some of these.

Extension/m	Safe load/tonnes
12	80
16	60
24	40
40	17

(i) Plot a graph of the safe load against the extension [4]



www.chemactive.com

(Continued...)

QUESTIONSHEET 15 CONTINUED

(ii) What is the safe extension when lifting 48 tonnes?

.....

.....

..... [1]

(iii) What would be the safe load for a 36 metre extension?

.....

..... [1]

www.chemactive.com

TOTAL / 11

Medium Demand Questions QUESTIONSHEET 16

(a) When sliding a heavy crate along the ground you need to overcome friction.
If the frictional force acting against a crate is -110 N, what is the resultant force in each of the following cases?

(i) one man pushes the crate with a force of +100 N

..... [1]

(ii) one man pushes the crate with a force of +110 N

..... [1]

(iii) two men push the crate with a combined force of +210 N

..... [1]

(b) Two tug boats pull a liner into port.

(i) They each pull in the direction of movement of the liner.
One exerts a force of 500 000 N and the other of 250 000 N
What is the resultant force on the liner?

.....

..... [2]

(ii) They each exert the same force at an angle to the direction of movement.
What additional information would you need to calculate the resultant force on the liner?

..... [1]

(iii) Explain how you would work out the resultant force.

.....

.....

.....

..... [3]

www.chemactive.com

TOTAL / 9

Low Demand Questions QUESTIONSHEET 17

(a) Some types of Newton balance contain a spring.
Why is a spring good for measuring forces?

.....

..... [2]

(b) John wanted to find out how much a spring would stretch when different masses were hung on it.
His results are shown below.

mass/g	10	20	30	40	50	60	70
length of spring/cm	9	10	11		13	14	19

(i) What would be the length of a spring with 40 g hanging on it?

..... [1]

(ii) What would be the length of a spring with 5 g hanging on it?

..... [1]

(c) If the spring is overloaded it will be over-stretched.
Has the spring in John's experiment been over-stretched?
Explain your answer.

.....

..... [2]

(d) John examined two Newton balances. One was designed to measure up to 10 N and the other up to 50 N.
Which one would contain the stronger spring?

..... [1]

www.chemactive.com

TOTAL / 7

Low Demand Questions QUESTIONSHEET 18

(a) In each of the following situations, state whether friction is a nuisance or useful.

(i) rock climbing

..... [1]

(ii) skiing

..... [1]

(iii) a bicycle chain

..... [1]

(iv) writing with a pencil

..... [1]

(v) brakes on cars

..... [1]

(b) How is friction reduced in a hovercraft?

.....

..... [2]

www.chemactive.com

TOTAL / 7

Low Demand Questions QUESTIONSHEET 19

Work is measured in Joules.
One way to do work is to use a force to move an object.

(a) Explain why you do work when you

(i) open a drawer

.....

..... [2]

(ii) climb a rope

.....

..... [2]

(b) Is more work done when you pick up a book or climb a flight of stairs?
Explain your answer.

.....

.....

..... [3]

www.chemactive.com

TOTAL / 7

GCSE PHYSICS **FORCES IN ACTION**

Low Demand Questions QUESTIONSHEET 20

Fill in the missing word in the following sentences.

A force is a _____ or a _____.

When two surfaces rub together a force called _____ is produced. This force makes moving objects move more _____.

Paper clips are attracted to magnet by _____ force.

Small insects can run across the surface of a pond because of a force called surface _____.

A plastic pen, which you rub on your jumper, will pick up pieces of tissue paper because of an _____ force.

The force which pulls objects to earth, is called _____.

Upthrust is a force which makes wood _____ on water and helium balloons _____.

www.chemactive.com

TOTAL / 10