1

Which statement is correct?

**A** Mass is a force, measured in kilograms.

**B** Mass is a force, measured in newtons.

**C** Weight is a force, measured in kilograms.

**D** Weight is a force, measured in newtons.

2

Which statement about the masses and weights of objects on the Earth is correct?

**A** A balance can only be used to compare weights, not masses.

**B** Heavy objects always have more mass than light ones.

**C** Large objects always have more mass than small ones.

**D** Mass is a force but weight is not.

3

Which statement is correct?

**A** The mass of a bottle of water at the North Pole is different from its mass at the Equator.

**B** The mass of a bottle of water is measured in newtons.

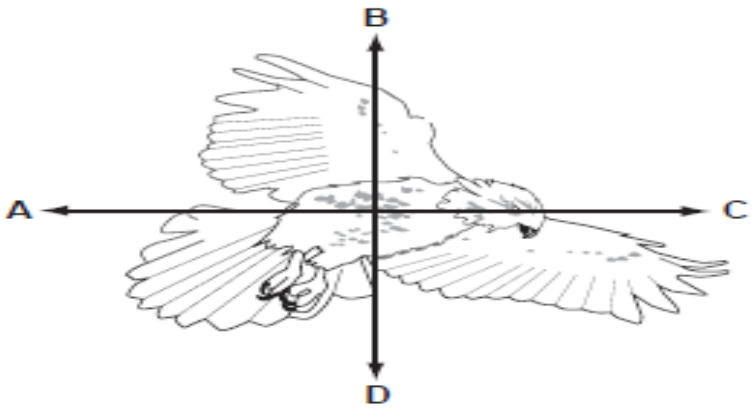
**C** The weight of a bottle of water and its mass are the same thing.

**D** The weight of a bottle of water is one of the forces acting on it.

4

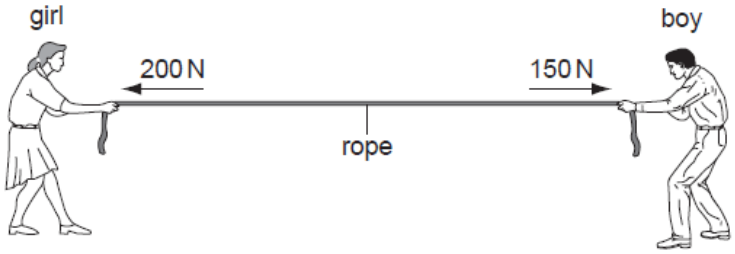
The diagram shows a bird in flight.

In which direction does the weight of the bird act?




5

A girl and a boy are pulling in opposite directions on a rope. The forces acting on the rope are shown in the diagram.




Which single force has the same effect as the two forces shown?

**A** 50 N acting towards the girl

**B** 350 N acting towards the girl

**C** 50 N acting towards the boy

**D** 350 N acting towards the boy

6

Two stones of different weight fall at the same time from a table. Air resistance may be ignored.

What will happen and why?

| | what will happen | why |
|---|---|---|
| **A** | both stones hit the floor at the same time | the acceleration of free fall is constant |
| **B** | both stones hit the floor at the same time | they fall at constant speed |
| **C** | the heavier stone hits the floor first | acceleration increases with weight |
| **D** | the heavier stone hits the floor first | speed increases with weight |

7

Which property of an object **cannot** be changed by a force?

**A** its mass

**B** its motion

**C** its shape

**D** its size

8

A train is passing through a station at constant speed, as shown in Fig. 3.1. The track is horizontal.

Fig. 3.1

The engine produces a forward thrust of 70000N. There is a 25000N force opposing the motion, due to friction in the wheels.

**(a)** Mark these forces on Fig. 3.1, using an arrow labelled 70000N and an arrow labelled 25000N. [2]

**(b)** The train is travelling at constant speed, so there must be another horizontal force acting on it.

**(i)** State the direction of this force.

.....

**(ii)** Calculate the size of this force.

size of force = ..... N

**(iii)** Suggest what might be causing this force.

.....

[3]

**(c)** Once the train has passed the station, the driver increases the engine's forward thrust.

All other forces stay the same.

**(i)** What happens to the train? .....

**(ii)** Why does this happen? .....

.....

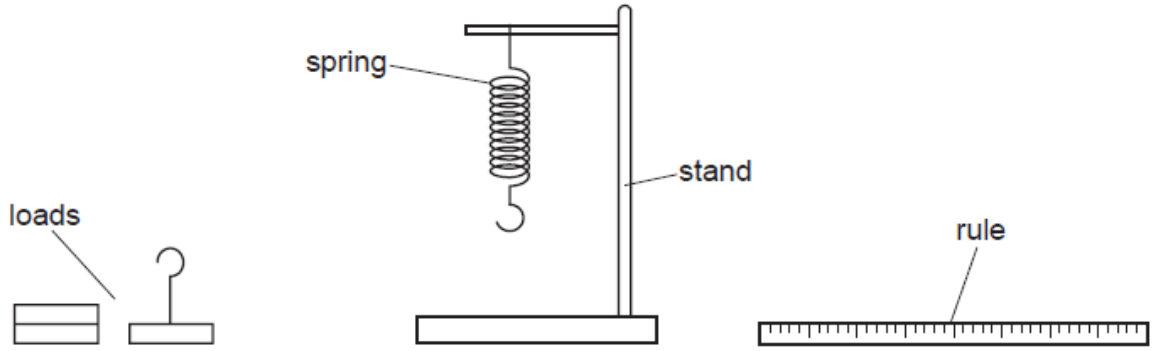
.....

[2]

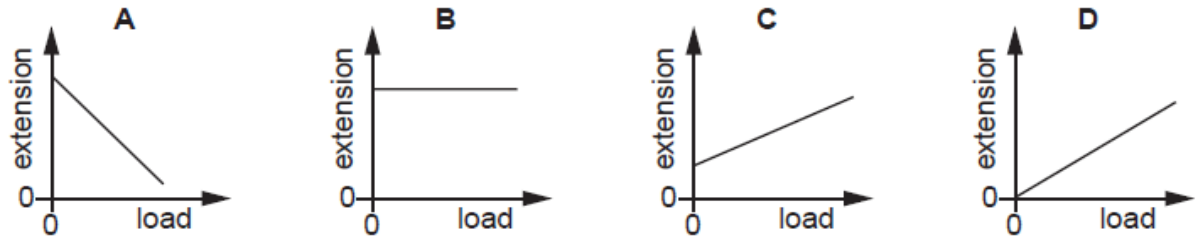
[Total: 7]

9

A spring is suspended from a stand. Loads are added and the extensions are measured.

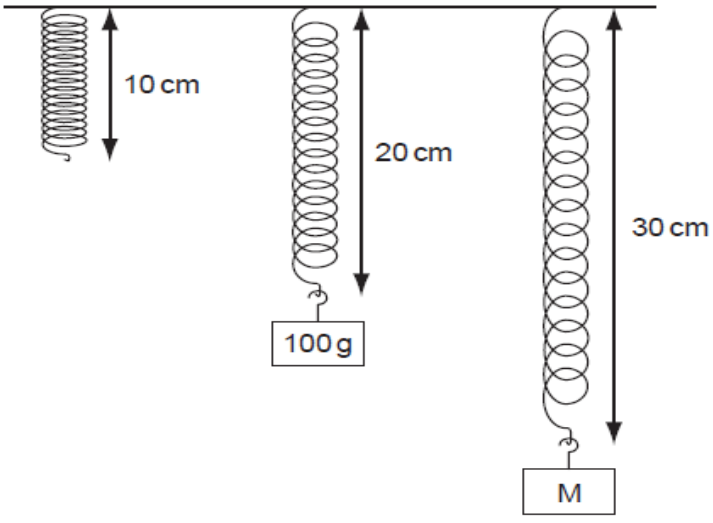



Which graph shows the result of plotting extension against load?




10

Objects with different masses are hung on a 10 cm spring. The diagram shows how much the spring stretches.




The extension of the spring is directly proportional to the mass hung on it.

What is the mass of object M?

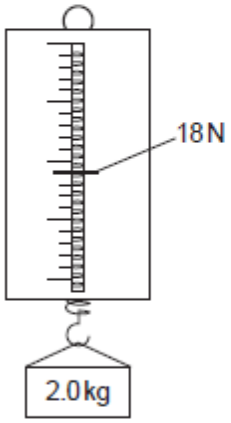
**A** 110 g **B** 150 g **C** 200 g **D** 300 g

11

The table shows the weight in newtons of a10 kg mass on each of four planets.

| planet | weight of a 10 kg mass/N |
|---|---|
| Earth | 100 |
| Jupiter | 250 |
| Mercury | 40 |
| Venus | 90 |

The diagram shows a force meter (spring balance) being used.




On which planet is the force meter (spring balance) being used?

**A** Earth

**B** Jupiter

**C** Mercury

**D** Venus

12

An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

| load/N | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| length/cm | 15.2 | 16.2 | | 18.6 |
| extension/cm | 0 | 1.0 | 2.1 | 3.4 |

Which figure is missing from the table?

**A** 17.2 **B** 17.3 **C** 17.4 **D** 17.6

13

The car in Fig. 3.1 is on a level road.


Fig. 3.1

(a) Calculate the magnitude of the resultant force on the car.

resultant force = ..... N [1]

(b) Tick the box below that describes the motion of the car.

| | |
|---|---|
| travels forward at constant speed | ☐ |
| travels forward with increasing speed | ☐ |
| travels forward with decreasing speed | ☐ |
| travels backward at constant speed | ☐ |
| travels backward with increasing speed | ☐ |
| travels backward with decreasing speed | ☐ |
| remains at rest | ☐ |

[1]

(c) The frictional forces increase to 2000 N when the car is moving. What happens to the car?

..... [1]

(d) Suggest two things that might have caused the frictional forces in (c) to increase.

1. .....

2. ..... [2]

[Total: 5]

14

A car moves along a level road.

The diagram shows all of the horizontal forces acting on the car.


Which statement is correct?

**A** The car is slowing down.

**B** The car is speeding up.

**C** The car is moving at a constant speed.

**D** The car is moving backwards.

15

**(a)** The object illustrated in Fig. 4.1 is not in equilibrium. It has a weight of 12 N.

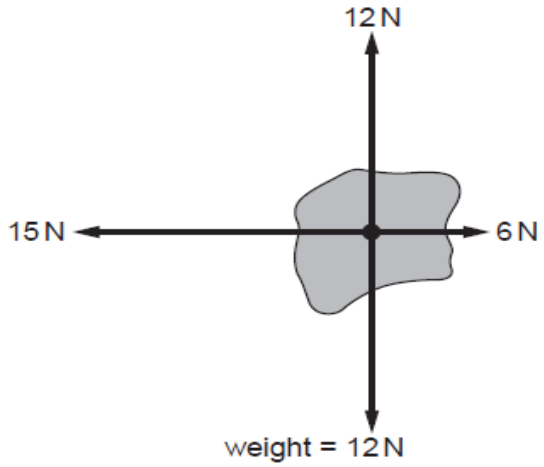



**Fig. 4.1**

**(i)** State what happens to the object.

.....

..... [2]

**(ii)** On Fig. 4.1, draw an arrow to show the extra force necessary to bring the object to a state of equilibrium. Label the arrow with the size of the force. [2]

**(iii)** On Fig. 4.1, show where the centre of mass of the object is situated, using the letter G. [1]