Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

Hailstones are small balls of ice. Hailstones form in clouds and fall to the ground.

Figure 1 shows different-sized hailstones.

Figure 1



(a) Which force causes the hailstones to fall to the ground?

Tick (✓) **one** box.

Air resistance	☐
Gravitational force	☐
Magnetic force	☐
Tension	☐

(1)

(b) As the hailstones begin to fall they accelerate.

Which force increases as the hailstones accelerate?

Downloaded from www.merit-minds.com

Tick (✓) **one** box.

Air resistance ☐

Gravitational force ☐

Magnetic force ☐

Tension ☐

(1)

(c) After a short time hailstones fall at terminal velocity.

Which of the following statements is true at terminal velocity?

Tick (✓) **one** box.

The hailstones begin to slow down. ☐

The mass of the hailstones increases. ☐

The resultant force on the hailstones is zero. ☐

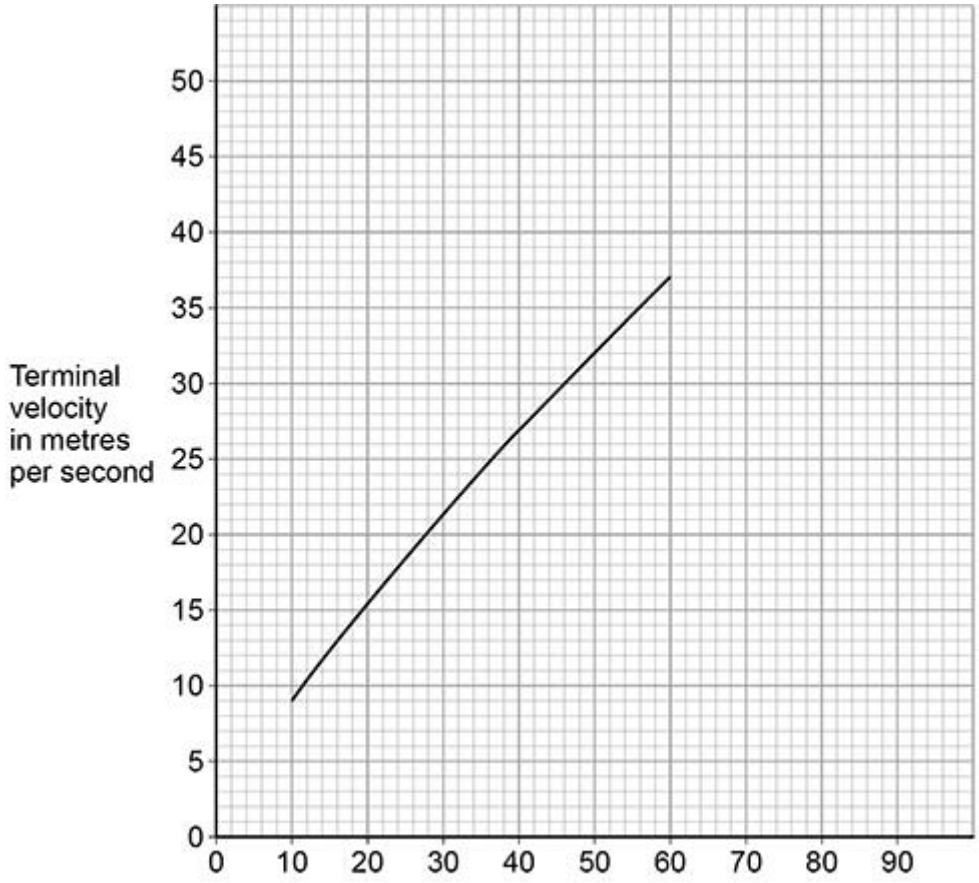
(1)

A scientist investigated how the terminal velocity of hailstones varies with their diameter.

Figure 2 shows the results.

Figure 2

Downloaded from www.merit-minds.com



(d) Estimate the terminal velocity for a hailstone with a diameter of 80 mm.

Show how you obtain your answer.

_____

_____

_____

Terminal velocity = _____ m/s

(2)

(e) Give **one** reason why a hailstone with a large diameter has a greater terminal velocity than a hailstone with a smaller diameter.

Tick (✓) **one** box.

It has a greater power. ☐

It has a greater pressure. ☐

It has a greater temperature. ☐

It has a greater weight. ☐

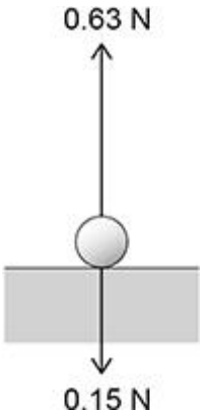
(1)

Downloaded from www.merit-minds.com

After falling, the hailstone hits the ground.

Figure 3 shows the forces acting on the hailstone at the moment it hits the ground.

Figure 3



(f) What is the magnitude of the resultant force on the hailstone in **Figure 3**?

Tick (✓) **one** box.

0.15 N ☐

0.48 N ☐

0.63 N ☐

0.78 N ☐

(1)

(g) What is the direction of the resultant force on the hailstone in **Figure 3**?

_____

(1)

(Total 8 marks)

Q2.

Figure 1 shows the weight of an orange acting from a point labelled **X**.

Figure 1

Downloaded from www.merit-minds.com



(a) What name is given to point **X** in **Figure 1**?

Tick (✓) **one** box.

Centre of force ☐

Centre of mass ☐

Centre of balance ☐

Centre of weight ☐

(1)

(b) Weight and mass are not the same.

The relationship between weight and mass for an object can be written as:

$$\text{weight} \propto \text{mass}$$

Which sentence describes the relationship between weight and mass?

Tick (✓) **one** box.

Weight is approximately equal to mass. ☐

Weight is directly proportional to mass. ☐

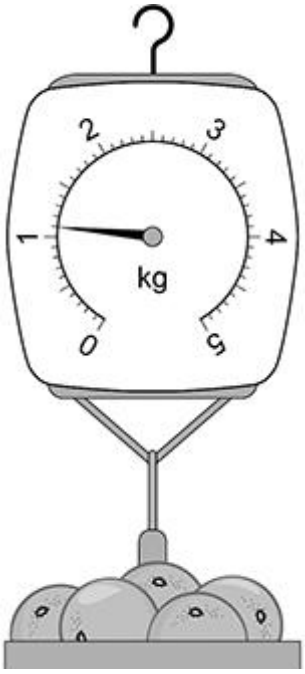
Weight is less than mass. ☐

(1)

Figure 2 shows a balance used to measure the mass of 5 oranges.

Figure 2

Downloaded from www.merit-minds.com



(c) All 5 of the oranges have the same mass.

Determine the mass of 1 orange.

_____

Mass = _____ kg

(2)

(d) Calculate the weight of 1 orange.

gravitational field strength = 9.8 N/kg

Use the equation:

weight = mass × gravitational field strength

_____

_____

_____

Weight = _____ N

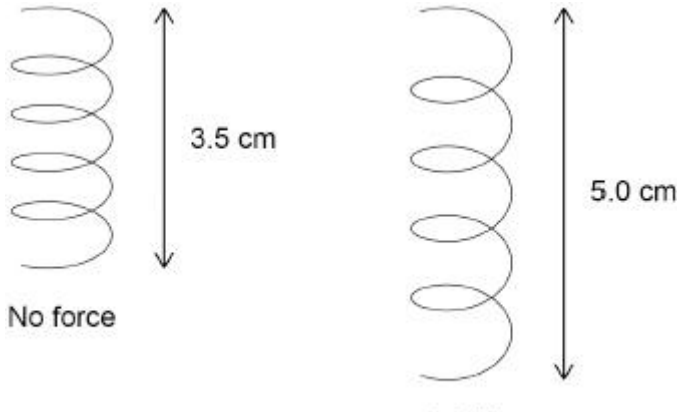
(2)

The balance shown in **Figure 2** contains a spring.

Figure 3 shows the spring with no force acting on it and with a force of 6.0 N acting on it.

Figure 3

Downloaded from www.merit-minds.com



(e) What is the extension of the spring when a force of 6.0 N acts on it?

Tick (✓) **one** box.

0.015 m ☐

0.035 m ☐

0.050 m ☐

0.085 m ☐

(1)

(f) Calculate the spring constant of the spring.

Use the equation:

$$\text{spring constant} = \frac{\text{force}}{\text{extension}}$$

_____

_____

_____

Spring constant = _____ N/m

(2)

(g) What will happen to the spring when the force is removed?

_____

_____

(1)

(Total 10 marks)

Downloaded from www.merit-minds.com