

Forces – GCSE Physics Paper 2

1. No.2

0	2
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Hailstones are small balls of ice. Hailstones form in clouds and fall to the ground.

Figure 3 shows different-sized hailstones.

Figure 3



0	2
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1

Which force causes the hailstones to fall to the ground?

[1 mark]

Tick (✓) **one** box.

Air resistance

☐

Gravitational force

☐

Magnetic force

☐

Tension

☐

0 2 . 2 As the hailstones begin to fall they accelerate.

Which force increases as the hailstones accelerate?

[1 mark]

Tick (✓) **one** box.

Air resistance

☐

Gravitational force

☐

Magnetic force

☐

Tension

☐

0 2 . 3 After a short time hailstones fall at terminal velocity.

Which of the following statements is true at terminal velocity?

[1 mark]

Tick (✓) **one** box.

The hailstones begin to slow down.

☐

The mass of the hailstones increases.

☐

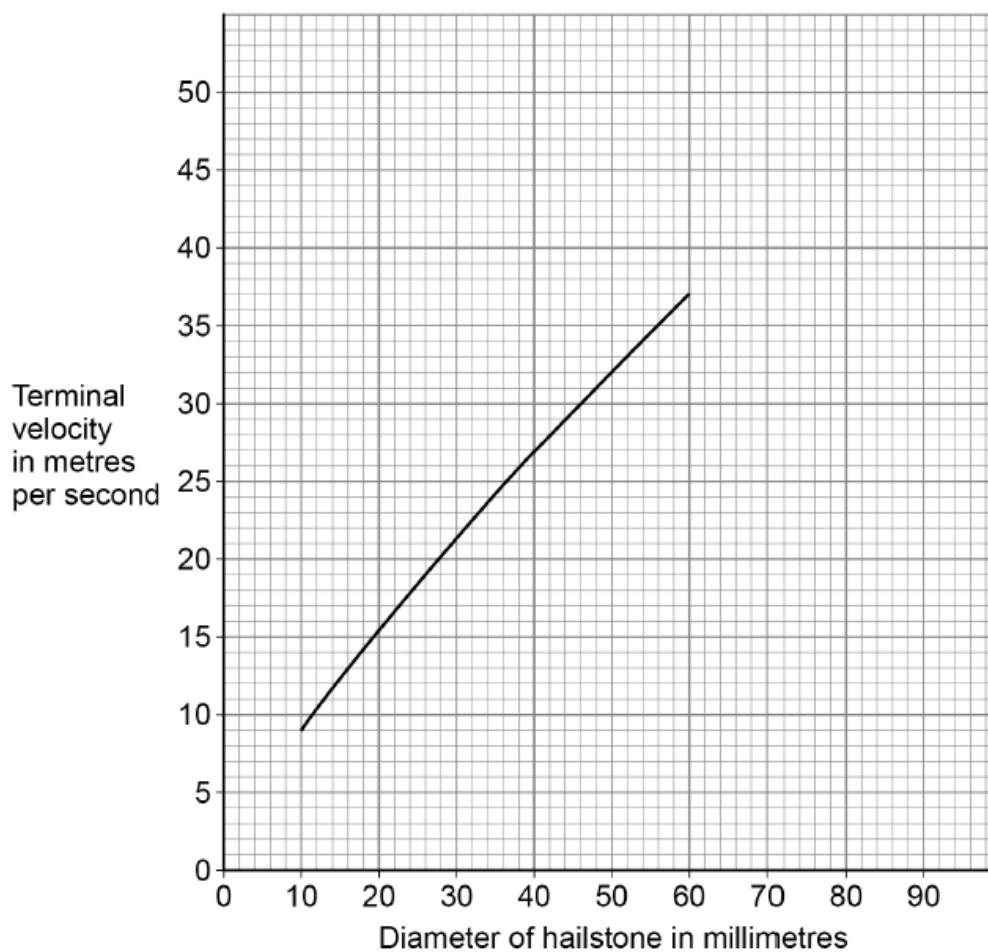
The resultant force on the hailstones is zero.

☐

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

Figure 4 shows the results.

Figure 4



0 2 . 4 Estimate the terminal velocity for a hailstone with a diameter of 80 mm.

Show how you obtain your answer.

[2 marks]

Terminal velocity = _____ m/s

0 2 . 5

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

[1 mark]

Tick (✓) **one** box.

It has a greater power.

☐

It has a greater pressure.

☐

It has a greater temperature.

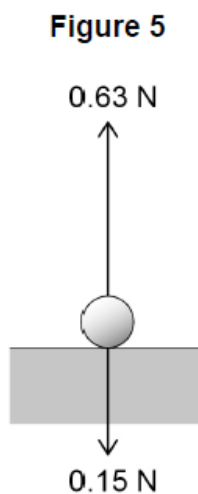
☐

It has a greater weight.

☐

After falling, the hailstone hits the ground.

Figure 5 shows the forces acting on the hailstone at the moment it hits the ground.



0 2 . 6

What is the magnitude of the resultant force on the hailstone in **Figure 5**?

[1 mark]

Tick (✓) **one** box.

0.15 N

☐

0.48 N

☐

0.63 N

☐

0.78 N

☐

0 2 . 7

What is the direction of the resultant force on the hailstone in **Figure 5**?

[1 mark]

2. No.4

0 4

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

Figure 7 shows different-sized hailstones.

Figure 7



A hailstone falls from a cloud and accelerates.

0 4 . 1

Why does the hailstone accelerate?

[1 mark]

0 4 . 2

The hailstone stops accelerating and reaches terminal velocity.

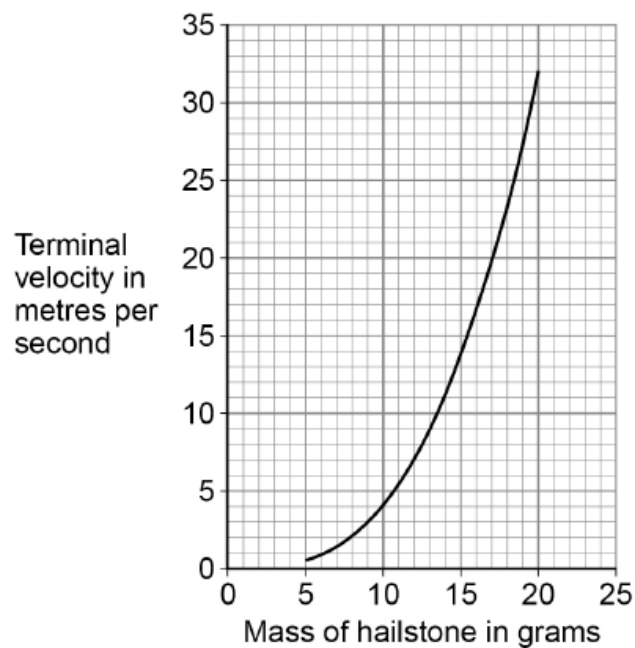
Explain why the hailstone reaches terminal velocity.

[3 marks]

A scientist investigated how the mass of hailstones affects their terminal velocity.

Figure 8 shows the results.

Figure 8



0 4 . 3

Why does terminal velocity increase with mass?

[1 mark]

Tick (✓) **one** box.

As mass increases the cross-sectional surface area of a hailstone increases.

☐

As mass increases the volume of a hailstone increases.

☐

As mass increases the weight of a hailstone increases.

☐

0 4 . 4

Explain the difference in the maximum kinetic energy of a hailstone with a mass of 10 g and a hailstone with a mass of 20 g.

[3 marks]

0 4 . 5

The kinetic energy of a hailstone is measured in joules.

Which of the following is the same as 1 joule?

[1 mark]

Tick (✓) **one** box.

1 N m

☐

1 N/m

☐

1 N/m²

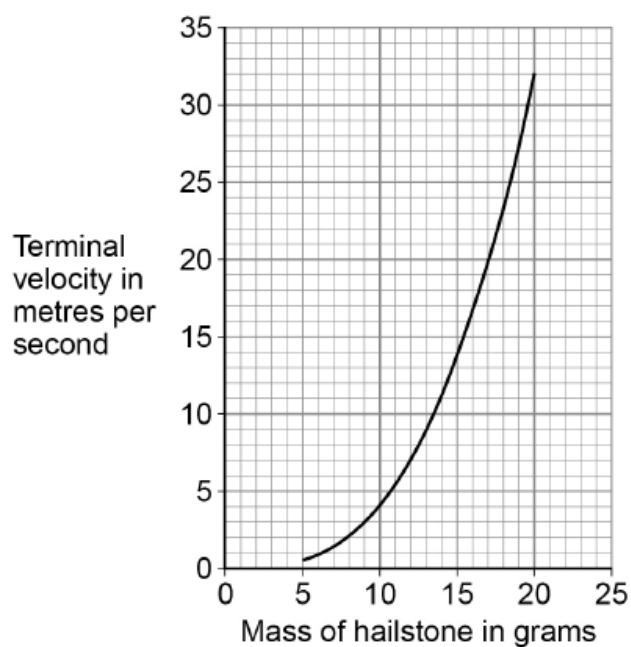
☐

1 N m²

☐

Figure 8 is repeated below.

Figure 8



0 4 . 6

A hailstone hit the ground at its terminal velocity of 25 m/s.

The hailstone took 0.060 s to stop moving.

Determine the average force on the hailstone as it hit the ground.

Use information from **Figure 8**.

Use the Physics Equations Sheet.

[3 marks]

Average force = _____ N