RADLEY

2026 Scholarship Examination Paper

PHYSICS

25th February – 26th February 2026

Time allowed – 30 minutes

Important Information

Read the information given for each question carefully.

Write all your working on the examination paper.

For all calculations, please show **full working.**

Please always include **units** for any calculations questions.

Where you can, use powers of ten to show very big or very small numbers.
For example:
1,000,000 = 1.0×10^6

Name: .....

Question	
1	/12
2	/10
3	/10
Total	/32

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

$$Pressure = \frac{Force}{Area}$$

$$Weight = mass \times gravitational\ field\ strength$$

$$Force = mass \times acceleration$$

$$acceleration = \frac{change\ in\ velocity}{time}$$

$$Gravitational\ Potential\ Energy = mass \times gravitational\ field\ strength \times change\ in\ height$$

The Physics of the Winter Olympics

This year the winter Olympics took place in 2026 in Milano and Cortina d'Ampezzo, Italy. The athletes rely on physics to move as fast and as efficiently as possible.

The Olympic Games are a showcase not only of athletic ability but also of physics in action. In many events, gravity, friction, air resistance, and energy transfers determine how athletes move. For example, skiers and snowboarders accelerate downhill as gravitational potential energy is converted into kinetic energy, while friction with the snow and air resistance slow them down. In bobsleigh and luge, athletes apply forces at the start to accelerate the sled, following Newton's laws of motion, and their speed is eventually limited by air resistance. In ski jumping, energy is transferred from gravitational potential energy at the top of the ramp to kinetic energy during the descent, although some is lost as heat and sound. Even in curling, friction affects how far the stone travels, and sweeping reduces this friction to help it move further. The Olympic Games therefore provide clear real-world examples of how forces and energy shape motion.

1. A speed skater travels at a steady speed of **12 m/s** along a straight section of the track.

a) How long would it take the skater to travel **60 m**?

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……..[2 marks]

b) Convert the skater's speed into **kilometres per hour (km/h)**.

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……[2 marks]

c i) We can ice skate because the pressure on the ice lowers its freezing temperature and creates a thin film of water under the skate blades. Calculate the weight a 70kg person standing on ice skate blades exerts on the ice. (Use g ≈ 10 N/kg.)

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……[2 marks]

c ii) If each blade has a surface area of 1.9×10^{-3} m^2 what is the pressure underneath each blade? Give your answer in **standard form.**

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……[3 marks]

d) Explain the difference between the **mass** of the speed skater and their **weight**.

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……[3 marks]

[12 marks]

2. Bobsleds at the winter Olympics routinely reach speeds between 75 and 93 mph. If 1 mile is 1609 m.

a) What is the maximum speed a bob sleigh can go in m/s?

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……[2 marks]

b) At the start of a race, a bobsleigh accelerates from rest to **11m/s** in **5s**. Calculate the acceleration of the bobsleigh.

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……[3 marks]

The total mass of the bobsleigh and its crew is **4.0×10^2 kg**.

c) Calculate the force needed to produce the acceleration from Question 2.
Give your answer in **standard form**.

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……[3 marks]

d) Suggest and explain one reason why a heavier bobsleigh might accelerate more slowly.

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……[2 marks]

[10 marks]

3**.** In the Stelvio downhill piste at the Winter Olympics a skier of mass **60 kg** starts from rest at the top of a slope. The length of the course is 3.27km and the change in vertical height from the start to the end of the course is 1,010m.

The gravitational field strength is **10 N/kg**.

a) Calculate the skier's loss in gravitational potential energy.
Give your answer in **standard form**.

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……[3 marks]

b) If only half of this energy becomes movement, calculate the useful energy gained.

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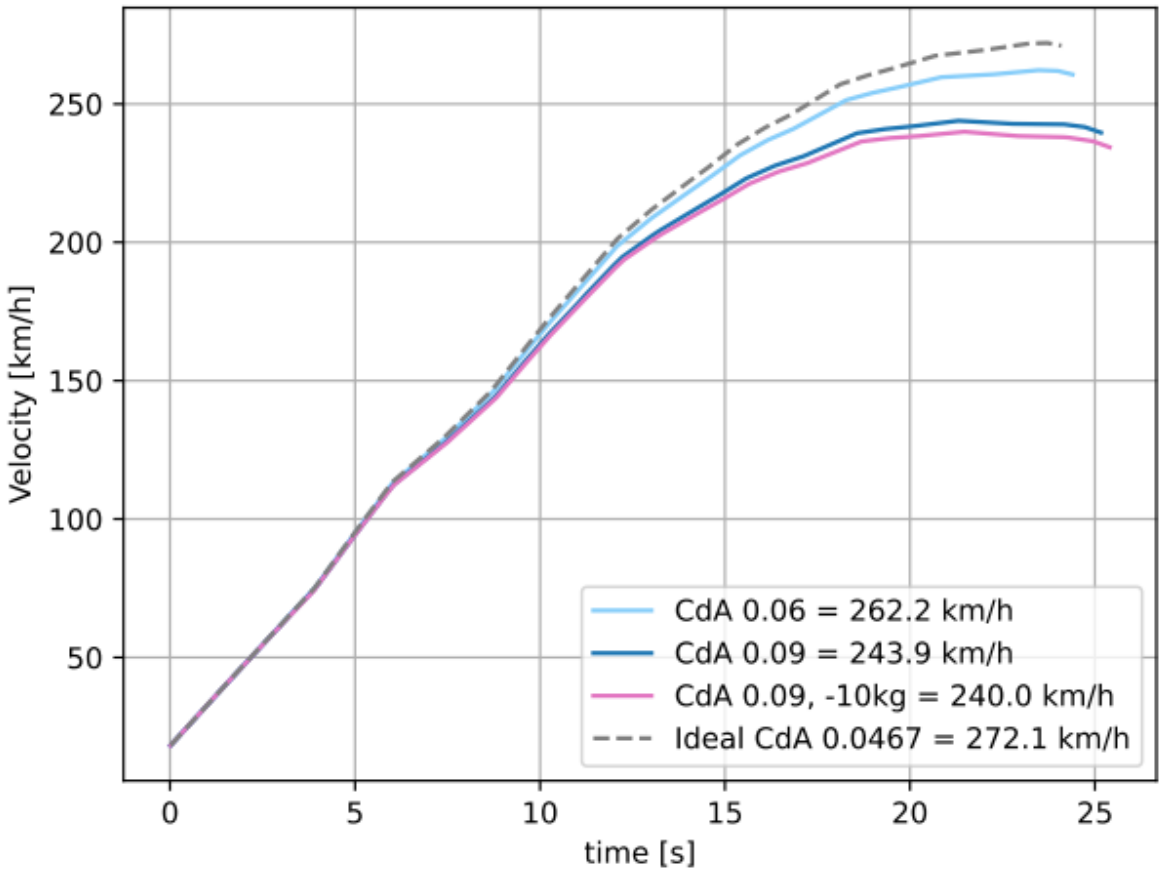
……[2 marks]

c) Name one form of energy that the rest of the energy is converted into.

……[1 mark]



The diagram above shown how a skier's velocity changes as they descend the slope. The different lines show different models of how the velocity changes with time.

d) Describe and explain how the air resistance changes as speed increases. Refer to the graph and the forces that act on the skier.

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……[4 marks]

[10 marks]

END OF TEST