



IBMYP Integrated Sciences Sample Paper 3



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Group 5: Integrated Science On-Screen Examination

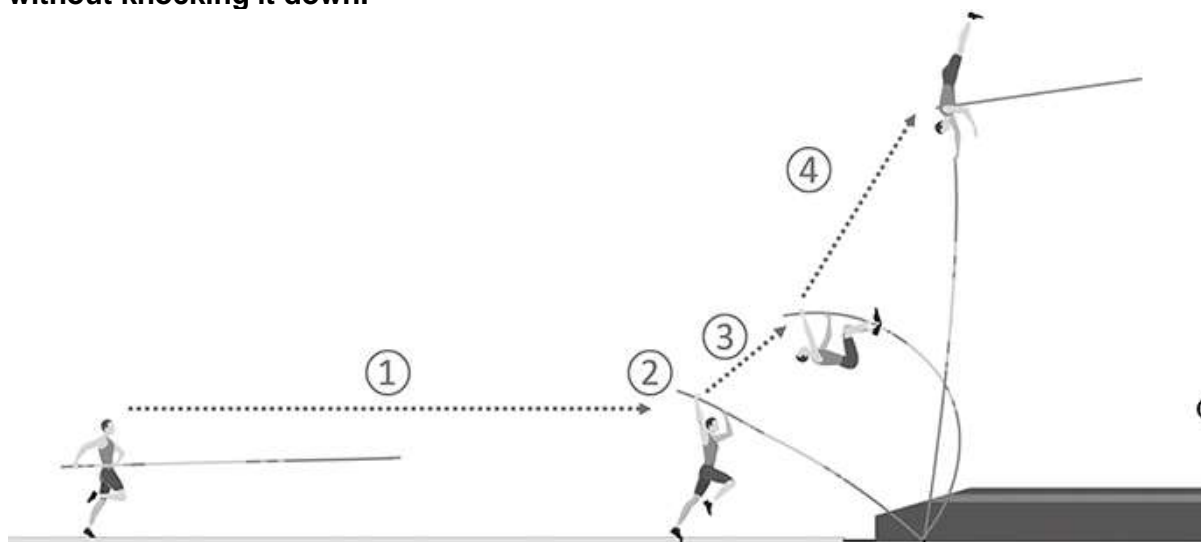
Total marks: 90

Instructions

- The on-screen examination has not yet started.
- Your time will begin once you have clicked the Start button below. Do not click Start until instructed to do so.
- Before the examination begins you are given 5 minutes to become familiar with its structure. Please navigate around the examination, taking note of the length of each task and question. You have 2 hours to complete the examination.
- There are 10 separate questions in this examination. Each question may have sub-parts. Answer all the questions in the response boxes provided. The maximum mark for this examination is 100 marks.
- As you progress through the questions, your answers are automatically saved.
- When 2 hours has ended, you will no longer be able to answer any questions.

Question 1: 6 marks

Q1) Pole vaulting is an athletic event that takes place in track and field competitions. In this sport, athletes, known as pole vaulters, use a long, flexible pole made of fibreglass or carbon fibre. The objective is to clear a high bar set at a certain height without knocking it down.



Between positions 1 and 2 the athlete speeds up.

(Choose the answers from the box)

a.) There is an increase in the athlete's kinetic energy and a decrease in the athlete's gravitational potential store of energy. (1 mark).

b.) A 50 kg athlete is at position 2, and their kinetic energy is measured to be 1600 J. Determine the speed of the athlete at position D (3 marks)

using the equation:

- $\text{speed} = \sqrt{2 \times \text{kinetic energy} \div \text{mass}}$
- Choose the appropriate unit for the speed from the options provided:
m/s J/kg J/s.

Answer:

- Kinetic energy (KE) = 1600 J
- Mass of the athlete (m) = 50 kg
- The equation to calculate speed (v) is: $v = \sqrt{2 \times KE \div m}$

- Substituting the values:
- $v = \sqrt{2 \times 1600 \text{ J} \div 50 \text{ kg}}$
- $v = \sqrt{3200 \text{ J} \div 50 \text{ kg}}$
- $v = \sqrt{64 \text{ m}^2/\text{s}^2}$
- $v = 8 \text{ m/s}$

So, the speed of the athlete at position D is 8 m/s.

c.) A second athlete has also competed in pole-vaulting but they had less power during the run from position 1 to position 2 compared to the first athlete. Complete the following sentences with appropriate answers from the box: (2 marks)

Two factors that could explain why the second athlete had less power than the first athlete are:

The time taken by the second athlete to run between position A and position B was more than the first athlete.

The work done by the second athlete was less than the first athlete.

d.) Between positions 3 and 4, the athlete jumps to the pole and climbs up it. Which statement describes a change in the athlete's energy between positions 3 and 4? Additionally, what is meant by the power of an athlete? (2 marks)

(pick the correct option from both and give your answer.)



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