Oxford Cambridge and RSA

GCSE Physics B (Twenty First Century Science)

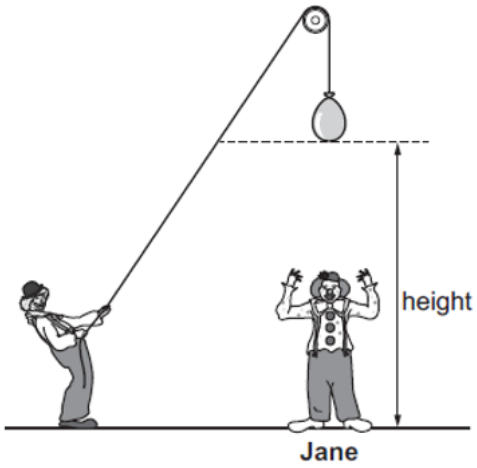
J259/01 Breadth in Physics (Foundation Tier)

Question Set 24

Multiple Choice Questions

1 Jane is a clown in a circus. She is preparing a new show.

(a) In the show, water balloons will be dropped on her head from different heights.



(i) She needs the first water balloon to hit her at a speed of 10 m/s.

The first water balloon has a mass of 1.6 kg.

Calculate the kinetic energy of this water balloon moving at 10 m/s.

$E_K = \frac{1}{2}mv^2 = \frac{1}{2} \times 1.6 \times 10^2$

$= 80\,J$

Kinetic energy = ... 80 ..... J **[3]**

(ii) The second water balloon has a mass of 2.4 kg. When it is released, it has gravitational potential energy of 120 J.

Calculate the height from which it is released.

Use the equation:

gravitational potential energy = mass × gravitational field strength × height

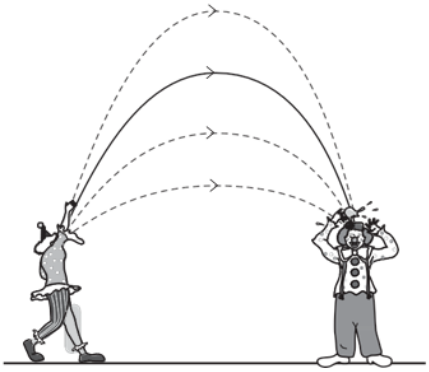
Gravitational field strength = 10 N/kg

$GPE = 2.4 \times 10 \times h = 120\,J$ so

$24h = 120$ so $h = \frac{120}{24} = 5\,m$

Height = ... 5 ..... m **[3]**

(b) In the next part of the show, a second clown throws water balloons at Jane. The clown throws each water balloon at Jane to a different height.



(i) What is the name of the energy store before the water balloon is thrown? Tick (✓) **one** box.

- Chemical store ✓
- Elastic store
- Kinetic store
- Nuclear store

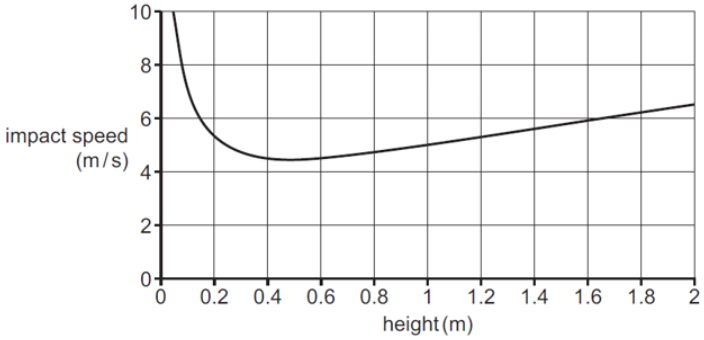
[1]

(ii) Name the energy store while the water balloon is in the air. Tick (✓) **one** box.

- Chemical store
- Elastic store
- Kinetic store ✓
- Nuclear store

[1]

(iii) The graph shows how the impact speed of the balloon depends on the height of the throw.



Describe the relationship between impact speed and height.

Use data from the graph in your answer.

[2]

Impact speed is high for low heights and decreases with height up to a minimum at a height of 0.4m

Total Marks for Question Set 24: 10