A Level · OCR · Physics

4 mins 4 questions

Multiple Choice Questions

Gravitational Potential & Energy

Gravitational Potential / Calculating Gravitational Potential / Force-Distance Graph / Gravitational Potential Energy / Escape Velocity

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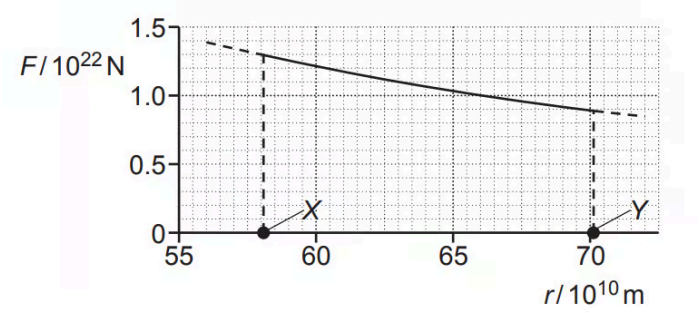
Total Marks /4

1 The planet Mercury has a highly elliptical orbit around the Sun. The gravitational force F acting on Mercury due to the Sun varies with its distance r from the centre of the Sun. The graph of F against r for Mercury in its orbit is shown below.



Mercury is closest to the Sun when $r = X$ and furthest when $r = Y$.

What does the **area** under the graph between the distances X and Y represent?

A. The centripetal force acting on Mercury

B. The change in the gravitational potential energy of Mercury

C. The impulse of the force acting on Mercury

D. The kinetic energy of Mercury

(1 mark)

2 Earth has a mass of 6.0×10^{24} kg and a radius of 6400 km.

A satellite of mass 320 kg is lifted from the Earth's surface to an orbit 1200 km above its surface.

What is the change in the gravitational potential energy of the satellite?

A. 9.1×10^{2} J

B. 9.9×10^{6} J

C. 3.2×10^{9} J

D. 3.8×10^{9} J

(1 mark)

3 Mars has a mass of 6.0×10^{24} kg and a radius of 7400 km. A satellite of mass 320 kg is lifted from the surface of Mars to an orbit 1300 km above its surface. What is the change in the gravitational potential energy of the satellite?

A. 2.6×10^{6}

B. 2.7×10^{7}

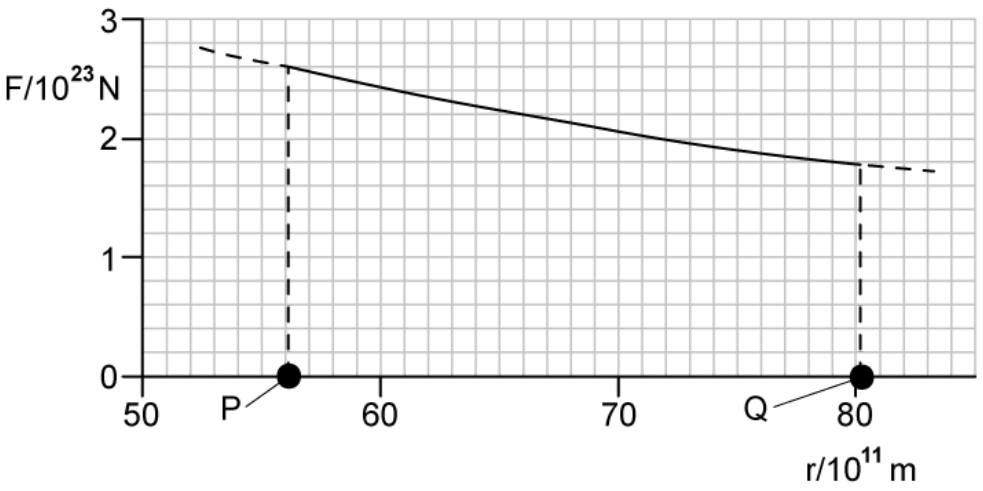
C. 2.8×10^{8}

D. 2.6×10^{9}

(1 mark)

4 The planet Venus has an elliptical orbit around the Sun.

The gravitational force *F* acting on Venus due to the Sun varies with its distance *r* from the Sun's centre. The graph of *F* against *r* for Venus in its orbit is shown below.



Venus is closest to the Sun when *r* = P and furthest when *r* = Q.

What does the area under the graph between the distances P and Q represent?

A. The centripetal force acting on Venus

B. The change in the gravitational potential energy of Venus

C. The impulse of the force acting on Venus

D. The kinetic energy of Venus

(1 mark)