



## Module 5 Advance Mechanics

### HSC Style questions

11 marks

2011

- 2 A 60 kg object has a weight of 240 N on the surface of Planet X.

What is the acceleration due to gravity on the surface of Planet X?

- (A)  $0.25 \text{ m s}^{-2}$
- (B)  $4 \text{ m s}^{-2}$
- (C)  $250 \text{ m s}^{-2}$
- (D)  $14\,400 \text{ m s}^{-2}$

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- 15 A marble rolls off a 1.0 m high horizontal table with an initial velocity of  $4.0 \text{ m s}^{-1}$ .

How long will it take the marble to hit the floor?

- (A) 0.20 s
- (B) 0.25 s
- (C) 0.45 s
- (D) 3.20 s

- 16 A satellite is orbiting a planet at a constant speed.

Which of the following statements is correct?

- (A) The satellite is not accelerating.
- (B) The orbit of the satellite has a fixed radius.
- (C) Fuel must be used to supply a constant thrust to the satellite.
- (D) The centripetal force on the satellite is balanced by the gravitational force.

- 20** A satellite, initially in a low Earth orbit, is moved to a new orbit where its gravitational potential energy is half its initial value.

What is the gravitational force experienced by the satellite in its new orbit?

- (A) Half the initial force
- (B) Twice the initial force
- (C) Four times the initial force
- (D) One quarter the initial force

**Question 23** (7 marks)

A rocket launches a satellite into an orbit 350 km above Earth's surface. The weight of the satellite is 14.0 kN at launch, and is 12.6 kN when in orbit.

(Radius of Earth = 6380 km, mass of Earth =  $5.97 \times 10^{24}$  kg)

- (a) Why does the weight of the satellite change? **1**
- (b) Calculate the orbital velocity of this satellite. **2**
- (c) Explain TWO effects that a reduction in altitude would have on the motion of this satellite. **4**