Revision Sheet

A-Level Physics · Unit 2 Kinematics

7 vocabulary items · 14 marks of exam questions (14 questions)

Part 1 · Vocabulary review (7 items). The terms this unit is examined on most. Mark it yourself from the answer key.

Section A · English dictation

Listen to each word and write it in English. The teacher reads the numbered answer key aloud.

1. Dictation item 1. _____ [1]
2. Dictation item 2. _____ [1]
3. Dictation item 3. _____ [1]
4. Dictation item 4. _____ [1]
5. Dictation item 5. _____ [1]
6. Dictation item 6. _____ [1]
7. Dictation item 7. _____ [1]

Part 2 · Exam questions (14 marks, 14 questions) begins on the next page. They are ordered easy to difficult and none of them has been set before.

8 An object is projected from horizontal ground at a velocity of magnitude u and angle θ to the horizontal. It hits the ground at a time t after it is projected. Assume air resistance is negligible.

Which statement does **not** describe the motion of this object?

A The horizontal component of the object's velocity is constant and has the value $u\cos\theta$.

B The horizontal distance travelled by the object is $tu\cos\theta$.

C The time taken for the object to reach maximum height is $\frac{t}{2}$.

D The vertical component of the object's velocity is constant and has the value $u\sin\theta$.

9 An object is dropped from rest on the Earth from a height of 2.0 m.

The same object is dropped from rest on the Moon from twice the height.

The acceleration of free fall on the Moon is approximately 16% of the value on the Earth.

Assume that there are no resistive forces acting on the object.

What is the ratio $\frac{\text{speed of the object just before hitting the surface on the Earth}}{\text{speed of the object just before hitting the surface on the Moon}}$?

A 1.8 **B** 2.5 **C** 3.1 **D** 3.5

10 Two identical balls are projected vertically upwards from ground level with the same initial velocity. Ball X is in a vacuum and ball Y is in air.

Which statement about the motion of the balls is correct?

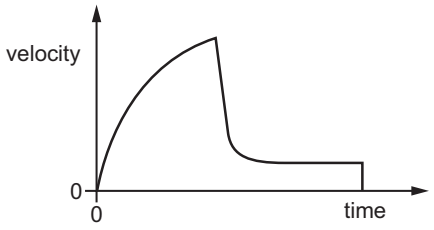
A Ball X reaches a greater maximum height and in a longer time than ball Y.

B Ball X reaches a greater maximum height and in a shorter time than ball Y.

C Ball Y reaches a greater maximum height and in a longer time than ball X.

D Ball Y reaches a greater maximum height and in a shorter time than ball X.

11 The graph shows the variation of velocity with time for a stone that falls from a bridge into a lake and sinks to the bottom of the lake.



What can be deduced about the motion of the stone?

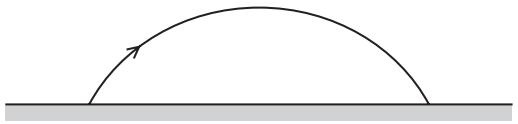
A Terminal velocity was reached in air.

B The acceleration in air was decreasing with increasing time.

C The distance travelled in water was greater than the distance travelled in air.

D The rate of change of velocity in air was constant.

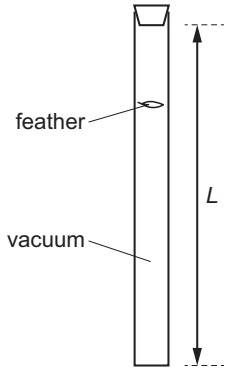
12 The diagram shows the path of a golf ball.



Which row describes changes in the horizontal and vertical components of the golf ball's velocity when air resistance is ignored?

	horizontal	vertical
A	constant deceleration	constant acceleration downwards
B	constant deceleration	acceleration decreases upwards then increases downwards
C	constant velocity	constant acceleration downwards
D	constant velocity	acceleration decreases upwards then increases downwards

13 The diagram shows a laboratory experiment in which a feather falls from rest in a long evacuated vertical tube of length L.



The feather takes time T to fall from the top to the bottom of the tube.

How far does the feather fall from the top of the tube in time $0.50T$?

A $0.13L$ **B** $0.25L$ **C** $0.38L$ **D** $0.50L$

14 An object of fixed mass is initially at rest at point P. The object then moves away from point P with uniform acceleration.

Which statement describes the resultant force acting on the object when it is moving?

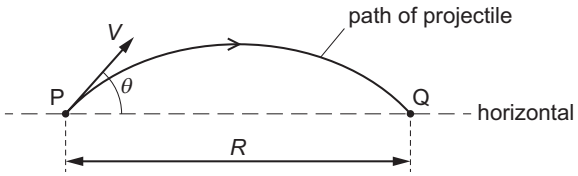
A It increases uniformly with respect to time.

B It is constant but not zero.

C It is proportional to the displacement from point P.

D It is zero.

15 A projectile is fired from point P with velocity V at an angle θ to the horizontal. It lands at point Q, a horizontal distance R from P, after time T.



The acceleration of free fall is g. Air resistance is negligible.

Which equation is correct?

A $R = VT\cos\theta$

B $R = VT\sin\theta$

C $R = VT\cos\theta - \frac{1}{2}gT^2$

D $R = VT\sin\theta - \frac{1}{2}gT^2$

16 A ball of mass 200 g is thrown horizontally with a speed of $20\,\mathrm{m\,s^{-1}}$ against a vertical wall.

The ball is in contact with the wall for a time of 0.10 s before rebounding back along its original path with a speed of $10\,\mathrm{m\,s^{-1}}$.

What is the average force exerted by the wall on the ball during the collision?

A 20 N **B** 60 N **C** 20 kN **D** 60 kN

17 The time taken for an object to fall from rest through a certain distance on Mars is T_M. The time taken for the same object to fall from rest through the same distance on Earth is T_E. The acceleration of free fall on Mars is $3.71\,\mathrm{m\,s^{-2}}$.

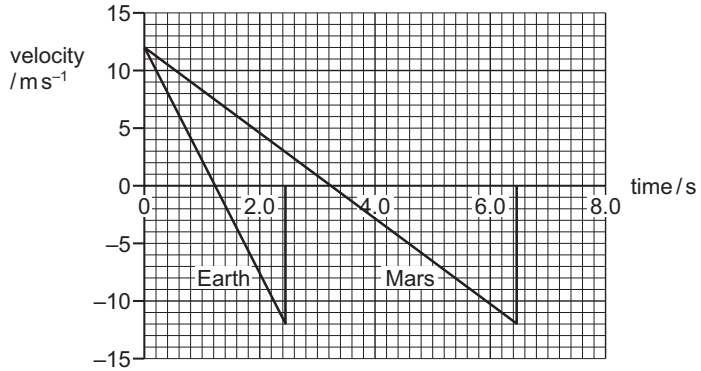
Assume that air resistance is negligible on both Earth and Mars.

What is the ratio $\frac{T_M}{T_E}$?

A 0.378 **B** 0.615 **C** 1.63 **D** 2.64

18 A rock is launched vertically upwards from the surface of the Earth and an identical rock is launched vertically upwards from the surface of Mars. Each rock is launched with an initial velocity of $12\,\mathrm{m\,s^{-1}}$.

Each rock then reaches its maximum height above the surface before returning back down to the surface. The velocity–time graph for each rock is shown. In both cases, air resistance is negligible.

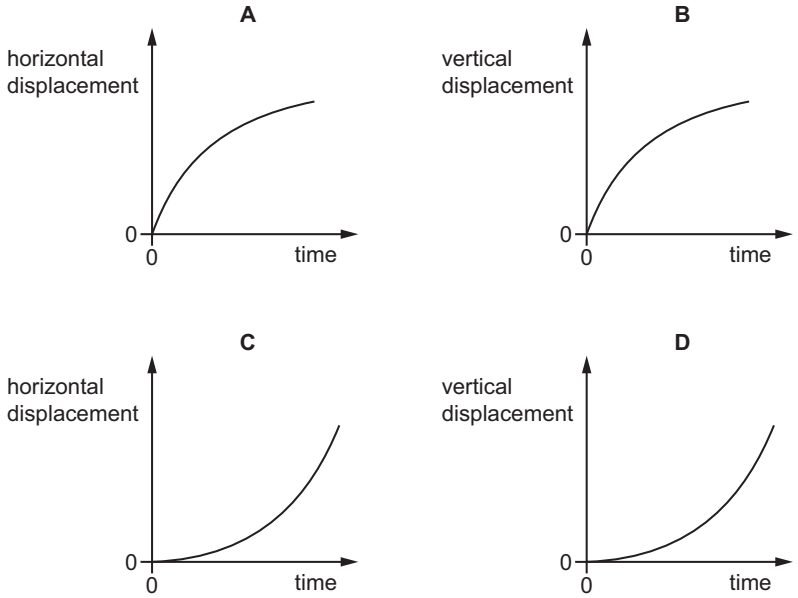


What is the difference in the maximum heights of the two rocks?

A 12 m **B** 15 m **C** 19 m **D** 24 m

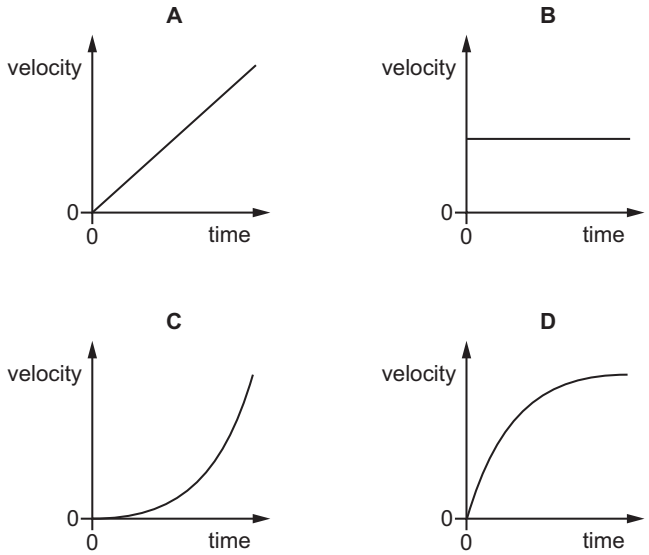
19 An object moves from rest with uniform velocity horizontally and uniform acceleration vertically.

Which graph showing the variation with time of the displacement of the object from its initial position is correct?



20 The velocity–time graphs of four different objects are shown.

Which graph represents an object falling from rest through a long distance in the Earth's atmosphere?



21 The acceleration of free fall on the surface of planet P is one-tenth of that on the surface of planet Q.

On the surface of P, an object has a mass of 1.0 kg and a weight of 1.0 N.

What are the mass and the weight of the same object on the surface of planet Q?

	mass on Q / kg	weight on Q / N
A	1.0	0.1
B	1.0	10
C	10	10
D	10	100