

Revision Sheet

A-Level Physics · Unit 5 Work, energy and power

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

Part 1 · Vocabulary review (6 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]

Section B · Pictures

Write the English word for each picture.



6.

[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.

7 A ball falls towards the ground from point X. Point X is 2.4 m above the ground.

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The ball rebounds from the ground and rises to point Y. Point Y is 1.8 m above the ground.

A single value of the change in height Δh is used to calculate the change in gravitational potential energy of the ball from X to Y.

What is the magnitude of Δh ?

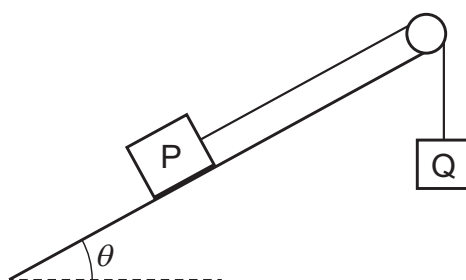
A 0.6 m

B 1.8 m

C 2.4 m

D 4.2 m

8 The diagram shows a block P of mass M connected by a string over a frictionless pulley to a block Q of mass m .

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Block P moves up the slope with a constant velocity v . The slope is at angle θ to the horizontal.

The acceleration of free fall is g .

The resistive forces on the blocks are negligible.

Which expressions give the energy transferred per unit time to block P?

1 mgv

2 $Mgv \sin \theta$

3 $(M + m)gv$

A 1 and 2

B 1 only

C 2 and 3

D 2 only

- 9** An object travels between two points. The change in gravitational potential energy ΔE_p of the object is given by

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$$\Delta E_p = mg\Delta h$$

where m is the mass of the object, Δh is its change in height and g is the acceleration of free fall.

What is a necessary condition in order for the above equation to be valid?

- A** The object must have a constant acceleration of 9.81 m s^{-2} .
- B** The object must be travelling in a uniform gravitational field.
- C** The object must be travelling only in a vertical direction.
- D** The resultant force on the object must be equal to its weight.

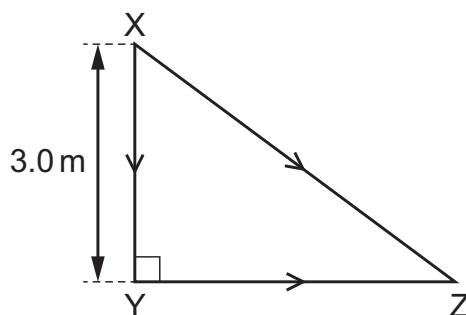
- 10** An object is falling in a uniform gravitational field.

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Which two quantities are sufficient to calculate the change in gravitational potential energy?

- A** mass and acceleration of free fall
- B** mass and change in vertical displacement
- C** weight and acceleration of free fall
- D** weight and change in vertical displacement

11 The points X, Y and Z are on a rough, horizontal surface.



A box P is pushed across the surface from X to Y and then from Y to Z.

The distance from X to Y is 3.0 m. The work done against the frictional force in moving the box from X to Y is 150 J.

The work done against the frictional force in moving the box from Y to Z is 200 J.

An identical box Q is pushed in a straight line from X to Z.

The magnitude of the frictional force between the boxes and the surface is constant.

How much extra work is done against the frictional force in moving P than Q?

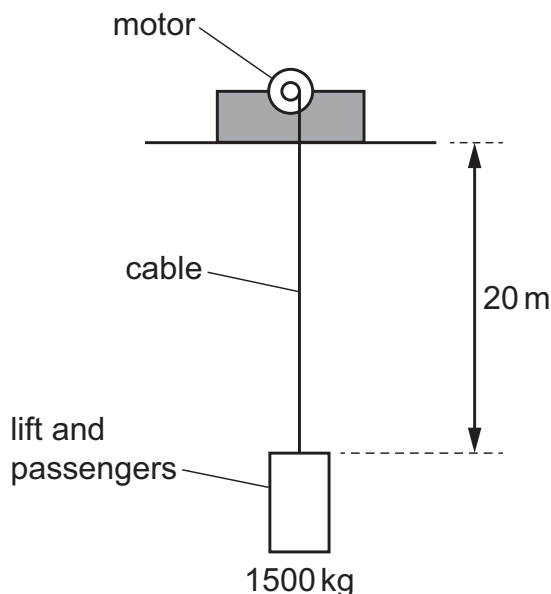
- A** 100 J **B** 250 J **C** 350 J **D** 600 J

12 Which expression gives the efficiency of a system?



- A** $\frac{\text{total energy input}}{\text{useful energy output}}$
- B** $\frac{\text{useful energy output} + \text{wasted energy output}}{\text{total energy input}}$
- C** $\frac{\text{useful energy output}}{\text{total energy input}}$
- D** $\frac{\text{wasted energy output}}{\text{total energy input}}$

13 An electric motor operating a lift has an output power of 20 kW.

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The lift and passengers have a combined mass of 1500 kg. The motor raises the lift at constant speed through a distance of 20 m.

How long does it take?

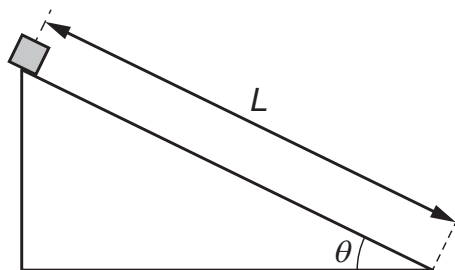
A 6 s

B 15 s

C 30 s

D 60 s

14 A block is released from rest at the top of a slope inclined at an angle to the horizontal. The slope has length L as shown in the diagram.

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There are no resistive forces acting on the block.

What is the speed of the block at the bottom of the slope?

A $4.43\sqrt{L\cos\theta}$

B $4.43\sqrt{L\sin\theta}$

C $19.6L\cos\theta$

D $19.6L\sin\theta$

15 What is the definition of power?

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A work done in one second

B work done in unit time

C work done per second

D work done per unit time

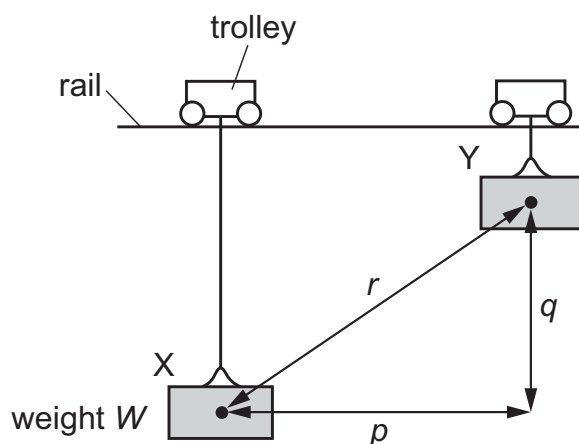
16 A student can run or walk up the stairs to her classroom.

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Which statement describes the power required and the gravitational potential energy gained while running up the stairs compared to walking up them?

- A** Running provides more gravitational potential energy and uses more power.
- B** Running provides more gravitational potential energy and uses the same power.
- C** Running provides the same gravitational potential energy and uses more power.
- D** Running provides the same gravitational potential energy and uses the same power.

17 A weight W hangs from a trolley that runs along a rail. The trolley moves horizontally through a distance p and simultaneously raises the weight through a height q .

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As a result, the weight moves through a distance r from X to Y . It starts and finishes at rest.

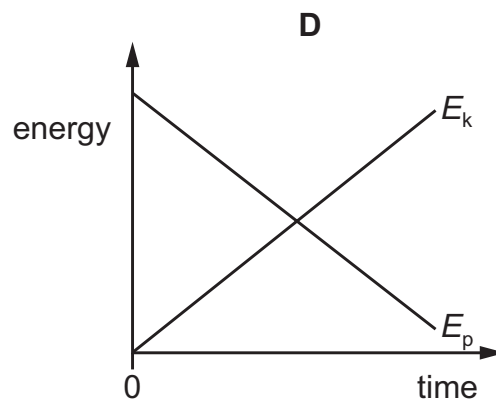
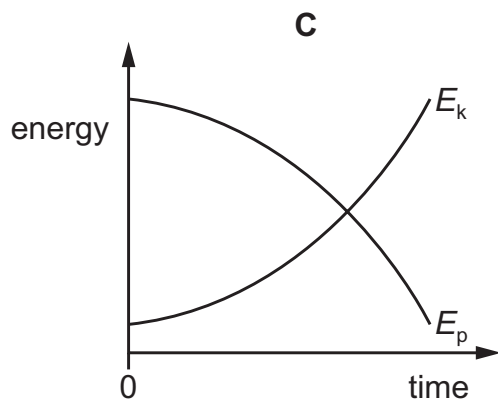
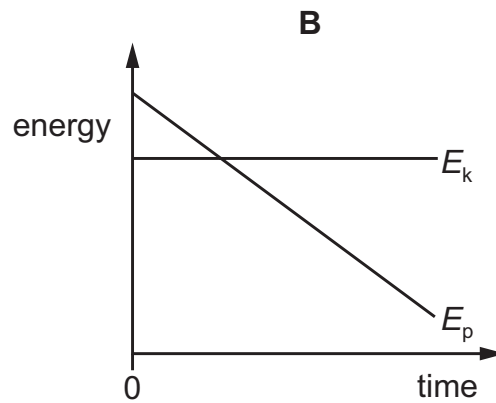
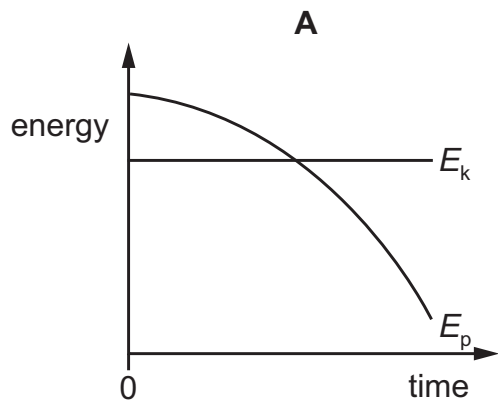
How much work is done on the weight during this process?

- A** Wp
- B** $W(p + q)$
- C** Wq
- D** Wr

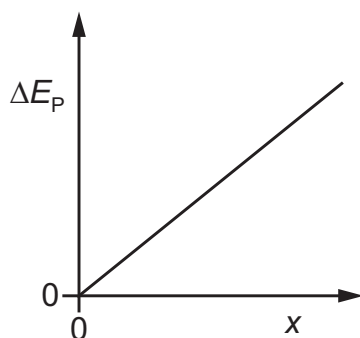
18 A steel ball is falling at constant speed in oil.



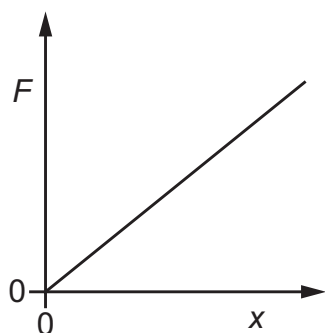
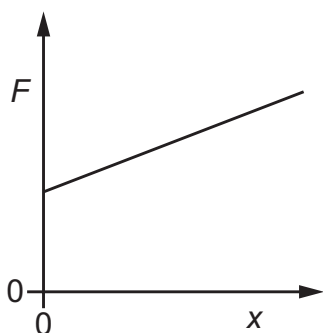
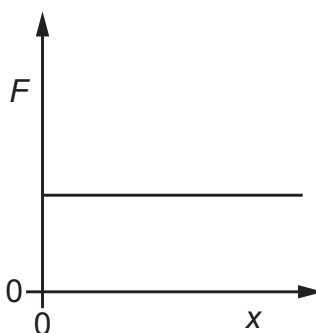
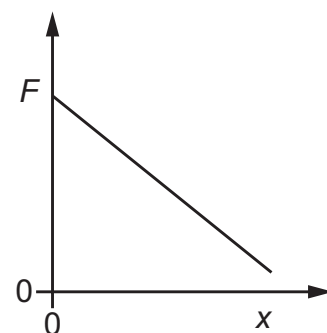
Which graph shows the variation with time of the gravitational potential energy E_p and the kinetic energy E_k of the ball?



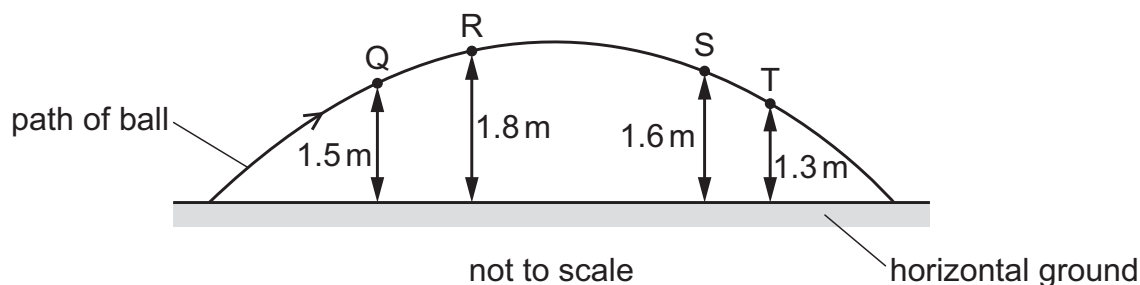
- 19** An object is in a uniform gravitational field. The graph shows how the change in gravitational potential energy ΔE_P of the object varies with the vertical distance x moved by the object from a fixed point.



Which graph shows how the gravitational force F acting on the object varies with distance x ?

A**B****C****D**

- 20** A ball is projected into the air from horizontal ground and follows the path shown in the diagram.



At points Q, R, S and T, the ball has kinetic energies E_Q , E_R , E_S and E_T respectively. The heights above the ground of these four points are shown.

Air resistance is negligible.

Which difference in kinetic energies is the smallest?

A $E_Q - E_S$

B $E_S - E_R$

C $E_T - E_Q$

D $E_T - E_R$