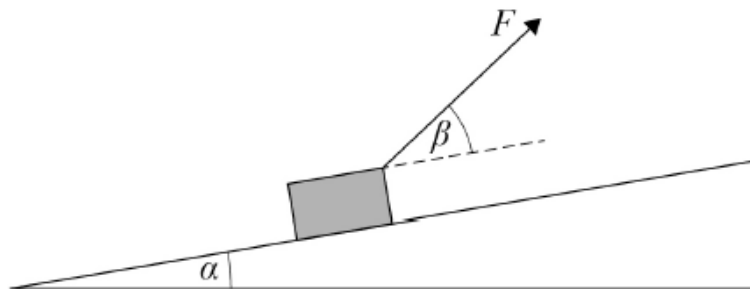


Force, energy and momentum – A2 Physics P11. **No.18**

A force of magnitude F acts on a box of mass m that moves along a frictionless slope. The slope is at an angle α to the horizontal and the force acts at an angle β to the slope.



What is the magnitude of the acceleration of the block along the slope?

[1 mark]

A $\frac{F}{m} \sin \alpha - g \sin \beta$

☐

B $\frac{F}{m} \cos \beta - g \sin \alpha$

☐

C $\frac{F}{m} \cos (\alpha + \beta) - g \cos \beta$

☐

D $\frac{F}{m} \cos (\alpha + \beta) - g \sin \beta$

☐

2. No.19

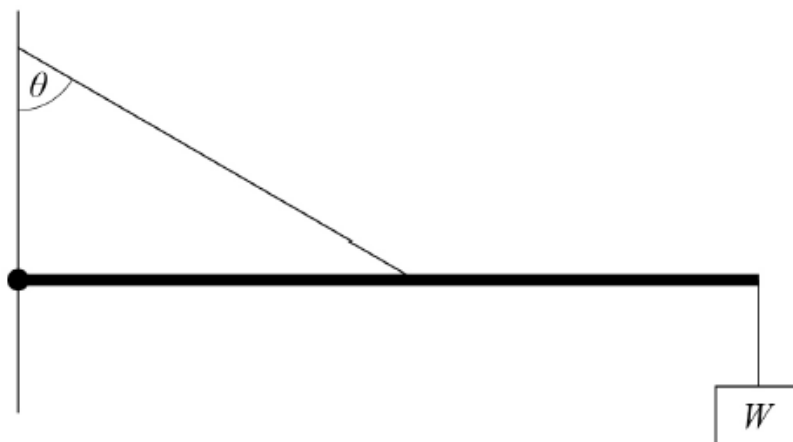
The weight of a uniform bar is W .

An object also of weight W is attached to one end.

The bar is pivoted at the other end and held horizontal by a rope attached to its centre.

The tension in the rope is $4W$.

not to scale



What is angle θ ?

[1 mark]

A 41°

☐

B 45°

☐

C 60°

☐

D 71°

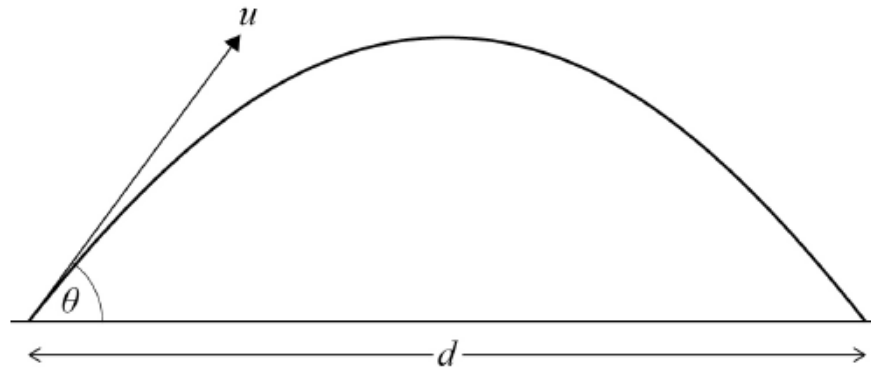
☐

3. No.20

A projectile is fired from ground level over horizontal ground.

Its initial velocity is u at an angle θ to the horizontal.

The range of the projectile is d .



A second projectile is fired with a velocity $2u$ at the same angle.

What is the range of this projectile?

Assume that air resistance is negligible.

[1 mark]

A $\sqrt{2}d$ ☐

B $2d$ ☐

C $2\sqrt{2}d$ ☐

D $4d$ ☐

4. No.21

A particle travelling horizontally at $1.0 \times 10^7 \text{ m s}^{-1}$ enters a region where it has a constant vertical acceleration of $4 \times 10^{14} \text{ m s}^{-2}$.

What is the horizontal distance the particle has travelled in the region when its vertical displacement is $8 \times 10^{-2} \text{ m}$?

[1 mark]

A 0.2 m

☐

B 0.1 m

☐C $2 \times 10^{-8} \text{ m}$ ☐D $0.4 \times 10^{-9} \text{ m}$ ☐

5. No.22

An object is thrown vertically upwards at time $t = 0$

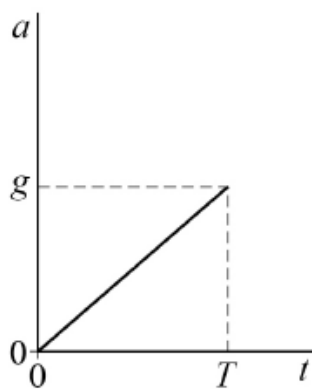
The object reaches its maximum height when $t = T$ and reaches its terminal speed on the way down.

The magnitude of the object's acceleration is a .

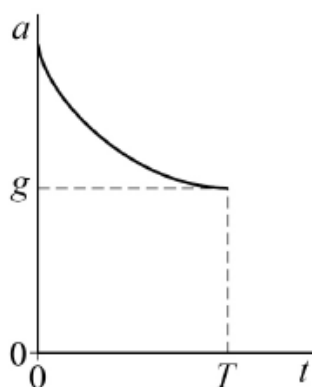
Which graph shows the variation of a with t ?

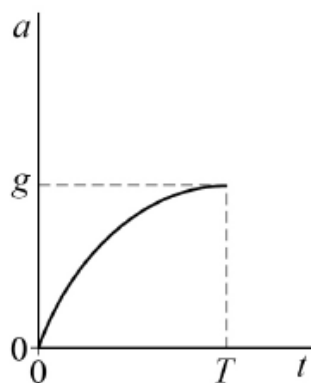
[1 mark]

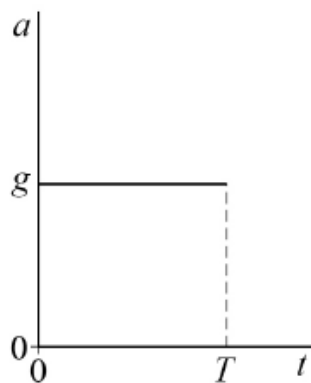
A



B



C

D

6. No.23

A man has a mass of 75.0 kg.

He stands on weighing scales in a lift that accelerates upwards at 2.60 m s^{-2} .

What is the reading on the scales during the acceleration?

[1 mark]**A** 195 N
B 541 N
C 736 N
D 931 N

7. No.24

An average force of 42 kN acts on the air passing through a jet engine. This force causes the speed of the air to increase by 540 m s^{-1} .

What mass of air passes through the engine in one minute?

[1 mark]

A $7.7 \times 10^{-2} \text{ kg}$ ☐

B 4.7 kg ☐

C 78 kg ☐

D 4700 kg ☐