AQA – Forces and Newton's laws – AS Mathematics P1

1. June/2021/Paper_7356/1/No.10

Two forces $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$ N and $\begin{bmatrix} -7 \\ -5 \end{bmatrix}$ N act on a particle.

Find the resultant force.

Circle your answer.

[1 mark]

$\begin{bmatrix} -21 \\ 10 \end{bmatrix}$ N $\begin{bmatrix} -4 \\ -7 \end{bmatrix}$ N $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$ N $\begin{bmatrix} 10 \\ 7 \end{bmatrix}$ N

2. June/2021/Paper_7356/1/No.11

Jackie says:

"A person's weight on Earth is directly proportional to their mass."

Tom says:

"A person's weight on Earth is different to their weight on the moon."

Only one of the statements below is correct.

Identify the correct statement.

Tick (✓) **one** box.

[1 mark]

Jackie and Tom are both wrong. ☐

Jackie is right but Tom is wrong. ☐

Jackie is wrong but Tom is right. ☐

Jackie and Tom are both right. ☐

3. June/2021/Paper_7356/1/No.12

A particle P lies at rest on a smooth horizontal table.

A constant resultant force, **F** newtons, is then applied to P.

As a result P moves in a straight line with constant acceleration $\begin{bmatrix} 8 \\ 6 \end{bmatrix}$ m s^{-2}

(a) Show that the magnitude of the acceleration of P is $10\,\text{m s}^{-2}$

[1 mark]

(b) Find the speed of P after 3 seconds.

[1 mark]

(c) Given that $\mathbf{F} = \begin{bmatrix} 2 \\ 1.5 \end{bmatrix}$ N, find the mass of P.

[2 marks]

4. June/2021/Paper_7356/1/No.15

In this question, use $g = 10\,\mathrm{m\,s}^{-2}$

A box, B, of mass 4 kg lies at rest on a fixed rough horizontal shelf.

One end of a light string is connected to B.

The string passes over a smooth peg, attached to the end of the shelf.

The other end of the string is connected to particle, P, of mass 1 kg, which hangs freely below the shelf as shown in the diagram below.

Wall

B
4 kg
Peg
Shelf
P (1 kg)
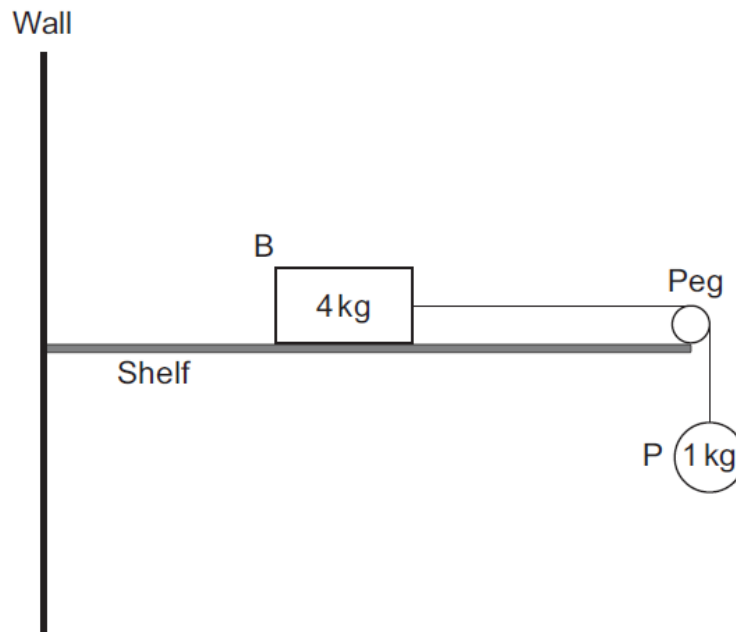
B is initially held at rest with the string taut.

B is then released.

B and P both move with constant acceleration $a\,\mathrm{m\,s}^{-2}$

As B moves across the shelf it experiences a **total** resistance force of 5 N

(a) State one type of force that would be included in the total resistance force.

[1 mark]

(b) Show that $a = 1$

[4 marks]

(c) When B has moved forward exactly 20 cm the string breaks.

Find how much further B travels before coming to rest.

[4 marks]

(d) State one assumption **you** have made when finding your solutions in parts **(b)** or **(c)**.

[1 mark]