

 SCAN ME

CHECK YOUR ANSWERS

- The engine of the car produces a constant horizontal driving force of magnitude 1200 N.

- (b) Find the magnitude of the tension in the tow-rope. (3)

(c) find the magnitude of the new driving force. (2)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. In the bottom-left corner, there is a small, stylized blue circular logo or seal. The rest of the page is empty.

(Total for Question 1 is 8 marks)



- (d) Find the time taken for the car and trailer to reach a speed of 15 ms^{-1} (2)

This image shows a full page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. In the bottom-left corner, there is a small, stylized blue logo that resembles a gear or a flower. The rest of the page is empty, providing space for writing.

2

3

The mass of the trailer is $\frac{1}{5}$

The car and the trailer are modelled as particles and the towbar as a light inextensible rod.

The engine of the car produces a constant horizontal driving force of magnitude 1400 N.

The car and trailer accelerate at 0.8 ms^{-2}

- (a) Find the mass of the trailer. (3)

- (b) Find the magnitude of the tension in the towbar. (3)

- (c) State how you have used the modelling assumption that the towbar is light. (1)

The driver of the car sees a hazard and reduces the driving force produced by the engine to zero and applies the brakes. The brakes produce a horizontal force on the car of magnitude F N and the car and the trailer decelerate. Given that the resistances to motion are unchanged and the magnitude of the thrust in the towbar is 400 N,

- (d) find the value of F . (6)

This image shows a full page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. In the bottom-left corner, there is a small, stylized graphic of a blue gear or cogwheel.

(Total for Question 3 is 13 marks)



- (Total for Question 4 is 13 marks)**

- (d) Find the magnitude of the thrust in the rod after the vertical force has been reduced. (3)

(Total for Question 6 is 11 marks)

A diagram showing a person standing inside a square room. A vertical line extends from the top center of the room, passing through the ceiling and continuing upwards.

A person of mass 67 kg is standing on the floor of a lift of mass 850 kg.
The lift is supported by a vertical cable which is modelled as light and inextensible.
The lift is accelerating upwards at 1.2 ms^{-2}

- (a) Find the tension in the cable. **(3)**
- (b) Find the magnitude of the force exerted on the person by the floor of the lift. **(3)**

Shortly after the lift continues to move upwards but **decelerates** at 0.8 ms^{-2}

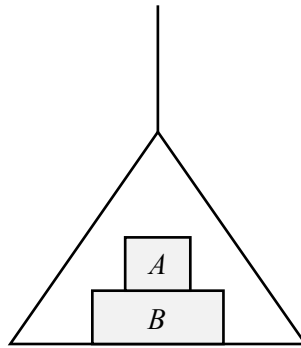
- (c) Find the tension in the cable whilst the lift decelerates. (3)
- (d) Find the magnitude of the force exerted on the person by the floor of the lift whilst it decelerates. (3)

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(Total for Question 8 is 12 marks)



10



A scale pan of mass 0.5 kg is attached to the lower end of a vertical light inextensible string. The scale pan carries two boxes, A and B , with box A resting on top of box B . The mass of box B is twice the mass of box A .

The scale pan is raised vertically with constant acceleration 2.2 ms^{-2} and the tension in the string is 51 N.

- Find the mass of box A . **(4)**
- Find the magnitude of the force exerted on box A by box B . **(3)**
- Find the magnitude of the force exerted on box B by the scale pan. **(3)**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. In the bottom-left corner, there is a small, stylized blue gear or cogwheel icon. The rest of the page is empty.

(Total for Question 10 is 10 marks)

