Physics

Question	Maximum Mark	Mark Awarded
#1	8	
#2	8	
#3	9	
#4	10	
#5	11	
Total	46	

#1

6. *(a)* State what is meant by the centre of gravity of an object. [1]

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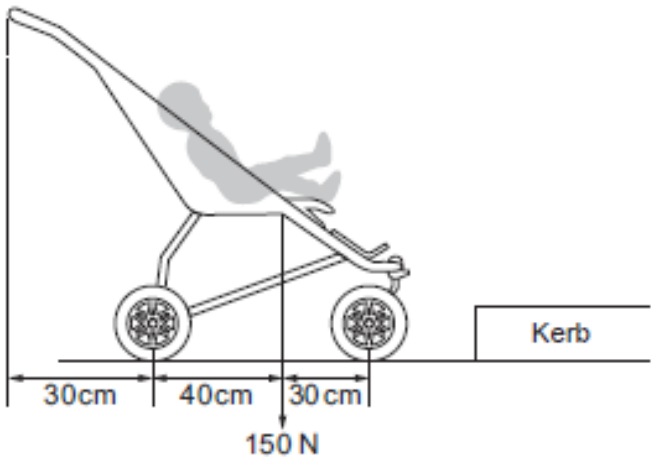
(b) A baby is being pushed in a buggy as shown below. The baby and buggy have a combined weight of 150 N.



(i) The father moves the buggy from the road over the kerb. By taking moments about the rear wheel of the buggy calculate the vertical downward force on the handle that would be needed to just lift the front wheel. [2]

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(ii) The father finds it a lot easier to turn the buggy around and, using the handle, lift the back wheel onto the kerb while keeping the front wheel on the ground. Explain why the father finds this new approach easier and justify your answer with a calculation. [3]

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(iii) Describe two ways in which you could alter the design of the buggy in order to make it more stable. [2]

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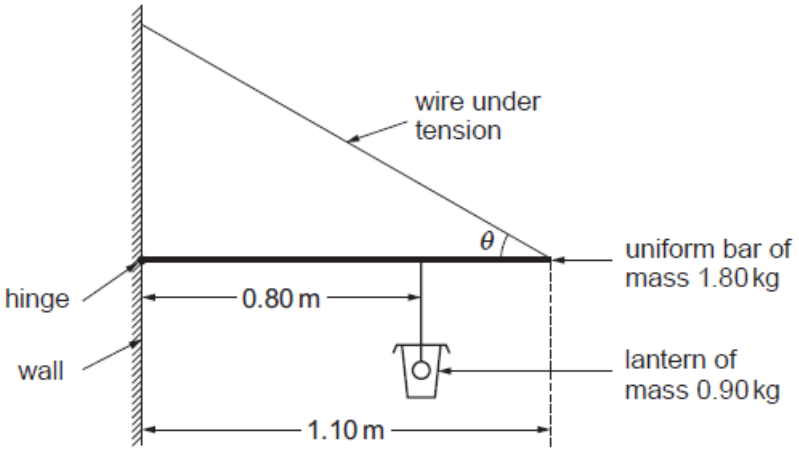
Question taken from Eduqas examination paper 842001, June 2018

#2

A lantern is suspended from a hinged horizontal metal bar, as shown in the diagram.



(a) (i) Calculate the sum of the clockwise moments about the hinge of the forces acting on the bar. [3]

(ii) For an angle, θ, of 35°, calculate the tension in the wire. [2]

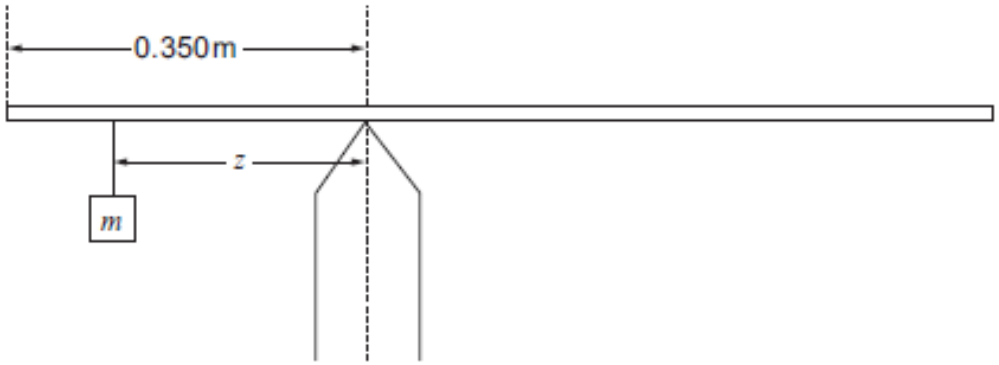
(iii) Discuss the effect, if any, on the tension of making the angle θ smaller (by using a shorter wire and attaching it to a lower point on the wall). [2]

(b) A physics student, Sundeep, calculates that if the wire breaks, then, 0.10 s after it breaks, the angular velocity of the bar about the hinge would be 1.3 rad s^{-1}. Calculate the speed of the tip of the bar (right hand end) when it has this angular velocity. [1]

Question taken from Eduqas examination paper 842101, June 2017

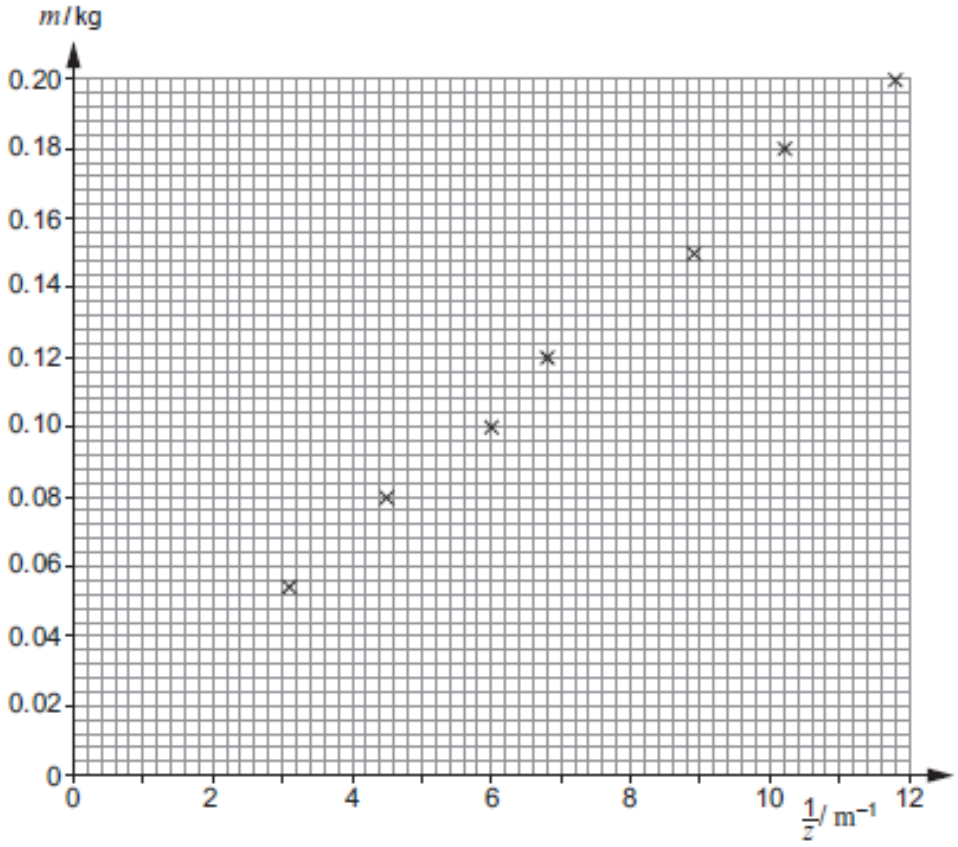
#3

6. Nathan pivots a uniform metre ruler at 0.350 m from one end. He hangs a mass, m, from the ruler and moves the mass along until the ruler balances.



He records the distance, z (see diagram) and repeats the experiment with different masses, keeping the pivot in the same position on the ruler.

He plots m against $\frac{1}{z}$ on the grid below.



(a) Nathan correctly believes that m and z are related by the equation:

$$mz = M \times 0.150$$

in which M is the mass of the ruler and z is in metres.

Explain, in terms of moments, why this equation is correct. [3]

(b) Determine from the graph the best value for M, showing your working. The uncertainty is not required. [4]

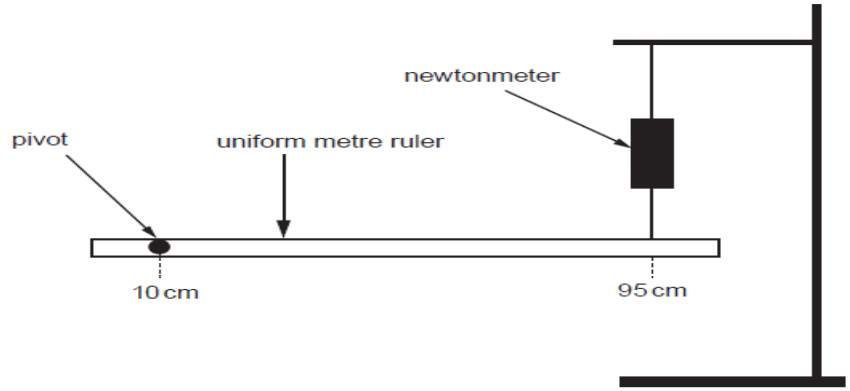
(c) Discuss whether or not Nathan could have obtained readings for lower values of m than 0.050 kg, for the pivot in the same position on the ruler. [2]

Question taken from Eduqas examination paper 842101, June 2018

#4

(a) Explain, with the aid of a diagram, what is meant by the *moment* of a force about a point. [2]

(b)



(i) A uniform metre ruler is pivoted at the 10 cm mark and the other end is supported by a newtonmeter attached to the 95 cm mark. The ruler balances horizontally when the newtonmeter reads 0.8 N. Determine the **mass** of the ruler to an appropriate number of significant figures. [3]

(ii) A mass of 0.5 kg is now added at the 70 cm mark on the ruler and the ruler is adjusted to be horizontal once more.

I. How could you check the ruler is horizontal? [1]

II. What is the new reading on the newtonmeter when the ruler is horizontal? [2]

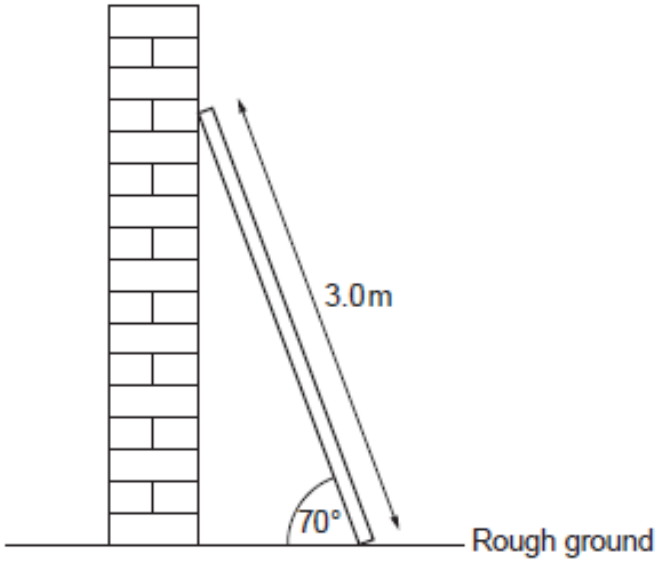
(c) If a uniform metre ruler of greater mass than the one in part *(b)* were used, describe how you could alter the apparatus so the ruler is horizontal once more. Explain your reasoning. [2]

Question taken from Eduqas examination paper 842001, June 2017

#5

5. *(a)* Describe how you could determine the mass of an unknown object using only a metre ruler, pivoted at the 30 cm point, and a known mass. Assume both the known and unknown masses are similar to the mass of the metre ruler. **You cannot change the position of the pivot.** [6 QER]

(b) A uniform ladder of length 3.0 m and mass 30 kg rests against a frictionless wall at an angle of 70° to the ground as shown below.



By taking moments about a suitable point calculate the size of the force that the ladder exerts on the wall and explain in which direction it acts. [5]

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Question taken from Eduqas examination paper 842001, June 2019