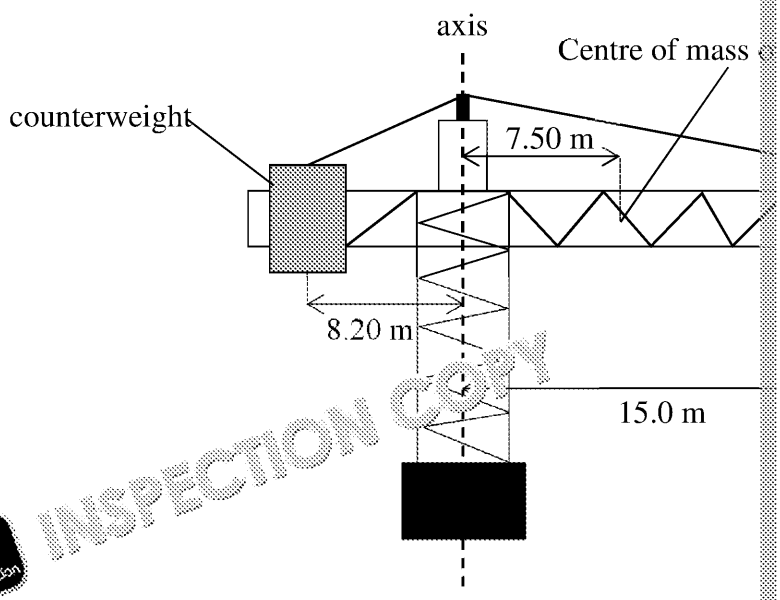
1. The equation for acceleration is $a = \frac{\Delta v}{\Delta t}$

   (a) State the quantity represented by $\triangle v$.

   (b) Taking the upward direction as positive, sketch an acceleratio
   is dropped from rest
   (i) in the absence of air resistance
   (ii) in the presence of air resistance

2. (a) When calculating a moment, a student uses a force in kilonew
   state the unit for the moment in the student's answer.

   (b) The diagram shows a crane supporting a 12 000 N load. The
   is 4500 N. The axis of the crane acts as a pivot.



   The load causes a clockwise moment on the arm of the crane
   (i) Calculate the total clockwise moment on the arm of the c
   (ii) Hence calculate the weight of the counterweight required

   (c) The weight of the crane with no load and with no counterwei
   base of the crane is 3.0 m^2. Calculate the pressure that the cr
   exerts on the ground.

3. A stone is thrown vertically upwards in the absence of air resistan
   (a) Calculate the maximum height reached by the stone.
   (b) The stone falls back to its original position. Calculate the tot
   (c) Use your answer to (a) to estimate the maximum height reacl
   air resistance.

4. The diagram shows apparatus that can be used to determine the value of g by free fall.
When the electromagnet is switched off, the ball bearing falls to the base plate. The digital timer records the time taken for the ball to fall.
The card is dropped and the time taken for the card to pass through the light gate is used to work out the speed of the card.

(a) Explain how the time from the light gate is used to work out the speed of the card. **[3]**

(b) Explain which could be plotted to give a straight line graph of the results where g can be determined from the gradient. **[3]**

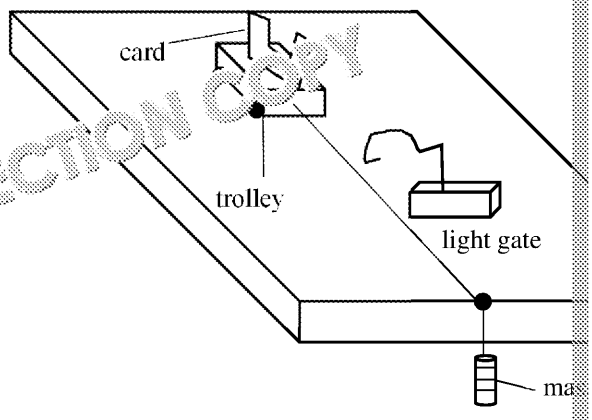
metre r

card

light

to timer or data logger

5. The diagram shows apparatus that can be used to verify Newton's s



When the trolley is released, the masses fall, causing the trolley to a
The force exerted by the falling masses is the variable that is change

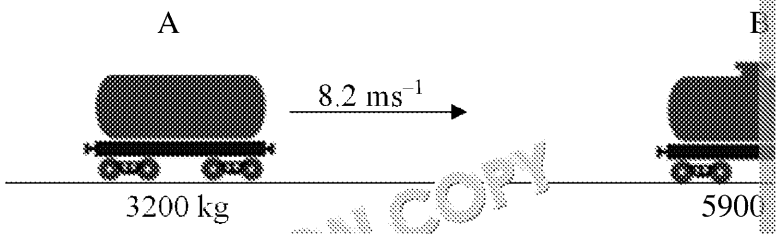
(a) List the variables that are measured and the variables that are c
The light gate records the time taken for the card to pass throug

(b) Explain how the results of this investigation can be used to con

(c) State one source of random error in this investigation.

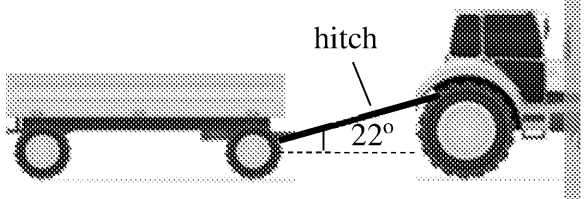
6. The density of a certain type of is $2.71\ \text{gcm}^{-3}$. Calculate the m
rock that has a volume

7. The diagram shows two railway wagons, A and B, moving on the s



Wagon A collides with wagon B and the two wagons continue to m
(a) Calculate the speed of both wagons immediately after the collis
(b) Show by calculation whether or not the collision is elastic.

8. A tractor pulls a trailer in a straight line and at a constant speed. Th trailer is inclined at 22° to horizontal.

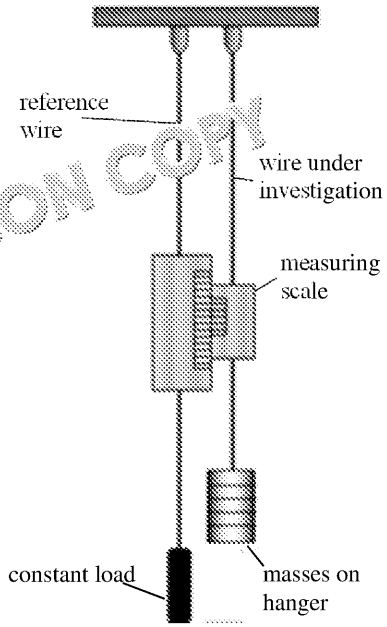


(a) The tractor pulls the trailer for a distance of 0.96 km. The tens remains constant. Calculate the work done pulling the trailer.
(b) Explain how Newton's third law appli the tension in the hi

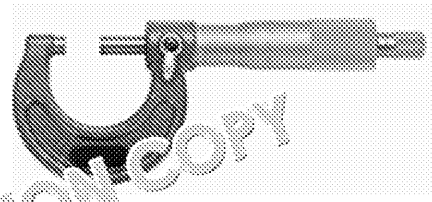
9. A carriage on a roll ast rolls freely down an inclined track. De how the spe the carriage depends on the vertical height of the t

10. A spring obeys Hooke's law. The spring is stretched within its elast needed to extend the spring by 3.3×10^{-2} m.
(a) Calculate the spring constant of this spring. Give the unit.
(b) Calculate the energy stored when this spring was stretched by t
(c) This stretched spring is used to propel a nail of mass 3.5 g in a released, the nail is propelled forward. Calculate the maximum

11. The diagram shows apparatus that can be used to find the Young's
Masses can be added to or removed from the hanger to stretch the w

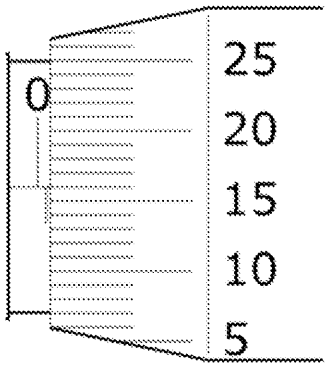


(a) The diagram shows a piece of eq



(i) Name this piece of equipment.

(ii) The diagram shows a reading made on this equipment



State the reading shown.

(b) In order to calculate Young's modulus in Pa, each quantity calc
must be in the correct unit. State the units, if any, required for
(i) the cross-sectional area of the wire
(ii) the tensile stress in the wire
(iii) the tensile strain in the wire

(c) One safety precaution when using the Young's modulus appara
State **one other** safety precaution.

Preview of Questions Ends Here