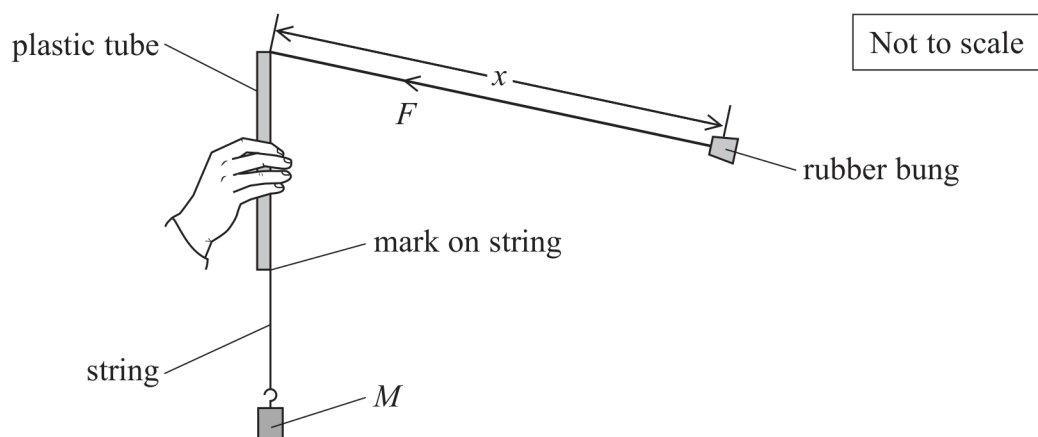


- 2 A student used the apparatus shown to investigate circular motion.



The rubber bung with mass m was rotated around the plastic tube at a constant angular velocity ω . The part of the string between the rubber bung and the plastic tube was almost horizontal.

The mark on the string was kept level with the bottom of the plastic tube so that the length x stayed constant.

The mass M provided the tension F in the string.

- (a) The variables in this experiment are related by the formula $Mg = mx\omega^2$.

- (i) Show that the relationship between the period of rotation T and mass M can be written as

$$T^2 = 4\pi^2 \frac{mx}{Mg} \quad (2)$$

- (ii) The student used a stopwatch to determine T for different values of M .
Devise a plan to test the validity of the relationship between T^2 and M .
The method should use a suitable graph.

(6)

- (b) The student suggested that using a video recording of the motion would improve the determination of T .
Comment on this suggestion.

(2)