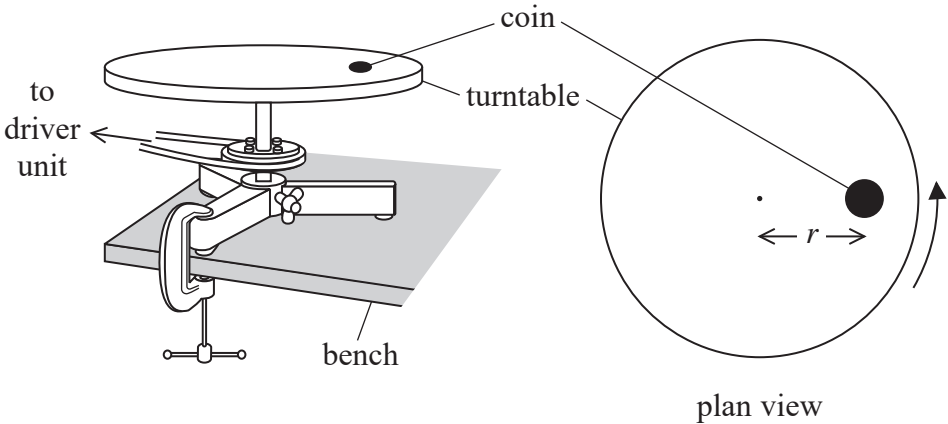
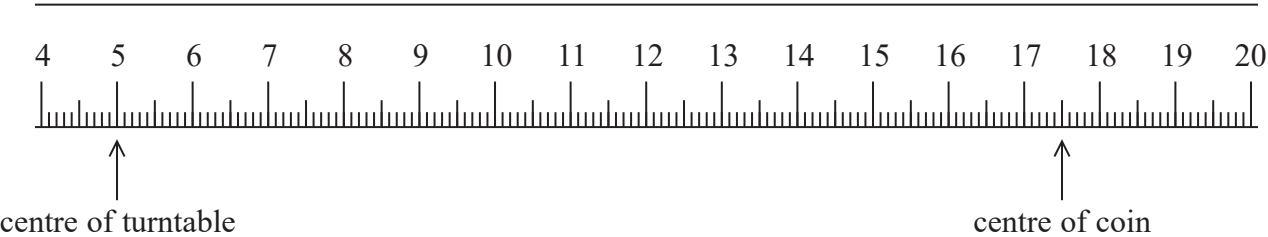


A student was investigating the forces involved in circular motion.

He placed a small coin on a horizontal turntable as shown. The turntable was connected to a driver unit so that it could be rotated at a constant rate.



- (a) The student measured the distance r between the centre of the turntable and the centre of the coin, with a metre rule as shown.



Explain why the percentage uncertainty in the value of r is about 1%.
Your answer should include a calculation.

(3)

- (b) The student switched on the driver unit and increased the rate of rotation until the coin slid off the turntable. He read the angular velocity ω of the turntable from a digital display on the driver unit. He then replaced the coin in the original position on the turntable and repeated the procedure.

His results are shown.

$\omega / \text{rad s}^{-1}$				
0.125	0.112	0.118	0.123	0.116

- (i) The student used the results to calculate a mean value of ω .

State the purpose of calculating a mean.

(1)

- (ii) Calculate the percentage uncertainty in the mean value of ω .

(3)

Percentage uncertainty =

- (iii) The student used ω and r to calculate the centripetal acceleration of the coin at the instant it started to slide.

Calculate the percentage uncertainty in this centripetal acceleration.

(3)

Percentage uncertainty =

- (c) The student repeated the procedure with different values of r .

Explain how the value of ω at which the coin started to slide varied as r increased.

(3)