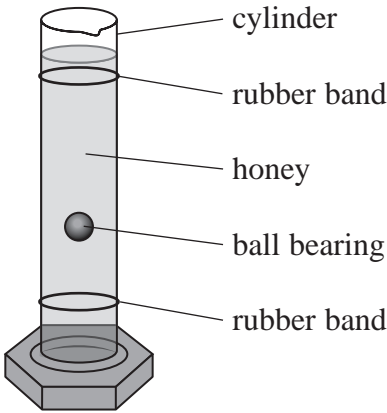


10 A student carried out an experiment to determine the viscosity of some honey. He filled a tall glass cylinder with honey as shown, and timed a ball bearing as it fell through the honey.



- (a) The student placed rubber bands near the top and bottom of the cylinder. He started a stopwatch when the ball bearing passed the first band and stopped the stopwatch when the ball bearing passed the second band. He repeated this several times to determine a mean time.

Criticise the student’s method.

(2)

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- (b) The time t for the sphere to fall through a distance of 25.0cm is shown in the table.

t/s			
6.40	6.35	6.36	6.38

- (i) Show that the mean velocity v of the ball bearing is about 0.04 m s^{-1} .

(3)

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- (ii) The student had three different types of honey available.

Viscosity η is given by the following expression

$$\eta = \frac{2r^2g\left(\rho_{\text{B}} - \rho_{\text{H}}\right)}{9v}$$

radius r of ball bearing = $5.50 \times 10^{-3}\text{ m}$

density of ball bearing $\rho_{\text{B}} = 7750\text{ kg m}^{-3}$

density of honey $\rho_{\text{H}} = 1360\text{ kg m}^{-3}$

Viscosity (at 20 °C)/Pa s		
Honey A	Honey B	Honey C
10.6	12.5	13.6

Deduce which honey the student used.

(2)

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