2007 **4.** **(a)** A particle slides down a rough plane inclined at $45°$ to the horizontal. The coefficient of friction between the particle and the plane is $\frac{3}{4}$.
Find the time of descending a distance 4 metres from rest.

$$R = mg\cos 45$$
$$mg\sin 45 - \mu R = mf$$

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$$mg\sin 45 - \frac{3}{4}(mg\cos 45) = mf$$

5

$$f = \frac{g}{4\sqrt{2}} \text{ m/s}^2$$

5

$$s = ut + \tfrac{1}{2}ft^2$$
$$4 = 0 + \frac{1}{2}\left(\frac{g}{4\sqrt{2}}\right)t^2$$
$$t = \sqrt{\frac{32\sqrt{2}}{g}}$$
$$= 2.15 \text{ s.}$$

5

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