Section 1: Friction

Solutions to Exercise level 1

1. (a) (i) Resolving vertically: $R - 10g = 0$

$R = 10 \times 9.8 = 98$ N

(ii) Resolving horizontally: $14 - F = 0$

$F = 14$

$F = \mu R$

$14 = 98\mu$

$\mu = \frac{1}{7}$

(b) (i) Resolving vertically: $R + 21\sin 30° - 10g = 0$

$R = 10 \times 9.8 - 21 \times \frac{1}{2} = 87.5$ N

(ii) Resolving horizontally: $21\cos 30° - F = 0$

$F = 21 \times \frac{1}{2}\sqrt{3}$

$F = \mu R$

$\frac{21}{2}\sqrt{3} = 87.5\mu$

$\mu = 0.208$ (3 s.f)

(c) (i) Resolving vertically: $R - 10\sin 20° - 10g = 0$

$R = 98 + 10\sin 20° = 101$ N (3 s.f.)

(ii) Resolving horizontally: $10\cos 20° - F = 0$

$F = 10\cos 20°$

$F = \mu R$

$10\cos 20° = (98 + 10\sin 20°)\mu$

$\mu = 0.0927$ (3 s.f)

(d) (i) Resolving vertically: $R + 15\sin 60° - 10g = 0$

$R = 98 - 15 \times \frac{1}{2}\sqrt{3} = 85.0$ N (3 s.f.)

(ii) Resolving horizontally: $15\cos 60° - F = 0$

$F = \frac{15}{2}$

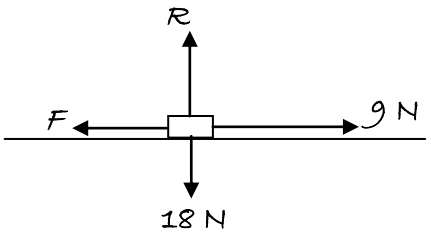
$F = \mu R$

$\frac{15}{2} = (98 - \frac{15}{2}\sqrt{3})\mu$

$\mu = 0.0882$ (3 s.f)

AQA A level Maths Friction 1 Exercise solutions

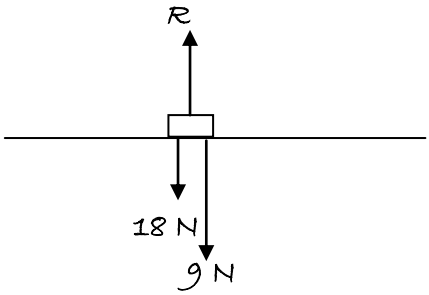
2. (i)



Resolving horizontally: $F = 9$

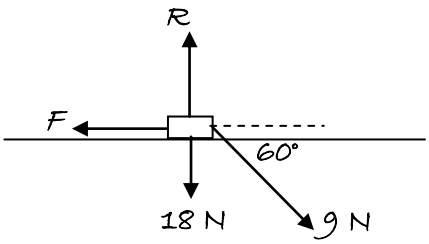
The frictional force is 9N.

(ii)



There are no horizontal forces, so there is no frictional force.

(iii)



Resolving horizontally: $F = 9\cos 60° = 4.5$

The frictional force is 4.5 N.