

Exercise A

- 1 (a) 115° ;
(b) triangular shape per cycle;
(c) square wave equally above and below zero axis per cycle;
(d) graph (c) is the gradient of graph (b).
- 2 (a) 60° , $\pi/3$; 180° , π ; 270° , $3\pi/2$; 360° , 2π ;
(b) 3 s; (c) 80° , 0.44π or 1.4 rad.
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Exercise B

- 1 (a) 30° s^{-1} or $\pi/6 \text{ rad s}^{-1}$; (b) 2.1 m s^{-1} ;
(c) 1.1 m s^{-2} towards centre.
- 2 (a) 1.0 km s^{-1} ; (b) $2.7 \times 10^{-3} \text{ m s}^{-2}$
- 3 (a) 28 m s^{-1} ; (b) 89 m s^{-2} ; 9.1 g.
- 4 $2.1 \times 10^{13} \text{ m s}^{-2}$
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Exercise C

- 1 (a) 70 N;
(b) frictional force between roundabout surface and child
- 2 (a) 2.4 N;
(b) reduction in measured weight as some of the gravitational force is pulling you to the surface, i.e. the reaction force is less than your weight as you are accelerating downwards.
- 3 (a) 190 N;
(b) Taking moments about the contact point of the tyre, there must be a turning moment towards the centre of the arc as a centripetal force must be created through the centre of mass of cyclist plus bicycle. This is provided by leaning inwards.
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Exercise D

- 1 (a) 0.99 m s^{-1} ; (b) 0.99 ms^{-2} upwards;
(c) 2.2 N.
- 2 2300 N
- 3 (c) 33° ; (d) 940 N
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