# **11 Physics Revision**

## Motion

#### Vector Manipulation

1. A cyclist enters a roundabout at 32 km/h 070° and exits the roundabout at 27 km/h 160°. Find the cyclist’s change in velocity.
2. A pool ball travelling at 3.92 m s-1 strikes the edge of the table and bounces straight up in the air at 3.46 m s-1. Determine the ball’s change in velocity.
3. A bullet travelling at 472 m s-1 ricochets off tank armour at 341 m s-1. Determine the bullet’s change in velocity if the angle of incidence and angle of reflection were both 45°.
4. A boat needs to directly cross to the East side of a river, perpendicular to the current. If the current flows at 2.8 m s-1 S, and the barge’s engines can push it at 6.4 m s-1, what direction must it steer in?

#### Complex Problems

1. A cyclist enters a roundabout at 27 km/h 250° and exits the roundabout at 19 km/h 160°. Find the force exerted on the cyclist if the cornering took 12 s and combined mass of the cyclist and bicycle is 107 kg.
2. A 166 g pool ball travelling at 3.84 m s-1 strikes the edge of the table and bounces straight up in the air at 3.12 m s-1. Find the force exerted on the ball if it was contacting the table edge for 0.14 s.
3. A 26 g bullet travelling at 390 m s-1 ricochets off tank armour at 270 m s-1. Determine the force the bullet exerted on the tank if the angle of incidence and angle of reflection were both 45° and the collision took 0.07 s.
4. A boat needs to directly cross to the East side of a 120 m river, perpendicular to the current. If the current flows at 3.1 m s-1 S, and the barge’s engines can push it at 7.9 m s-1, how long will it take to cross?

# 11 Physics Revision Solutions

## Motion Solutions

#### Vector Manipulation Solutions



v=27 km/h

-u=32 km/h

Δv

θ

v=27 km/h

u=32 km/h



v=3.46 m s-1

-u=3.92 m s-1

Δv

θ

v=3.46 m s-1

u=3.92 m s-1



v=341 m s-1

-u=472 m s-1

Δv

θ

v=341 m s-1

u=472 m s-1

R

v2=2.8 m s-1

v1=6.4 m s-1

θ

#### Complex Problem Solutions



v=19 km/h

u=27 km/h

v=19 km/h

-u=27 km/h

Δv

θ



v=3.12 m s-1

-u=3.84 m s-1

Δv

θ

v=3.12 m s-1

u=3.84 m s-1



v=270 m s-1

u=390 m s-1

v=270 m s-1

-u=390 m s-1

Δv

θ

R

v2=3.1 m s-1

v1=7.9 m s-1

θ