

# Conservation of Momentum Problems

Level 3 Physics

January 2013

1. A bicycle has a momentum of  $24 \text{ kg}\cdot\text{m/s}$ . What momentum would the bicycle have if it had
  - (a) twice the mass and was moving at the same speed?
  - (b) one-half the mass and was moving with twice the speed?
  - (c) three times the mass and was moving with one-half the speed?
2. An  $82 \text{ kg}$  male and a  $48 \text{ kg}$  female pair figure skating team are traveling at  $7.4 \text{ m/s}$ , preparing for a throw-jump maneuver. The male skater tosses the female skater forward with a speed of  $8.6 \text{ m/s}$ . Determine the speed of the male skater immediately after the throw.
3. A tennis player sees a  $57.5 \text{ gram}$  ball approaching her racket with a northward velocity of  $26.7 \text{ m/s}$ . After it hits her  $331 \text{ gram}$  racket, the ball rebounds in the exact opposite direction with a speed of  $29.5 \text{ m/s}$ . Assume a coordinate system where the northward direction is positive.
  - (a) What is the pre-collision momentum of the ball?
  - (b) What is the post-collision momentum of the ball?
  - (c) What is the change in momentum of the ball?