5.3 A cricket ball of mass 150 g has an initial velocity $\mathbf{u} = (3\hat{\mathbf{i}} + 4\hat{\mathbf{j}})\,\mathrm{m\,s^{-1}}$ and a final velocity $\mathbf{v} = -(3\hat{\mathbf{i}} + 4\hat{\mathbf{j}})\,\mathrm{m\,s^{-1}}$ after being hit. The change in momentum (final momentum-initial momentum) is (in kg m s^{1})

(a) zero

(b) $-(0.45\hat{\mathbf{i}} + 0.6\hat{\mathbf{j}})$

(c) $-(0.9\hat{\mathbf{i}} + 1.2\hat{\mathbf{j}})$

(d) $-5(\hat{\mathbf{i}} + \hat{\mathbf{j}})$.

5.4 In the previous problem (5.3), the magnitude of the momentum transferred during the hit is

(a) Zero (b) 0.75 kg m s^{-1} (c) 1.5 kg m s^{-1} (d) 14 kg m s^{-1}.

6.12 Which of the diagrams shown in Fig. 6.6 most closely shows the variation in kinetic energy of the earth as it moves once around the sun in its elliptical orbit?

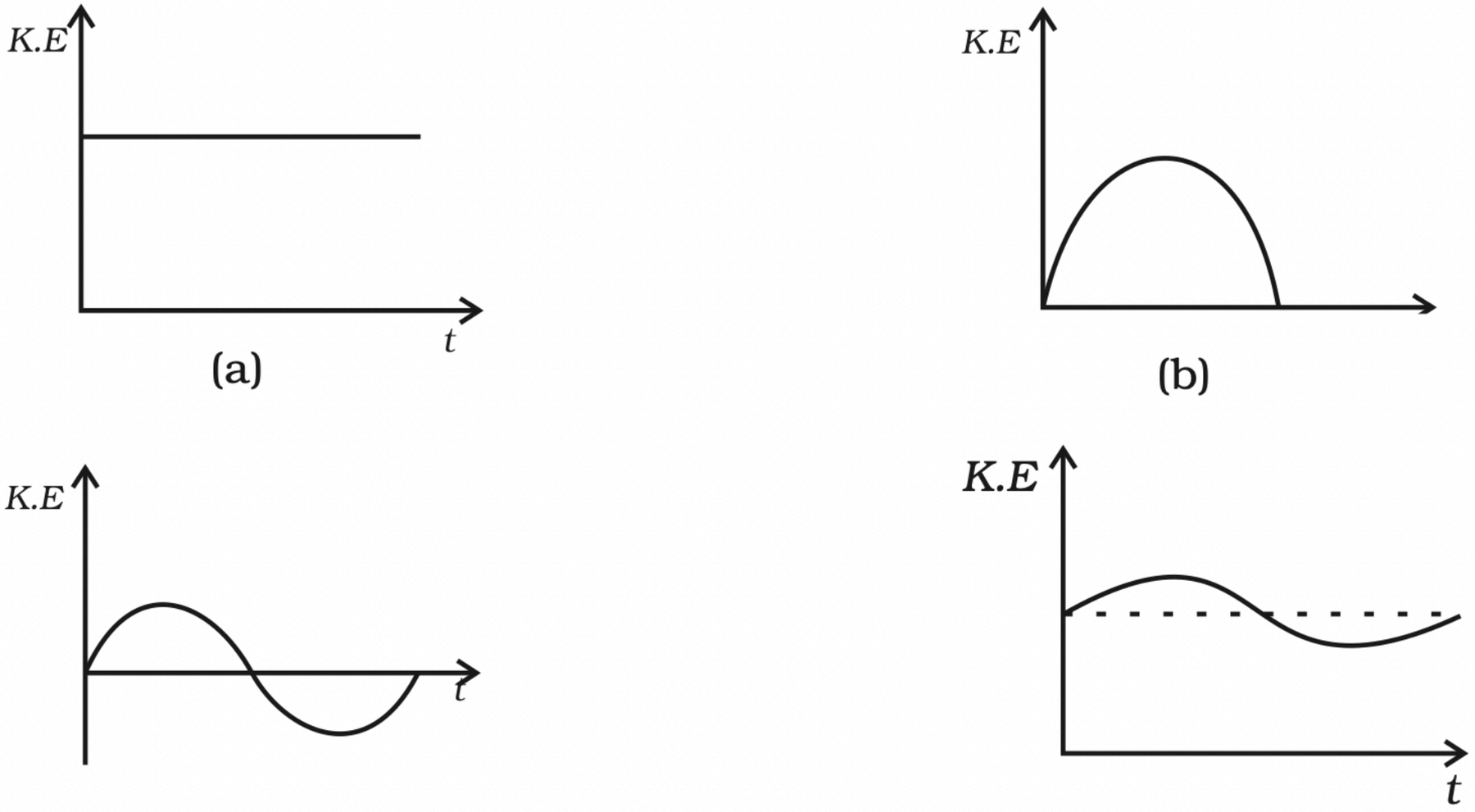

Fig. 6.6

6.38 A raindrop of mass 1.00 g falling from a height of 1 km hits the ground with a speed of 50 m s^{-1}. Calculate

(a) the loss of P.E. of the drop.
(b) the gain in K.E. of the drop.
(c) Is the gain in K.E. equal to loss of P.E.? If not why.

Take $g = 10 \text{ m s}^{-2}$

6.47 Two identical steel cubes (masses 50g, side 1cm) collide head-on face to face with a speed of 10cm/s each. Find the maximum compression of each. Young's modulus for steel = $Y = 2 \times 10^{11}$ N/m^2.