Direct impact and restitution

Answers

Further Maths topic practice

This topic online

Q	Answer	Marks
1	**a)** 3 m s^{-1} **b)** 3.6 N s	4
2	**a)** 3 m s^{-1} **b)** e = 0.25	4
3	**a)** A: 4 m s^{-1} (direction reversed); B: 2 m s^{-1} (direction reversed) **b)** 12 J	7
4	**a)** e = 0.8 **b)** 2.52 N s **c)** 1.76 J	7
5	**a)** e = 0.8 **b)** 7.2 N s	5
6	**a)** P: 1 m s^{-1} (reversed); Q: 6.5 m s^{-1} (reversed) **b)** e = 0.75 **c)** 2.625 J (2.63 J)	7
7	**a)** 3 m s^{-1} **b)** m = 2 **c)** 40.5 J	7
8	**a)** $v_B = \frac{1}{4}u(1 + e)$, $v_A = \frac{1}{4}u(1 - 3e)$ **b)** $\frac{1}{3} < e \leq 1$ **c)** $\frac{5}{4}mu$	8
9	**a)** $v_A = \frac{1}{3}u(2 - e)$, $v_B = \frac{2}{3}u(1 + e)$ **b)** KE lost = $\frac{1}{3}mu^2(1 - e^2)$ (shown) **c)** $e = \frac{1}{2}$	8
10	**a)** 0.9 m **b)** 6 m **c)** 2.57 s **d)** e.g. air resistance is ignored, or e is not exactly constant for very small bounces	9
11	**a)** 4.05 m s^{-1} **b)** 2.43 m s^{-1} **c)** 1.20 m **d)** 2.62 J	10
12	**a)** $v_A = \frac{2u}{5}(2 - 3e)$ (shown) **b)** $v_B = \frac{u}{5}(4 + 9e)$ in A's original direction: $4 + 9e > 0$, so always reversed **c)** $\frac{2}{3} < e \leq 1$ **d)** $3mu^2$	11

Full worked solutions, written out by hand, are on the solutions sheet for this topic.

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