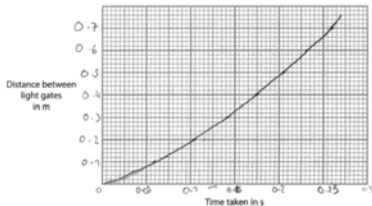


Question number	Answer	Notes	Marks
5 (a)	idea that 15% of <b>total</b> energy;  is transferred <b>usefully</b> ;	allow reverse argument e.g. 85% of total energy is wasted	2
(b)	correct efficiency read from graph; substitution into efficiency formula;  rearrangement; evaluation;  e.g. 90% or 0.9 seen in working $0.9 = 6.0 / \text{total energy input}$ total energy input = useful energy / efficiency (total energy input =) 6.7 (kJ)	allow ecf from incorrect efficiency    allow working in J or kJ   allow any correctly rounded value for 4 marks allow 6.6 or 6.6 recurring (kJ) for 3 marks	4
(c) (i)	uranium or plutonium;	allow specifically named fuel e.g. uranium-235, plutonium-239 condone incorrect isotope number	1
(ii)	neutron; unstable; daughter; neutrons; kinetic;		5

Total for Question 5 = 12 marks

Question number	Answer	Notes	Marks
10 (a) (i)	substitution into $a = \Delta v / t$ ; evaluation to 3 or more s.f.;  e.g. acceleration = $(4.20 - 1.45) / 0.286$ (acceleration =) $9.62 \text{ (m/s}^2\text{)}$		2
(ii)	idea that air resistance / friction also acts on ball; which opposes the ball's weight;	allow drag allow idea that frictional force is upwards whilst weight is downwards allow idea that resultant force is less than weight ignore idea of reaction time / other human errors	2
(iii)	substitution into $v^2 = u^2 + 2as$ ;  rearrangement; evaluation;  e.g. $4.20^2 = 1.45^2 + (2 \times 9.6 \times s)$ $s = (v^2 - u^2) / 2a$ (s =) $0.809 \text{ (m)}$	allow use of $a=9.6, 9.8, 9.81$ or $10$  reject 'change in speed $\times$ time' giving $0.78(65)$ as incorrect physics allow answers using correct average velocity.  allow range $0.78\text{-}0.81 \text{ (m)}$	3
(b) (i)	suitable scale on both axes; all points plotted correctly to nearest half square;  		2
(ii)	smooth curve drawn with an even distribution of data points either side;	ECF candidate plotting	1
(iii)	gradient of graph is equal to the speed / velocity of the ball; gradient is increasing (as time increases);  speed / velocity is increasing (as time increases);	allow "curve gets steeper" allow idea of greater distance in a unit of time DOP  award 1 mark for idea that graph is a curve if no other marks awarded	3

Total for Question 10 = 13 marks