Do not write outside the box

0 3 **Figure 4** shows a child playing with a toy train.

The train is on a bridge.

Figure 4

When the child lets go of the train, the train rolls down the bridge.

0 3 . 1 The momentum of the train at the bottom of the bridge is 0.216 kg m/s

mass of the train = 180 g

Calculate the velocity of the train at the bottom of the bridge.

Use the Physics Equations Sheet.

[4 marks]

Velocity = ______________________ m/s

Do not write outside the box

0 3 . 2 The train collides with a stationary carriage on the track.

Explain why the velocity of the train after the collision is less than it was before the collision.

Use ideas about momentum in your answer.

[4 marks]

8

Turn over for the next question

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	$m = 0.180$		1	AO2 6.5.5.1
	$0.216 = 0.180 \times v$	allow a correct substitution using an incorrectly / not converted value of *m*	1	
	$v = \frac{0.216}{0.180}$	allow a correct rearrangement using an incorrectly / not converted value of *m*	1	
	$v = 1.2$ (m/s)	allow a correct calculation using an incorrectly / not converted value of *m*	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	(total) momentum is conserved in the collision	allow (total) momentum before collision = (total) momentum after collision	1	AO1 6.5.5.1
	during the collision the momentum of carriage increases		1	
	so the momentum of train decreases		1	
	since momentum = mass × velocity, velocity (of train) decreases	allow since mass (of train) is constant, velocity (of train) decreases	1	

Total Question 3		**8**