Chapter 8 Momentum and force

Chapter test answers Total marks 48

Section A

Question 1

B (1 mark)

Question 2

C (1 mark)

Question 3

B (1 mark)

Question 4

C (1 mark)

Question 5

C (1 mark)

Question 6

C (1 mark)

Question 7

D (1 mark)

Question 8

A (1 mark)

Question 9

B (1 mark)

Question 10

A (1 mark)

Section B

Question 11

Taking west as negative and east as positive:

Δ*p* = *m*(*v – u*)

=(0.5) × (13 – 20) (1 mark)

*=* 16.5 kg m s–1 (1 mark)

Question 12

a

 (1 mark)

= 871 m s–1 to three significant figures (1 mark)

b *I* = *m(v – u)*

= (2.00) × (7.00 – 0) (1 mark)

= 14.0 N s (1 mark)

Question 13

a  (1 mark)

= 2.56 m s–1 (1 mark)

b *F* = *ma* = 945 × 2.56 (1 mark)

=2.42 × 103 N (1 mark)

c *F*wt = *mg* = 945 × 9.80 (1 mark)

= 9.26 × 103 N (1 mark)

d Arrows equal size (1 mark)

Arrows in opposite directions (1 mark)

Correct labels (1 mark)

*F*car on truck

*F*truck on car

Question 14

a According to Newton’s third law (1 mark)

The force of Mad-Emily’s car on Crazy-Clare’s car is equal and opposite to the force of   
Crazy-Clare’s car on Mad-Emily’s car. (1 mark)

b The impulse for both cars is the same, but in opposite directions. (1 mark)

The impulse is equal to the product of force and time, and the force on each car is equal and opposite and the cars are in contact for the same period of time. (1 mark)

**c** Any two of**:** safety belts, crumple zones, helmets, padding. (2 marks)

Question 15

a

*pinitial* = *mu*

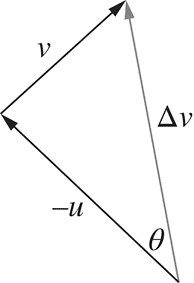
= (35.0) × (6.0)

= 210 kg m s–1 (1 mark)

b The change in velocity is given as the addition of the two vectors v + (-u). So its magnitude is given by:

 (1 mark)

Direction: initially she is travelling south-east, and at the end she is travelling north-east. So find the direction of her change in velocity vector.





If the initial velocity vector is at 45° to the horizontal. Then the ∆*v* vector is 35 + 45 = 80 degrees above the horizontal. i.e. N10°W (1 mark)

Then Δ*p* = *m*Δ*v*

= 35.0 × 7.32

=256 kg m s–1 N 10° W (1 mark)

Question 16

a  (1 mark)

 (1 mark)

b

*p*red

*p*blue

Σ*p*

θ

 (1 mark)

 (1 mark)

 (1 mark)

c The direction measured by the police is N 62° W, while the approximate direction determined by the witness is N 621° W. (1 mark)

The two directions are very similar. (1 mark)

d The claims made by the witness appear to be true as the direction measured by the police is approximately the same as the estimated direction. (2 marks)

Question 17

a According to Newton’s first law, an object will continue with its motion unless acted upon by an unbalanced, external force. (1 mark)

A driver’s head will continue to move with its velocity until it hits the airbag instead of the dashboard. (1 mark)

b The change in momentum of the driver’s head will be the same if the head hits the dashboard or the airbag. (1 mark)

With the same impulse a larger period of time results in less force acting on the   
driver’s head. (1 mark)