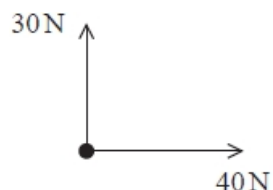# Newton's Laws and Momentum (MCQ Only)

Q1.

The diagram shows the two forces acting on a point mass.

The mass accelerates.

Which of the following gives the angle between the direction of the acceleration and the 40 N force?

☒ **A** $\cos^{-1}(30/40)$

☒ **B** $\sin^{-1}(40/50)$

☒ **C** $\tan^{-1}(30/40)$

☒ **D** $\tan^{-1}(40/50)$

(Total for question = 1 mark)

Q2.

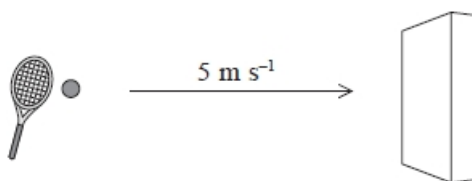An object is acted on by a vertical force of 25 N and a horizontal force of 34 N.

The angle to the horizontal of the resultant force is given by

☒ **A** $\cos^{-1}(25/34)$

☒ **B** $\sin^{-1}(34/25)$

☒ **C** $\tan^{-1}(25/34)$

☒ **D** $\tan^{-1}(34/25)$

(Total for question = 1 mark)

Q3.

A tennis ball of mass 0.06kg moves towards a wall at a velocity of 5 m s⁻¹ as shown.

The tennis ball hits the wall perpendicularly and rebounds at the same speed.
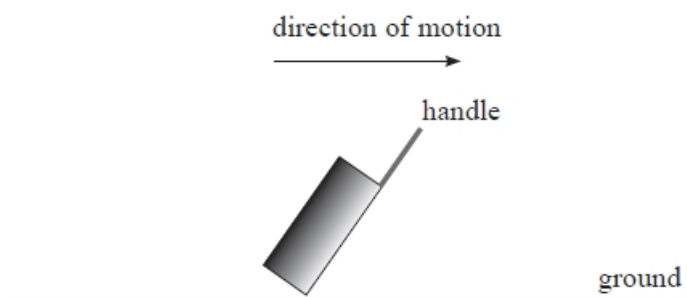
What is the change in momentum of the ball?

(1)

☒ **A** 0.60kg m s⁻¹

☒ **B** 0.30kg m s⁻¹

☒ **C** −0.30kg m s⁻¹
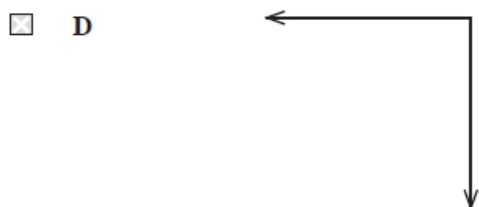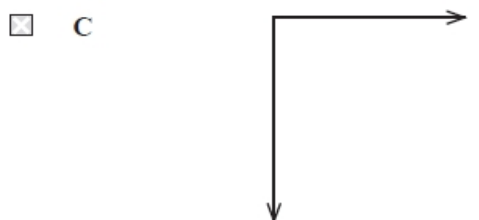
☒ **D** −0.60kg m s⁻¹

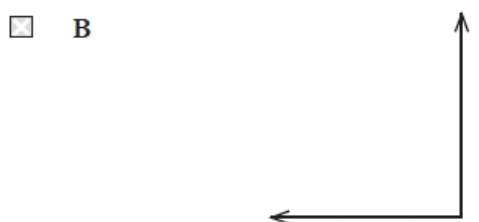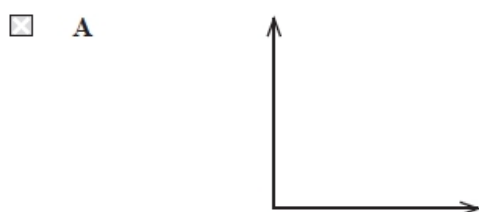**(Total for question = 1 mark)**

Q4.

A suitcase is being dragged along the ground by the handle in the direction shown.

direction of motion

handle

ground

Which of the following shows the direction of the horizontal and vertical components of force acting on the ground due to the suitcase?

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(Total for question = 1 mark)

Q5.

A space rocket lifts off vertically.

The rocket lifts off because

☒ **A**   the exhaust gases exert a force on the ground.

☒ **B**   the exhaust gases exert a force on the rocket.

☒ **C**   the ground exerts a force on the rocket.

☒ **D**   the rocket exerts a force on the ground.

(Total for question = 1 mark)

Q6.

A trapdoor is fixed to a vertical wall with a hinge. A wire is attached to the other end of the trapdoor and inclined at an angle of 60°, as shown. The wire holds the trapdoor horizontal.
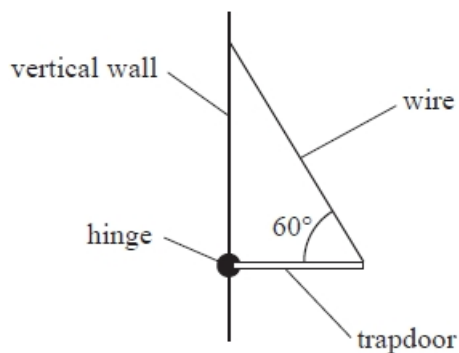
Which of the following shows the free-body force diagram for the trapdoor?

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(Total for question = 1 mark)

Q7.

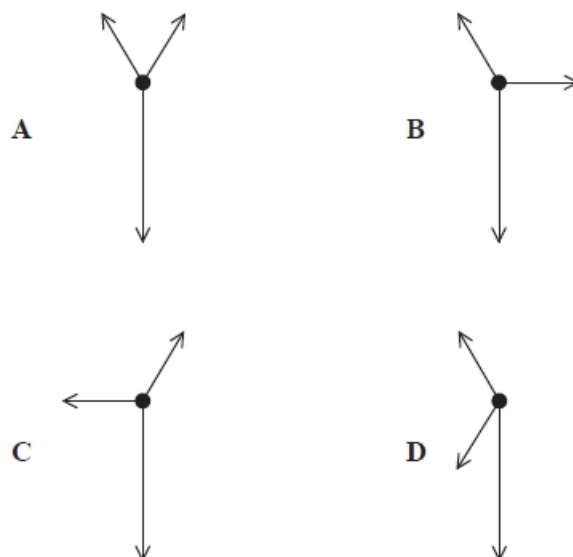Two objects of mass m travel towards each other on a smooth horizontal surface, each with velocity of magnitude v. The collision is elastic.

After the collision the

☒ **A**   total kinetic energy is $2mv^2$

☒ **B**   total kinetic energy is mv^2

☒ **C**   total momentum is $2mv$

☒ **D**   total momentum is mv

(Total for question = 1 mark)

Q8.

A trolley, mass 0.50 kg, has a speed of 2.0 m s^{-1}. A second trolley, mass 1.0 kg, has a speed of 2.0 m s^{-1}. The two trolleys are travelling in opposite directions and collide.

Which of the following could be a correct value of total momentum, in kg m s^{-1}, after the collision?

(1)

☒ **A**   0

☒ **B**   1.0

☒ **C**   2.0

☒ **D**   3.0

(Total for question = 1 mark)

Mark Scheme – Newton's Laws and Momentum (MCQ Only)

Q1.

Question Number	Answer	Additional Guidance	Mark
	C is the only correct answer	A is incorrect because the wrong trigonometric function has been used B is incorrect because the wrong trigonometric function has been used D is incorrect because the wrong forces have been used	1

Q2.

Question Number	Acceptable Answer	Additional Guidance	Mark
	C		1

Q3.

Question Number	Acceptable Answer	Additional Guidance	Mark
	D $-0.60 \text{ kg m s}^{-1}$		1

Q4.

Question Number	Answer	Mark
	C	1
	Incorrect Answers: A – incorrect normal force direction B – incorrect normal force direction and frictional force direction D – incorrect frictional force direction	

Q5.

Question Number	Acceptable answers	Additional guidance	Mark
	B		1

Q6.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is A B is not correct as these forces are not in equilibrium C is not correct as these forces are not in equilibrium D is not correct as these forces are not in equilibrium		**1**

Q7.

Question Number	Acceptable Answer	Additional guidance	Mark
	B	total kinetic energy is mv^2	**(1)**

Q8.

Question Number	Acceptable answers	Additional guidance	Mark
	B as equal to total momentum before = $1 \times 2 - 0.5 \times 2$	1.0	1
	A is the answer if each trolley had the same momentum C is the momentum of the second trolley only D is the answer if the two trolleys were travelling in the same direction		