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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Forces (Dynamics)

Paper 1 — Multiple-Choice Questions (topical compilation)

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DYNAMICS (FORCES)

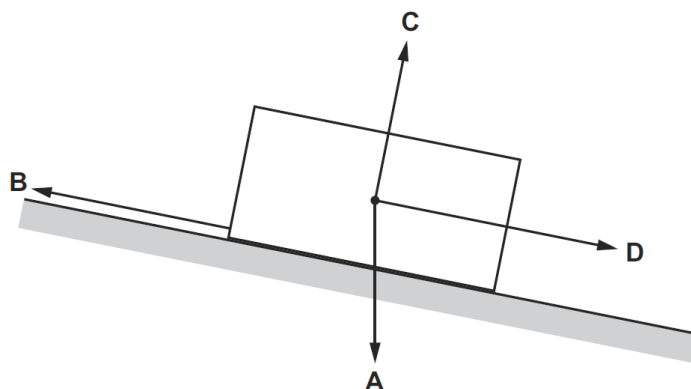
PAPER 1 QUESTIONS

Types of forces and Free body diagrams

QUESTION # 1:

- 9 The diagram shows a block of wood resting on a sloping board.

Which arrow shows the direction of the gravitational force acting on the block?

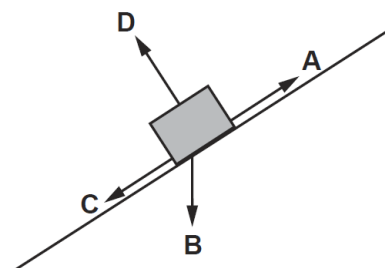


QUESTION # 2:

- 7 A force moves a box up a rough slope.

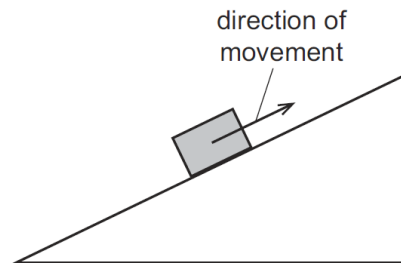
The diagram shows four forces acting on the box.

Which is the force due to friction on the box?

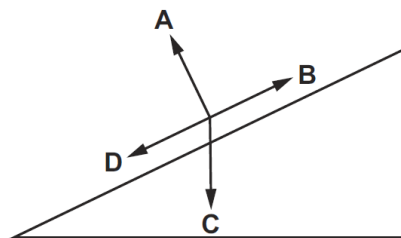


QUESTION # 3

- 6 A box is pulled up a rough slope, as shown.



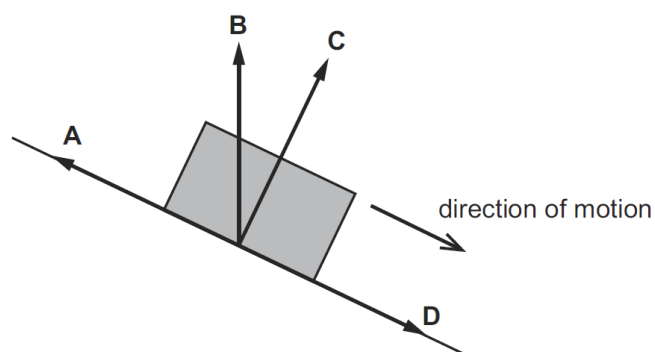
In which direction does friction act on the box?

**QUESTION # 4**

- 9 A body slides down a frictionless slope, as shown.

As the body presses on the surface, the surface pushes back on the body.

In which direction does the surface push back on the body?



QUESTION # 5

- 4** A car is travelling forwards at high speed. The brakes are applied and the car skids along the road surface.

In which direction and where does the friction force act?

- A** backwards on the tyres
- B** forwards on the tyres
- C** upwards on the tyres
- D** downwards on the road

Balanced and unbalanced forces

QUESTION # 1:

- 5 A man pulls a sledge of mass 25 kg across level ground with a horizontal force of 60 N. A constant force of friction of 20 N acts on the sledge.

What is the acceleration of the sledge?

- A 0.63 m/s^2 B 1.6 m/s^2 C 2.4 m/s^2 D 3.2 m/s^2

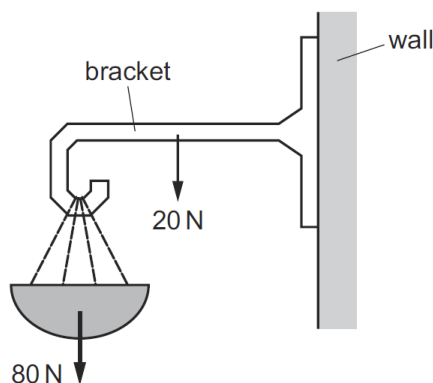
QUESTION # 2:

- 4 Which property of a body resists change from a state of rest or of motion?

- A density
B mass
C volume
D weight

QUESTION # 3

- 6 A hanging basket is fixed to a wall by a bracket.



The weight of the basket is 80 N. The weight of the bracket is 20 N.

What is the size of the upwards force exerted on the bracket by the wall?

- A 60 N B 70 N C 90 N D 100 N

QUESTION # 4

- 7 A train of mass 240 000 kg is travelling at a speed of 60 m/s. The brakes are applied and it decelerates for 10 minutes until it comes to rest.

What is the average resultant force?

- A** 24 000 N **B** 40 000 N **C** 480 000 N **D** 720 000 N

QUESTION # 5

- 11 A force of 1600 N accelerates a car, of mass 800 kg, from rest.

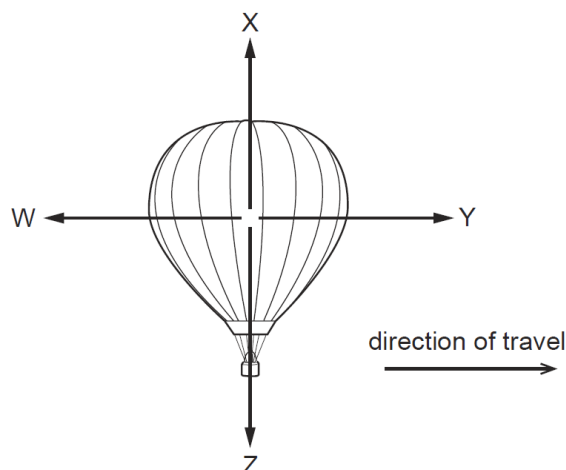
What is the car's acceleration and its velocity after 4.0 s?

	<u>acceleration</u> m/s ²	<u>velocity</u> m/s
A	0.50	0.13
B	0.50	0.50
C	2.0	2.0
D	2.0	8.0

QUESTION # 6

- 6 A hot-air balloon is travelling at constant velocity and is at a constant height above the ground.

The diagram shows the only four forces acting on the balloon.



Which statement is correct?

- A W and Y are equal, X and Z are equal.
- B W and Y are equal, X is greater than Z.
- C X and Z are equal, Y is greater than W.
- D Y is greater than W, X is greater than Z.

QUESTION # 7

- 6 A parachutist of mass 60 kg falls at a steady speed of 10 m/s. The gravitational field strength g is 10 N/kg.

What is the upward force acting on the parachutist?

- A 0 B 6.0 N C 60 N D 600 N

QUESTION # 8

- 8 The mass of object P is greater than the mass of object Q.

The objects contain different amounts of matter and have a different resistance to change of motion.

Which row is correct?

	greater amount of matter	greater resistance to change of motion
A	P	P
B	P	Q
C	Q	P
D	Q	Q

QUESTION # 9

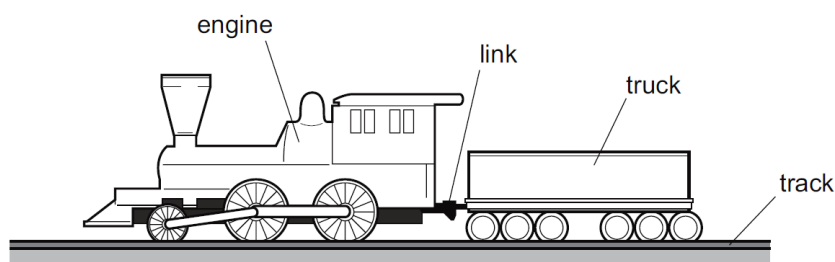
- 4 A car of weight 11 000 N moves with constant velocity along a horizontal road. A driving force of 5000 N acts on the car.

What is the force opposing the motion of the car?

- A** 5000 N **B** 6000 N **C** 11 000 N **D** 16 000 N

QUESTION # 10

- 5 An engine pulls a truck at constant speed on a level track.



The link between the engine and the truck breaks. The driving force on the engine remains constant.

What effect does this have on the engine and on the truck?

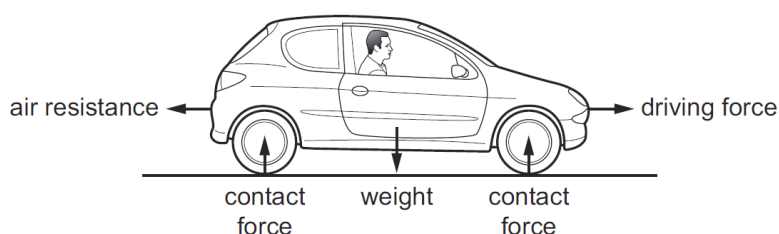
	engine	truck
A	speed stays constant	slows down
B	speeds up	slows down
C	speed stays constant	stops immediately
D	speeds up	stops immediately

QUESTION # 11

- 4 On which car is there a resultant force?
- A a car moving along a straight horizontal road at constant speed
 - B a car moving around a bend at constant speed
 - C a car moving uphill at constant velocity
 - D a car that is stationary

QUESTION # 12

- 6 A car is accelerating along a straight, horizontal road. The diagram shows forces acting on the car.



Which forces are balanced?

- A contact forces and air resistance
- B contact forces and weight
- C driving force and air resistance
- D driving force and weight

QUESTION # 13

- 7 A single force is applied to a body.

What **cannot** happen?

- A a change in the direction of the moving body
- B a change in the mass of the body initially at rest
- C a change in the position of the body initially at rest
- D a change in the speed of the moving body

QUESTION # 14

- 3 A car of mass 800 kg has a forward acceleration of 2.5 m/s^2 . A frictional force of 1200 N opposes the motion of the car.

What is the driving force due to the engine of the car?

- A 800 N B 1200 N C 2000 N D 3200 N

Newton's third law

QUESTION # 1:

5 Four of the gravitational forces that act between bodies in the Solar System are listed below.

- P the force on the Moon due to the Earth
- Q the force on the Earth due to the Sun
- R the force on the Earth due to the Moon
- S the force on the Moon due to the Sun

Which two forces are a Newton's third law pair (action and reaction)?

- A** P and Q **B** P and R **C** Q and S **D** R and S

QUESTION # 2:

5 A man with an open parachute falls to Earth at constant speed. The following forces act:

- P the upward force of the parachute on the man
- Q the upward force of the man on the Earth
- R the downward force of the Earth on the parachute
- S the downward force of the man on the parachute

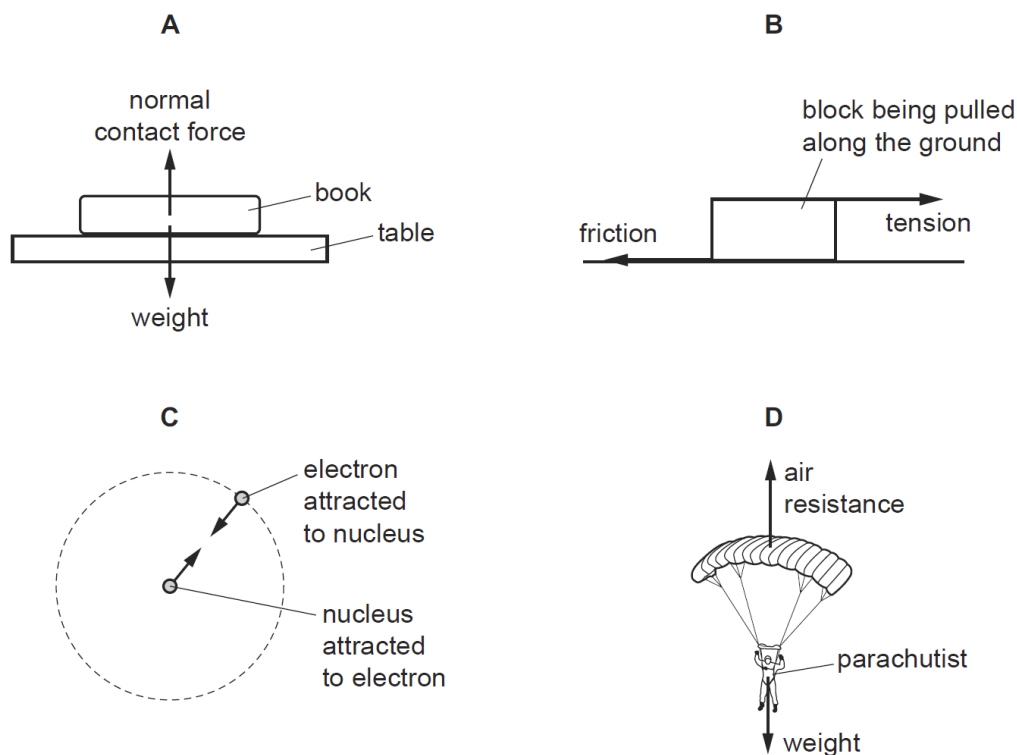
Which two forces are a Newton's third law pair?

- A** P and Q **B** P and R **C** P and S **D** Q and R

QUESTION # 3

- 6 Each diagram shows two forces that are equal in magnitude.

Which diagram shows two forces that are a Newton's third law pair of forces?

**QUESTION # 4**

- 9 A man with an open parachute is falling to Earth at constant speed. The following forces are acting.

- P the upward force of the parachute on the man.
- Q the upward force of the man on the Earth.
- R the downward force of the Earth on the parachute.
- S the downward force of the man on the parachute.

Which two forces are a Newton's third law pair?

- A** P and Q **B** P and R **C** P and S **D** Q and R

Friction

QUESTION # 1:

- 5 The minimum braking distance for a car is tested on a dry road.

The test is then repeated on a wet road.

What happens to the braking distance and to the frictional force between the tyres and the road?

	braking distance	frictional force
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Free fall

QUESTION # 1:

- 6 A skydiver jumps from an aeroplane. After a few seconds, he reaches a terminal velocity without opening his parachute.

Why does he reach terminal velocity?

- A Air resistance becomes greater than his weight and slows him down.
- B Air resistance decreases and he speeds up.
- C Air resistance increases and balances his weight so that his acceleration is zero.
- D His weight decreases and balances the air resistance.

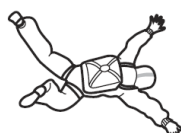
QUESTION # 2:

- 6 Which forces act on a skydiver who is falling at terminal velocity?

- A air resistance and weight
- B air resistance only
- C weight only
- D no forces act

QUESTION # 3

- 2 A skydiver falls from rest through the air and reaches terminal velocity.



What is the acceleration of the skydiver during his fall?

- A constant at 0 m/s^2
- B constant at 10 m/s^2
- C starting at 0 m/s^2 and increasing to 10 m/s^2
- D starting at 10 m/s^2 and decreasing to 0 m/s^2

QUESTION # 4

- 3 Two aluminium spheres P and Q, of masses 0.50 kg and 1.0 kg respectively, are released at the same time from the same height.

Why do they have the same acceleration?

- A The density of P is equal to the density of Q.
- B The force on P is equal to the force on Q.
- C The force on Q is double the force on P.
- D The gravitational field strength for Q is double that for P.

QUESTION # 5

- 5 A skydiver falls at terminal velocity. He then opens his parachute.

Which row gives the direction of the resultant force on the skydiver and the direction of the acceleration of the skydiver immediately after the parachute opens?

	resultant force	acceleration
A	downwards	downwards
B	downwards	upwards
C	upwards	downwards
D	upwards	upwards

QUESTION # 6

- 4 A free-fall skydiver jumps from a plane. As he falls there is a force acting upwards and a force acting downwards on his body. These produce a resultant force.

Before he reaches terminal velocity, how do the sizes of the forces change?

	downward force	upward force	resultant force
A	decreases	decreases	stays the same
B	increases	stays the same	decreases
C	stays the same	increases	decreases
D	stays the same	increases	increases

QUESTION # 7

- 3 A skydiver is falling at terminal velocity.



Which row describes the acceleration of the skydiver and the velocity of the skydiver?

	acceleration of the skydiver	velocity of the skydiver
A	downwards	constant
B	downwards	zero
C	zero	constant
D	zero	zero

QUESTION # 8

- 1 An apple falls from a tree.

Which row describes the forces acting on the apple and the motion of the apple as it falls?

	forces acting on the apple	motion of the apple
A	balanced	acceleration
B	balanced	constant speed
C	unbalanced	acceleration
D	unbalanced	constant speed

QUESTION # 9

- 10 There is no atmosphere on the Moon.

Two metal spheres of identical volume but different mass are at rest at the same height above the ground on the Moon. They are dropped at the same time.

How do the spheres move after release?

- A The sphere with the larger mass has a smaller acceleration.
- B The sphere with the larger mass hits the ground first.
- C The sphere with the smaller mass has a smaller acceleration.
- D The two spheres hit the ground together.

QUESTION # 10

- 7 In which descent is the acceleration equal to the acceleration of free fall g at all times?

- A a bungee jumper leaping from a bridge
- B a feather falling in a vertical tube that contains a vacuum
- C a hailstone travelling to Earth at terminal velocity
- D a sky-diver dropping from an aircraft towards the ground

QUESTION # 11

- 4 A parachutist falling at a steady speed opens her parachute.

Which row is correct for the direction of the resultant force and for the direction of the acceleration of the parachutist just after her parachute opens?

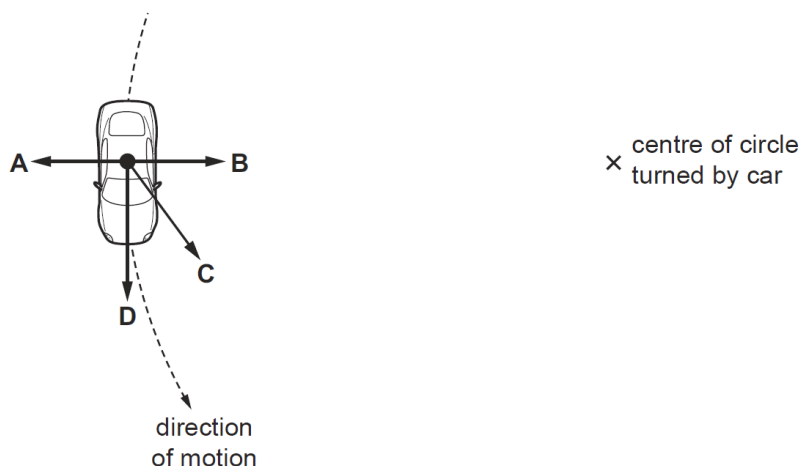
	resultant force direction	acceleration direction
A	downwards	downwards
B	downwards	upwards
C	upwards	downwards
D	upwards	upwards

Circular motion

QUESTION # 1:

- 6 A car moves in a circle at constant speed.

What is the direction of the resultant force acting on the car?



QUESTION # 2:

- 7 A satellite is orbiting the Earth in a circular orbit.

Which two quantities are always in the same direction as each other?

- A the acceleration of the satellite and the displacement of the satellite
- B the acceleration of the satellite and the velocity of the satellite
- C the resultant force on the satellite and the acceleration of the satellite
- D the resultant force on the satellite and the velocity of the satellite

QUESTION # 3

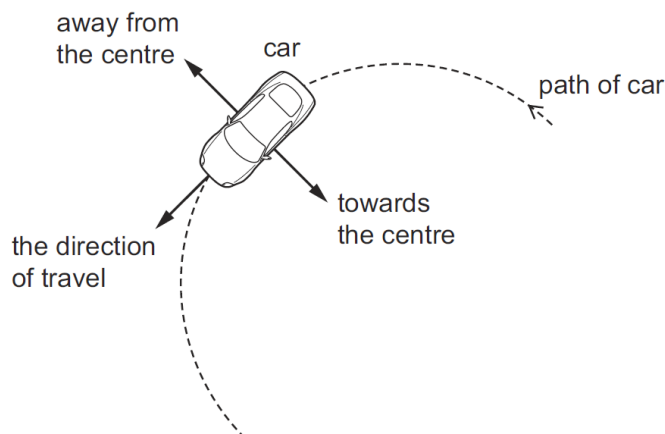
- 8 A satellite is in a circular orbit around a planet.

Which statement is correct?

- A Its acceleration is constant in direction but not in size.
- B Its acceleration is constant in size but not in direction.
- C Its gravitational potential energy varies.
- D Its velocity is constant.

QUESTION # 4

- 8 A car travels at a constant speed along a circular, horizontal path.

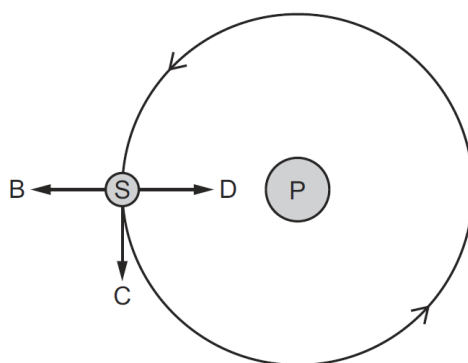


Which statement describes the forces acting on the car?

- A They are balanced as the car is moving at constant speed.
- B They are unbalanced with a resultant in the direction away from the centre.
- C They are unbalanced with a resultant in the direction of travel of the car.
- D They are unbalanced with a resultant in the direction towards the centre.

QUESTION # 5

- 3 The diagram shows a satellite S travelling at a constant speed in a circular orbit around a planet P.



Which statement is correct?

- A The resultant force on the satellite is zero.
- B The resultant force on the satellite is in direction B.
- C The resultant force on the satellite is in direction C.
- D The resultant force on the satellite is in direction D.

QUESTION # 6

- 5 The planets in the Solar System orbit the Sun.

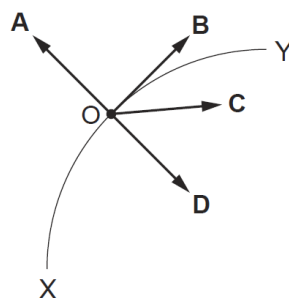
Which statement is correct?

- A There is a force on each planet away from the Sun.
- B There is a force on each planet in the direction in which it travels.
- C There is a force on each planet opposite to the direction in which it travels.
- D There is a force on each planet towards the Sun.

QUESTION # 7

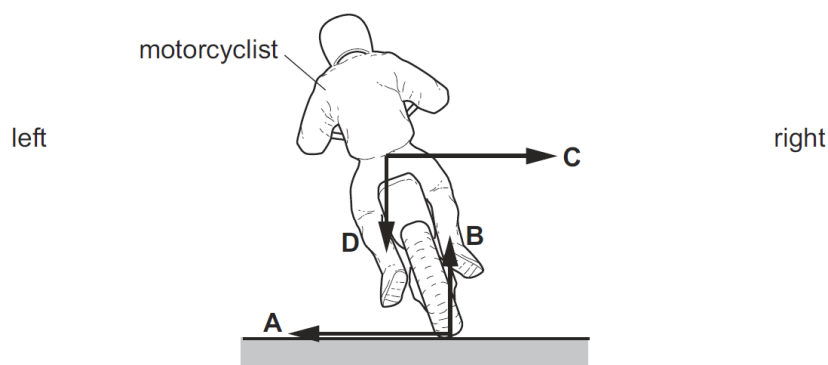
- 7 The diagram represents an object O moving from X to Y along a circular path at constant speed.

What is the direction of the resultant force on O in the position shown?

**QUESTION # 8**

- 7 The diagram shows a motorcyclist leaning over in order to turn the corner to the left.

Which force causes him to turn?



QUESTION # 9

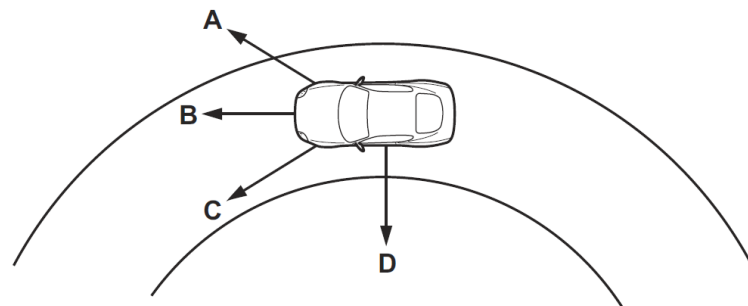
8 Which type of force causes the Earth to orbit the Sun?

- A elastic
- B electrostatic
- C gravitational
- D magnetic

QUESTION # 10

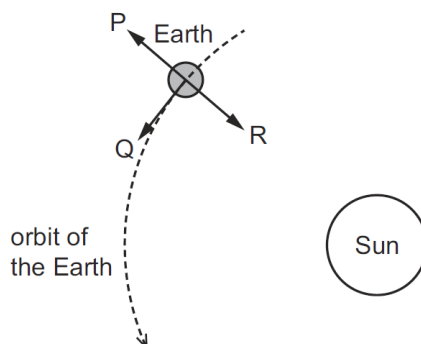
3 The diagram shows a car going around a circular track at constant speed.

Which arrow shows the direction of the resultant force on the car?



QUESTION # 11

- 8 The Earth travels at constant speed in a circular orbit around the Sun.



Which arrows show the direction of the acceleration of the Earth and the direction of the velocity of the Earth?

	direction of acceleration	direction of velocity
A	P	Q
B	Q	P
C	Q	R
D	R	Q

QUESTION # 12

- 6 A satellite orbits a planet in a circular path as shown. It has constant speed.

There is a force on the planet due to the satellite.

In which direction is the force on the planet?

