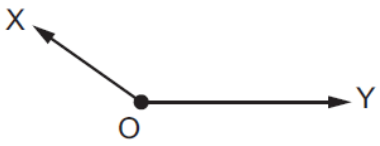
Dynamics – 2021 O Level 5054

1. Nov/2021/Paper_11/No.2

Two forces, X and Y, act upon an object O. The arrows represent the magnitudes and directions of the forces.

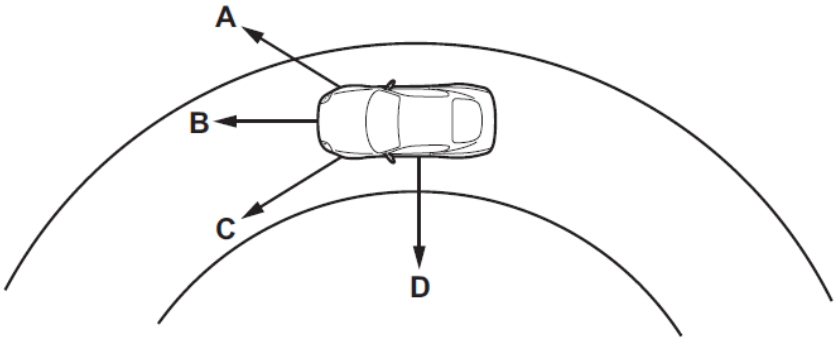


Which arrow shows the direction of the resultant force?

2. Nov/2021/Paper_11/No.4

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

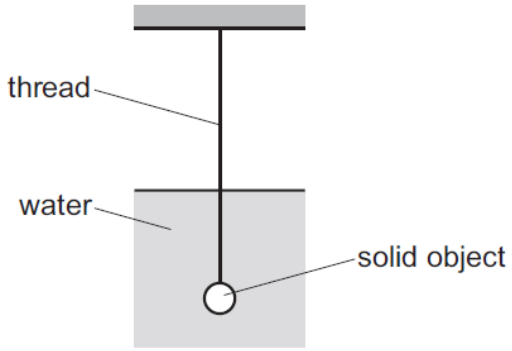
Which arrow shows the direction of the resultant force on the car?



3. Nov/2021/Paper_12/No.4

A solid object, immersed in water, hangs from an elastic thread. Three forces act on the object: its weight *W*, the tension in the thread *T*, and a force *F* from the water.

The force *F* acts upwards.



Which equation is correct when the object is stationary?

A $F + W = 0$

B $F - T = 0$

C $F - W - T = 0$

D $F - W + T = 0$

4. Nov/2021/Paper_12/No.9

A metal wire is stretched by a force *F* up to the limit of proportionality.

Which statement describes what happens when *F* is increased slightly?

A The wire breaks.

B The wire continues to extend but not in direct proportion to *F*.

C The wire continues to extend in direct proportion to *F*.

D The wire does not extend any further.

5. Nov/2021/Paper_21/No.2a,2b

Fig. 2.1 shows a man of mass 80 kg standing in a lift (elevator).

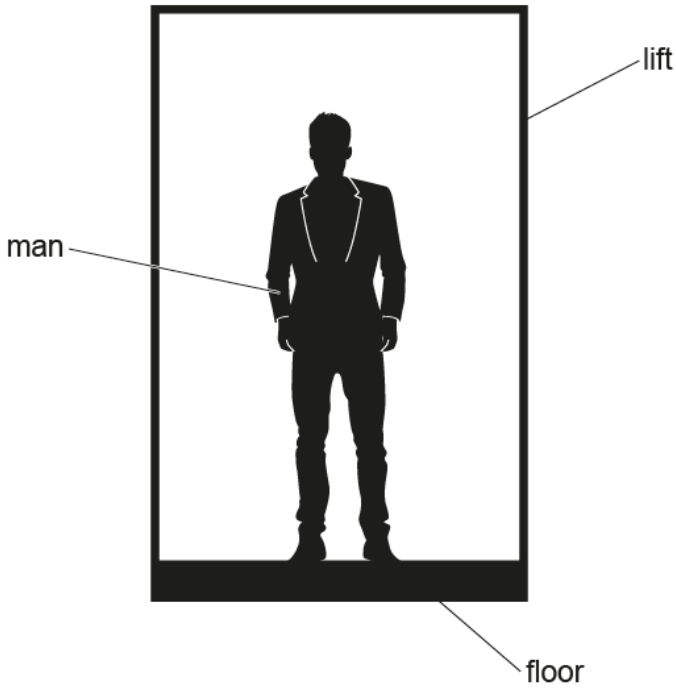


Fig. 2.1

The gravitational field strength g is 10 N / kg.

(a) Calculate the weight of the man.

weight = ... [1]

(b) The lift accelerates upwards uniformly at 0.50 m / s^2.

Calculate:

(i) the resultant upward force on the man

resultant force = ... [2]

(ii) the force exerted on the man by the floor of the lift.

force = ... [1]

6. Nov/2021/Paper_22/No.2

Force is a vector quantity.

(a) State what is meant by a *vector*.

.....

..... [1]

(b) A swimmer reaches the end wall of a swimming pool and turns around under the water.

Fig. 2.1 shows the swimmer immediately after turning around.

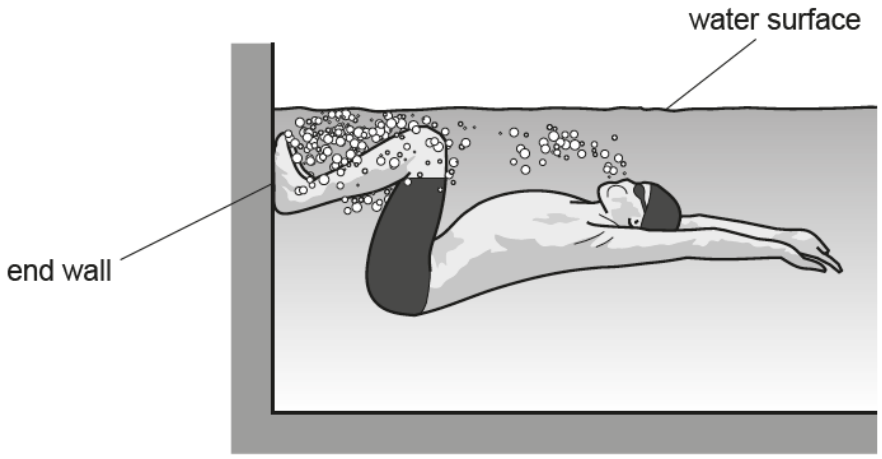


Fig. 2.1

(i) The swimmer pushes against the end wall of the pool with his legs.

Explain, in terms of Newton's third law, why the swimmer accelerates away from the end wall.

.....

.....

.....

..... [3]

(ii) While swimming, there is a constant forward force on the swimmer. His speed increases until eventually he reaches a constant speed.

Explain why he reaches a constant speed.

.....

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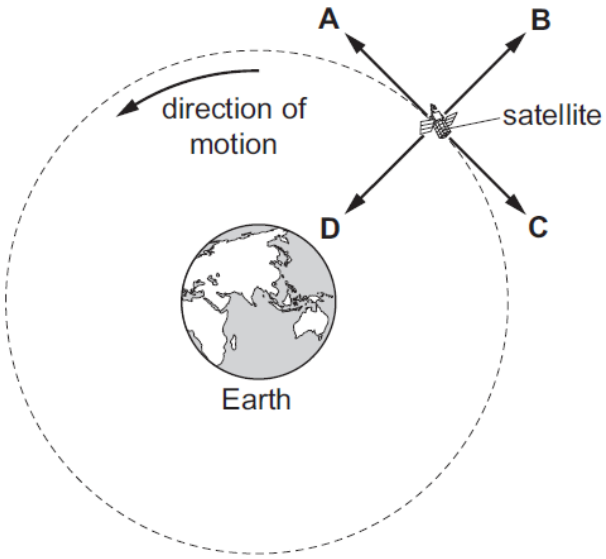
.....

..... [3]

7. June/2021/Paper_11/No.5

A satellite is shown moving around the Earth in a circular path at a constant speed.

Which arrow shows the direction of the force on the satellite?

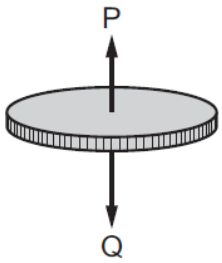


not to scale

8. June/2021/Paper_12/No.2

A coin falls from rest through the air and eventually reaches a constant speed.

There is a resultant force acting on the coin due to the two forces P and Q shown in the diagram.



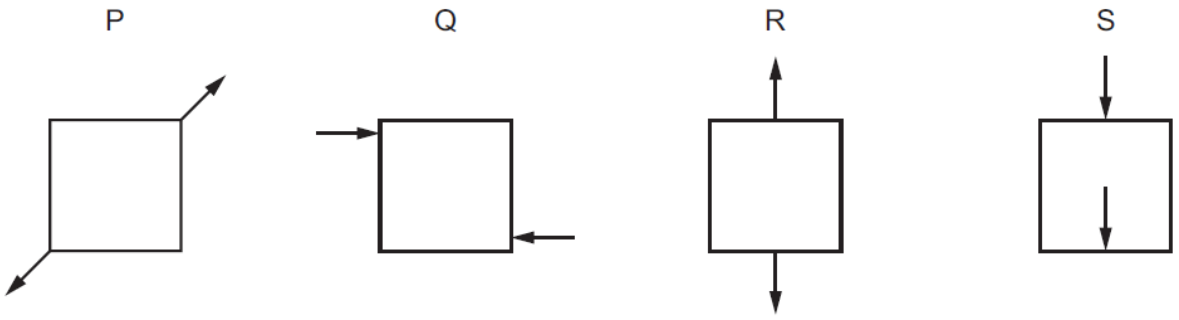
What happens to force P and what happens to the resultant force before the coin reaches constant speed?

	force P	resultant force
A	decreases	increases
B	decreases	decreases
C	increases	decreases
D	increases	increases

9. June/2021/Paper_12/No.3

The diagrams show the forces acting on four identical solid blocks.

Each arrow represents a force of 20 N.



Which blocks are in equilibrium?

A P and R only

B Q and S only

C P, Q and R only

D P, Q, R and S

10. June/2021/Paper_12/No.4

A student lists three changes that affect the stopping distance of a car.

1 increasing the braking force

2 increasing the friction between the tyres and the road

3 increasing the speed of the car

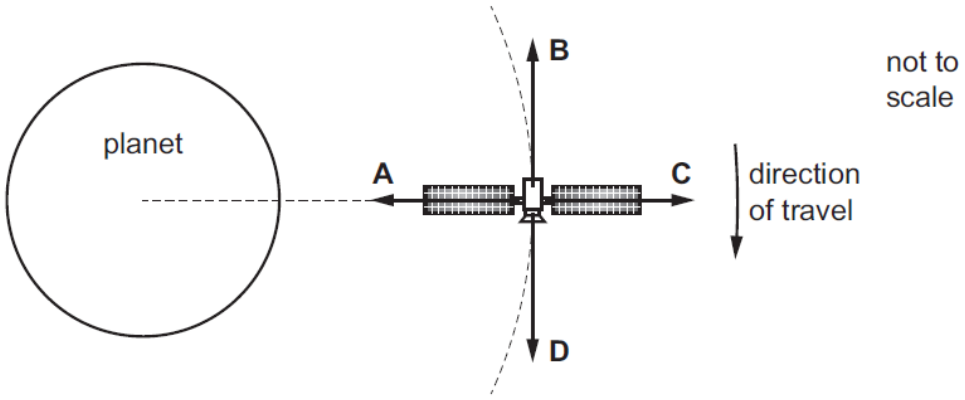
Which change or changes increase the stopping distance?

A 1 and 2 **B** 1 and 3 **C** 1 only **D** 3 only

11. June/2021/Paper_12/No.5

The diagram shows a satellite orbiting a planet at a steady speed.

In which direction does the resultant force act on the satellite?



12. June/2021/Paper_21/No.1a,1b

An aircraft flies at a constant height.

Air drag and the force from the aircraft's engines together produce a force on the aircraft of 36 kN due north, as shown in Fig. 1.1.

The wind produces a force of 12 kN towards the east.

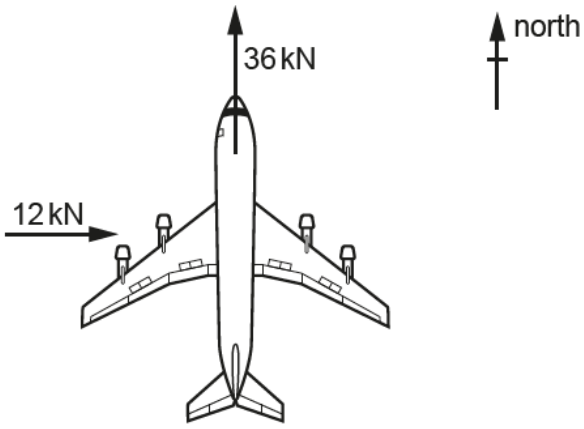


Fig. 1.1 (not to scale)

(a) Draw a scale drawing to show the resultant force acting on the aircraft.

Use your drawing to determine the size of the resultant force and the angle between the resultant force and north.

size of resultant force = ...

angle = ...

[3]

13. June/2021/Paper_21/No.8a

Fig. 8.1 shows a stationary horse and its rider, about to jump over two fences.

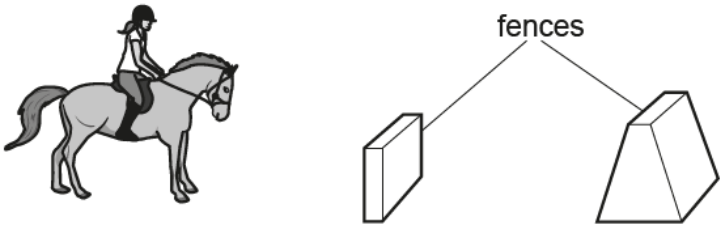


Fig. 8.1

(a) Fig. 8.2 shows a side view of the horse.

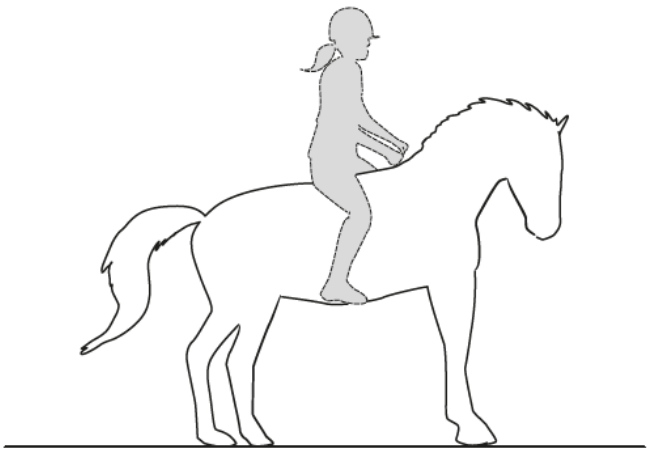


Fig. 8.2

(i) On Fig. 8.2, draw and label the forces acting on the horse.

Include the force that the rider exerts on the horse. Label this force *F*. [3]

(ii) Explain how Newton's third law applies to force *F*.

.....

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..... [2]