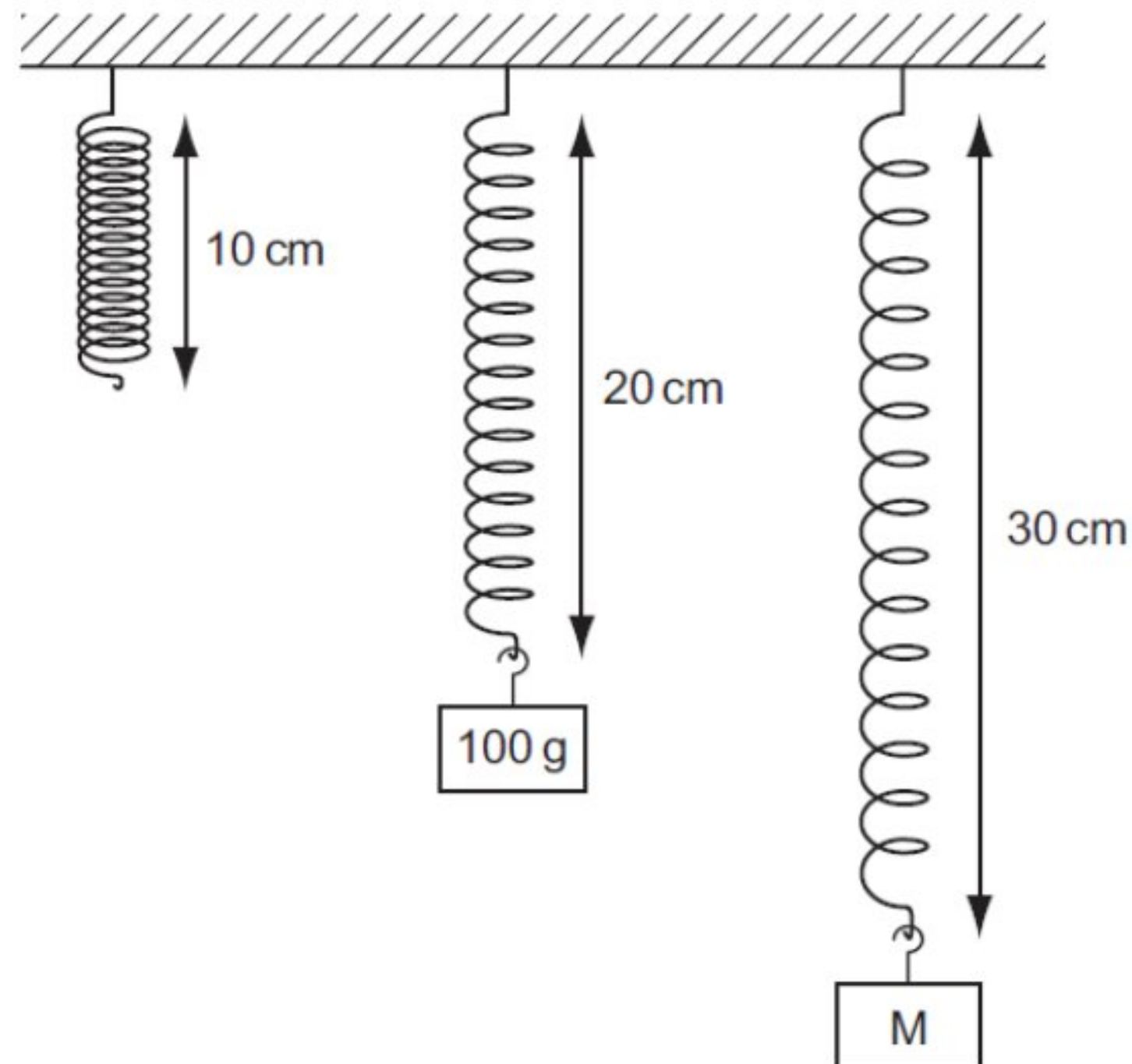


Topic 5.1 – Force and moment-Effect of force

1.

Objects with different masses are hung on a spring. The diagram shows how much the spring stretches.



The extension of the spring is directly proportional to the mass hung on it.

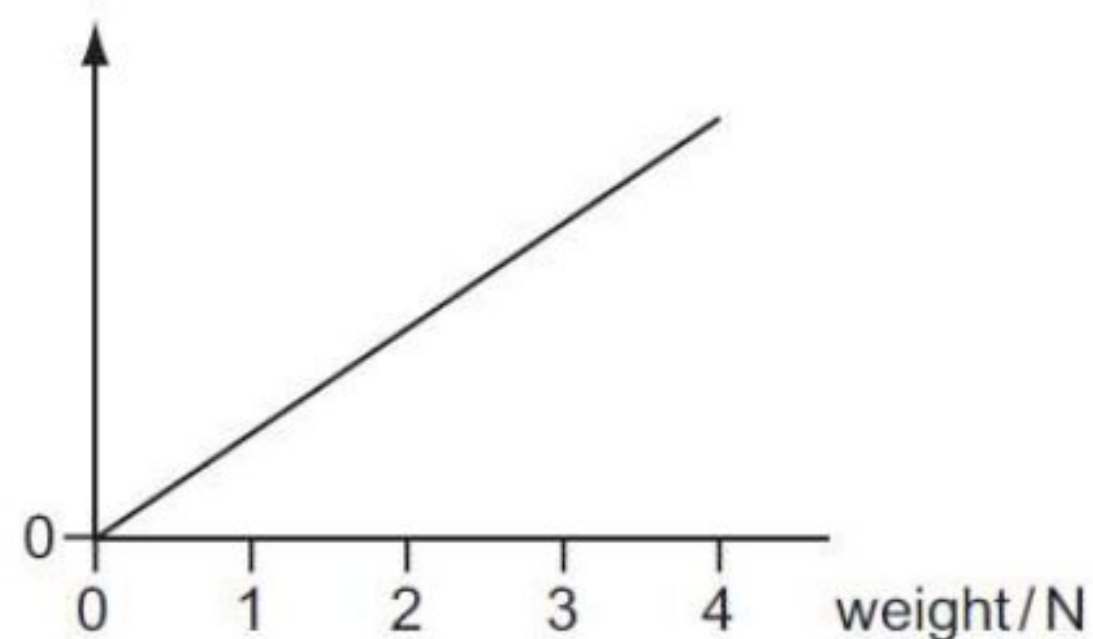
What is the mass of object M?

- A** 110 g **B** 150 g **C** 200 g **D** 300 g

2.

A student adds weights to an elastic cord. He measures the length of the cord for each weight.

He then plots a graph from the results, as shown.



Which length has he plotted on the vertical axis?

- A** measured length
B original length
C (measured length – original length)
D (measured length + original length)

3.

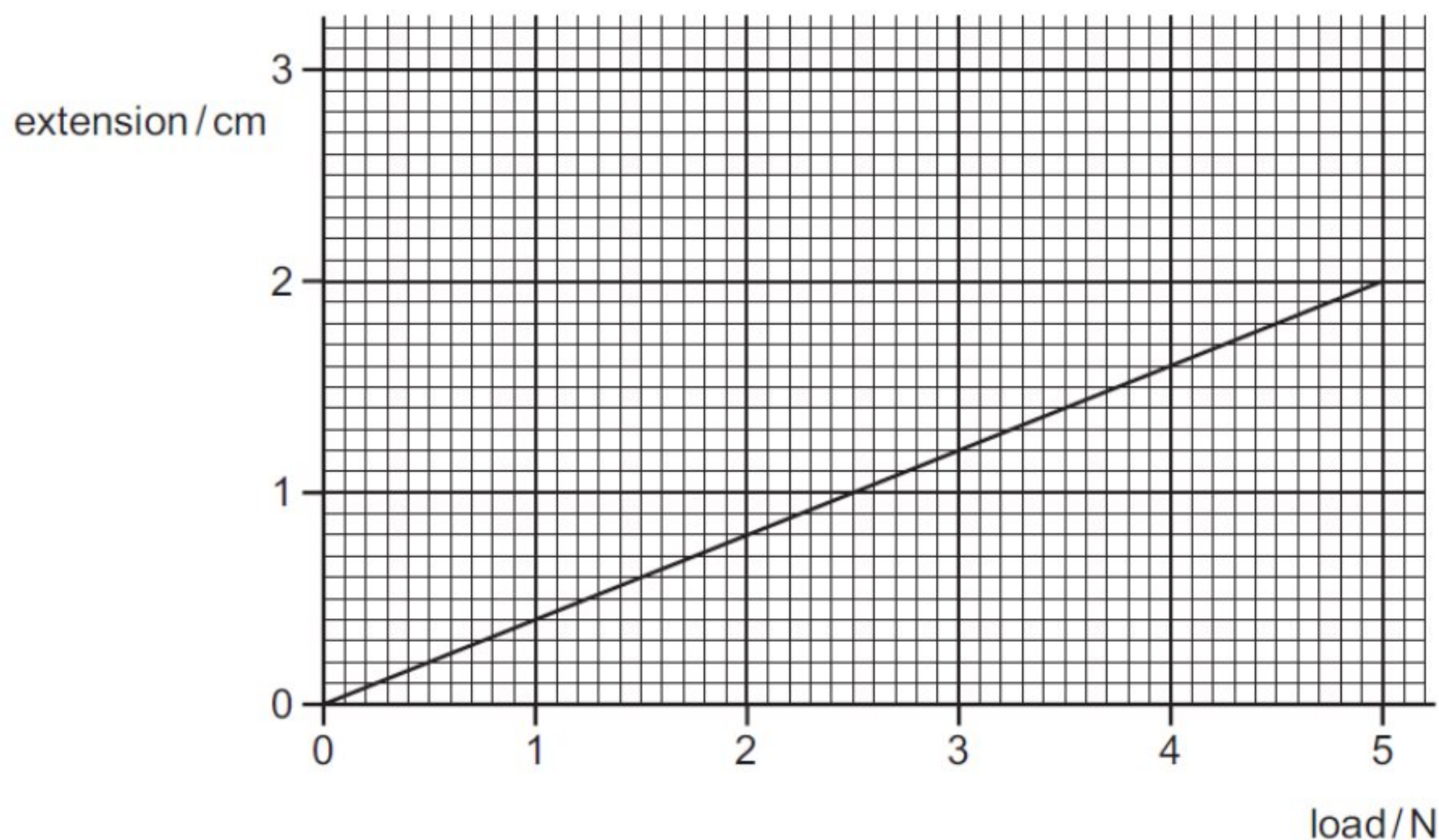
A force acts on a moving rubber ball.

Which of these changes could **not** happen to the ball because of the force?

- A a change in direction
- B a change in mass
- C a change in shape
- D a change in speed

4.

The extension/load graph for a spring is shown. The unloaded length of the spring is 15.0 cm.



When an object of unknown weight is hung on the spring, the length of the spring is 16.4 cm.

What is the weight of the object?

- A 0.55 N B 0.67 N C 3.5 N D 4.1 N

5.

Which statement about a moving object is correct?

- A When an object is accelerating, the resultant force acting on it must equal zero.
- B When an object is moving at a steady speed, the air resistance acting on it must equal zero.
- C When an object is moving at a steady speed, the resultant force acting on it must equal zero.
- D When an object is moving, there must be a resultant force acting on it.

6.

An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

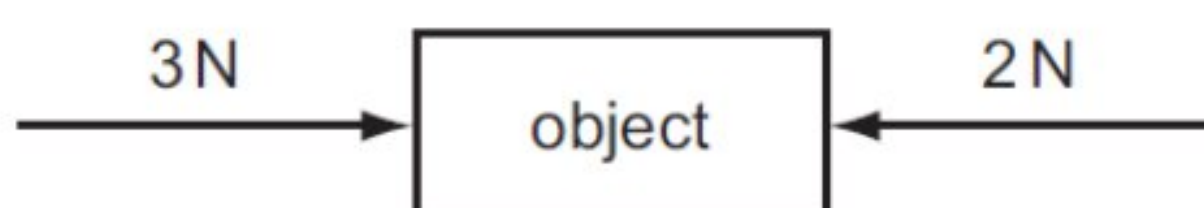
load / N	0	1	2	3
length / cm	15.2	16.2		18.6
extension / cm	0	1.0	2.1	3.4

Which figure is missing from the table?

A 17.2**B** 17.3**C** 17.4**D** 17.6

7.

The object in the diagram is acted upon by the two forces shown.



What is the effect of these forces?

A The object moves to the left with constant speed.**B** The object moves to the left with constant acceleration.**C** The object moves to the right with constant speed.**D** The object moves to the right with constant acceleration.

8.

Which property of an object **cannot** be changed by a force?

A its mass**B** its motion**C** its shape**D** its size

Below are four statements about the effects of forces on objects.

Three of the statements are correct.

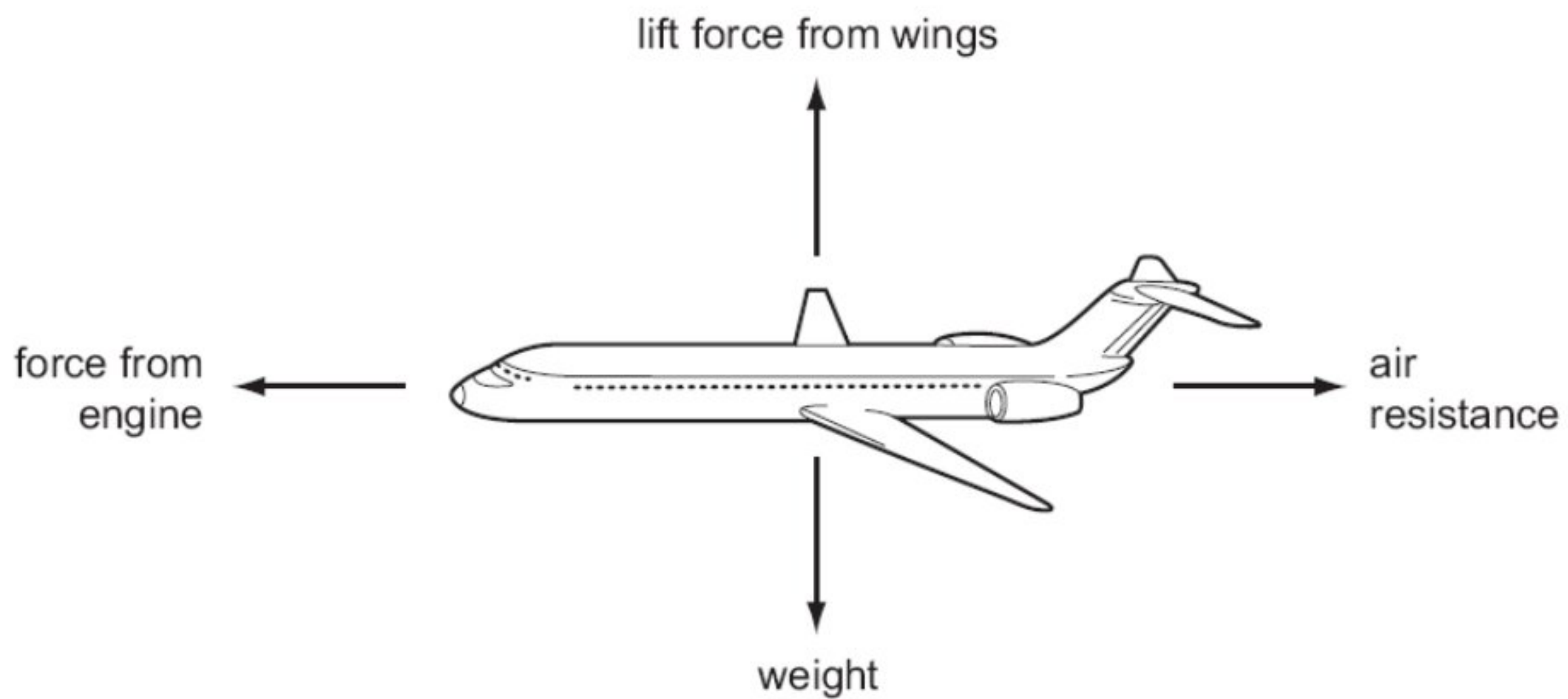
Which statement is **incorrect**?

A A force can change the length of an object.**B** A force can change the mass of an object.**C** A force can change the shape of an object.**D** A force can change the speed of an object.

9.

An aeroplane is in equilibrium.

The diagram shows the forces acting on the aeroplane.

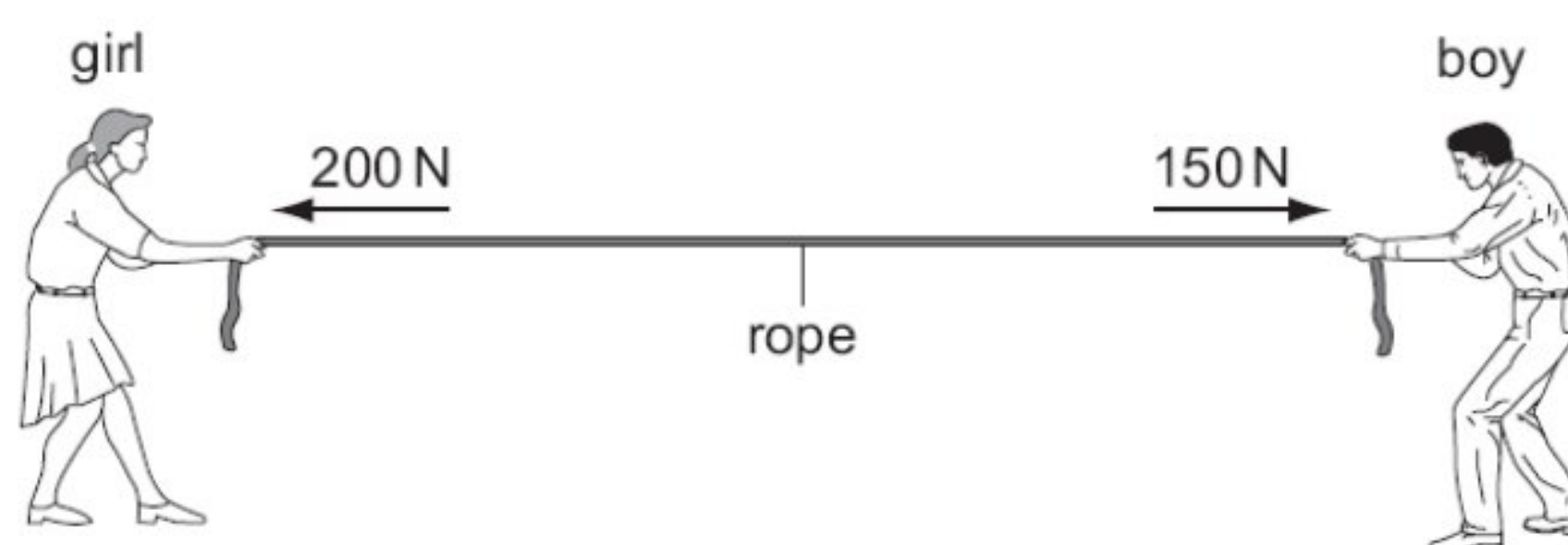


Which statement about the forces is correct?

	force from engine	lift force from wings
A	equal to air resistance	equal to weight
B	equal to air resistance	greater than weight
C	greater than air resistance	equal to weight
D	greater than air resistance	greater than weight

10.

A girl and a boy are pulling in opposite directions on a rope. The forces acting on the rope are shown in the diagram.

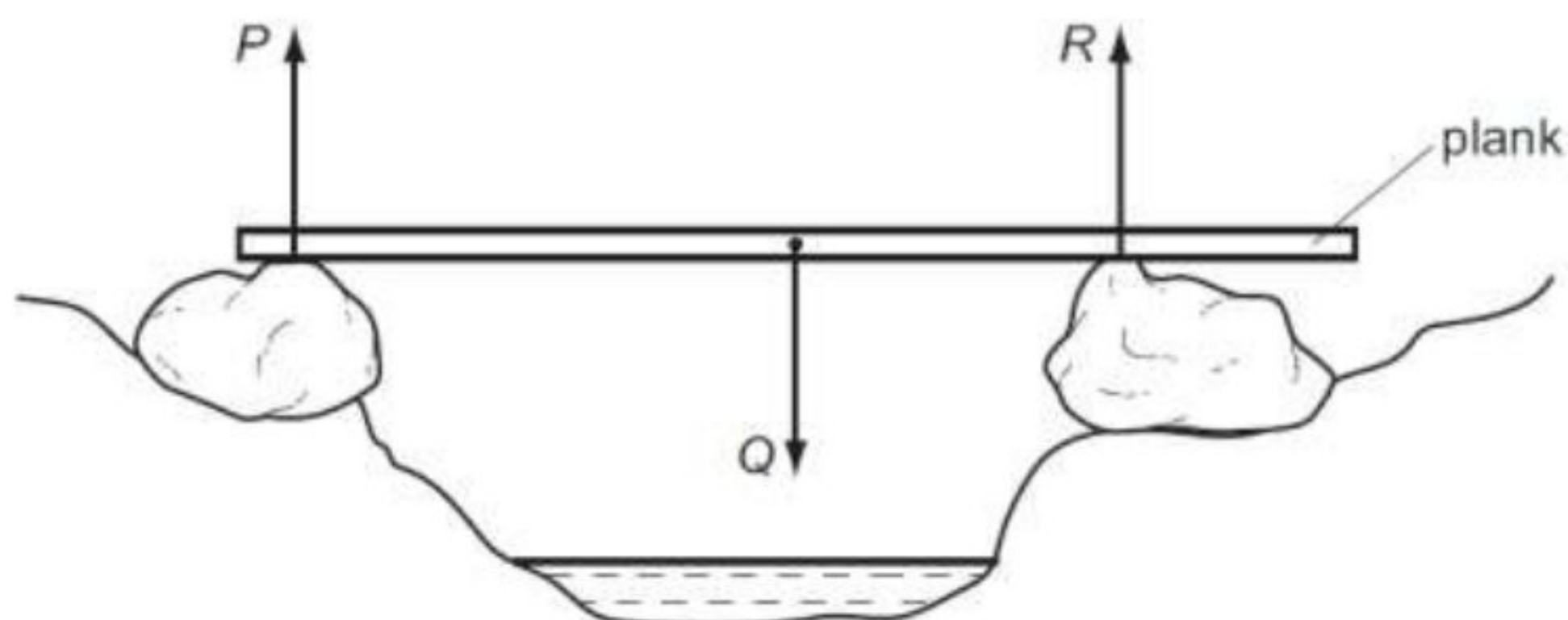


Which single force has the same effect as the two forces shown?

- A** 50 N acting towards the girl
- B** 350 N acting towards the girl
- C** 50 N acting towards the boy
- D** 350 N acting towards the boy

11.

A wooden plank rests in equilibrium on two boulders on opposite sides of a narrow stream. Three forces of size P , Q and R act on the plank.



How are the sizes of the forces related?

A $P + Q = R$

B $P + R = Q$

C $P = Q = R$

D $P = Q + R$

12.

A force acts on a moving rubber ball.

How many of the following changes could happen to the ball because of the force?

- a change in direction
- a change in shape
- a change in mass
- a change in speed

A 1

B 2

C 3

D 4

13.

The table shows the length of a wire as the load on it is increased.

load / N	0	10	20	30
length / cm	50.0	52.1	54.1	56.3

Which subtraction should be made to find the extension caused by the 20 N load?

A $54.1 \text{ cm} - 0 \text{ cm}$

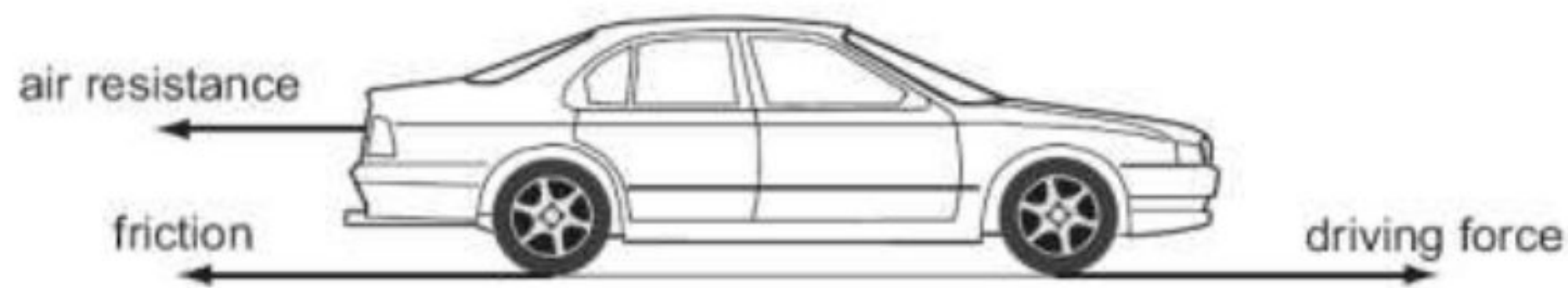
B $54.1 \text{ cm} - 50.0 \text{ cm}$

C $54.1 \text{ cm} - 52.1 \text{ cm}$

D $56.3 \text{ cm} - 54.1 \text{ cm}$

14.

Three horizontal forces act on a car that is moving along a straight, level road.



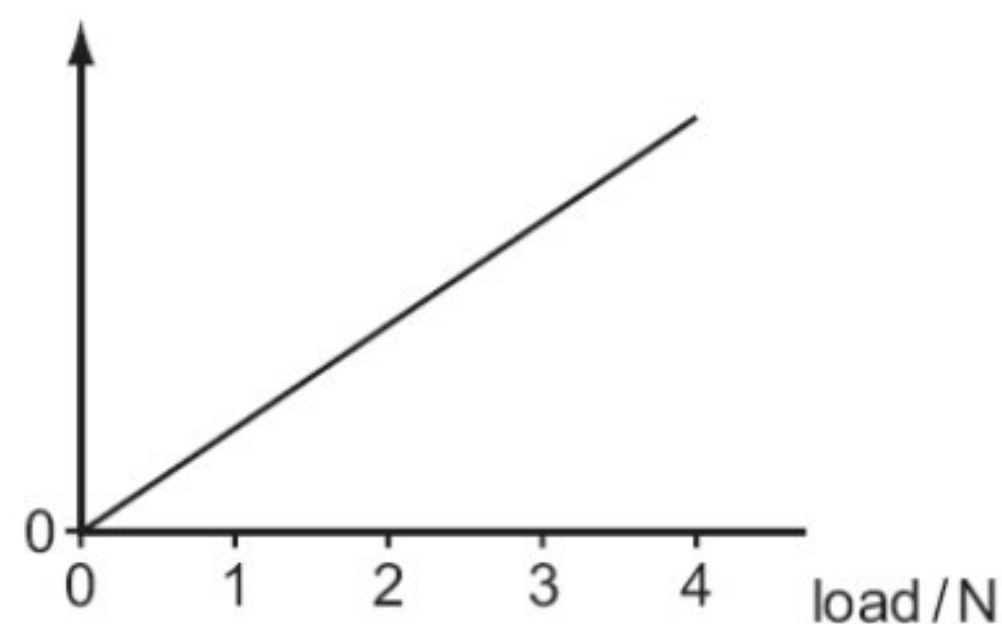
Which combination of forces would result in the car moving at constant speed?

	air resistance	friction	driving force
A	200 N	1000 N	800 N
B	800 N	1000 N	200 N
C	800 N	200 N	1000 N
D	1000 N	200 N	800 N

15.

A student adds loads to an elastic cord. He measures the length of the cord for each load.

He then plots a graph from the results.



Which length is plotted on the vertical axis?

- A** measured length
- B** original length
- C** (measured length – original length)
- D** (measured length + original length)

16.

A student carries out an experiment to plot an extension / load graph for a spring. The diagrams show the apparatus at the start of the experiment and with a load added.



What is the extension caused by the load?

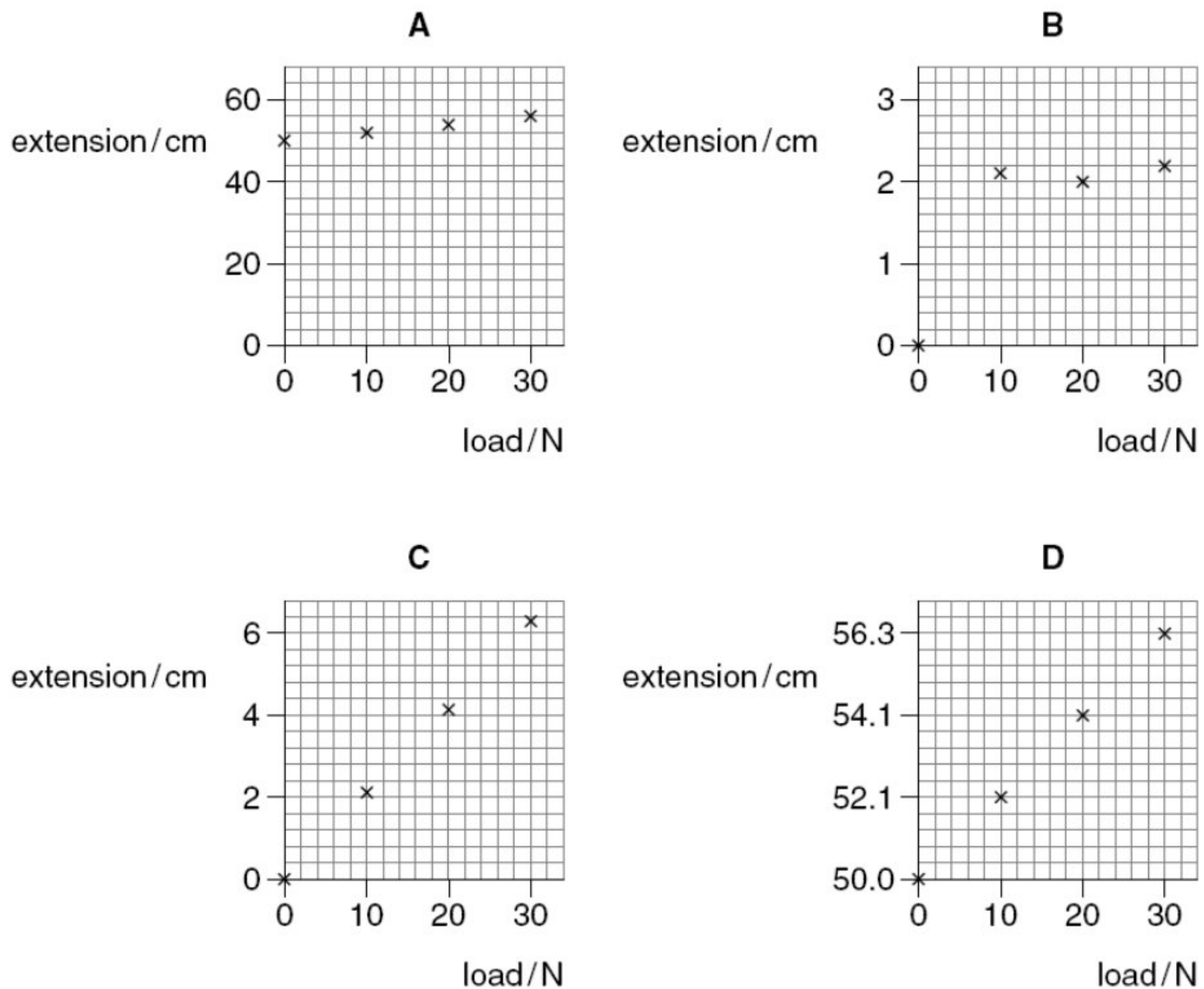
- A** x
- B** y
- C** $y + x$
- D** $y - x$

17.

The table below shows the length of a wire as the load on it is increased.

load / N	0	10	20	30
length / cm	50.0	52.1	54.1	56.3

Which graph correctly shows the extension of the wire plotted against load?



18.

An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

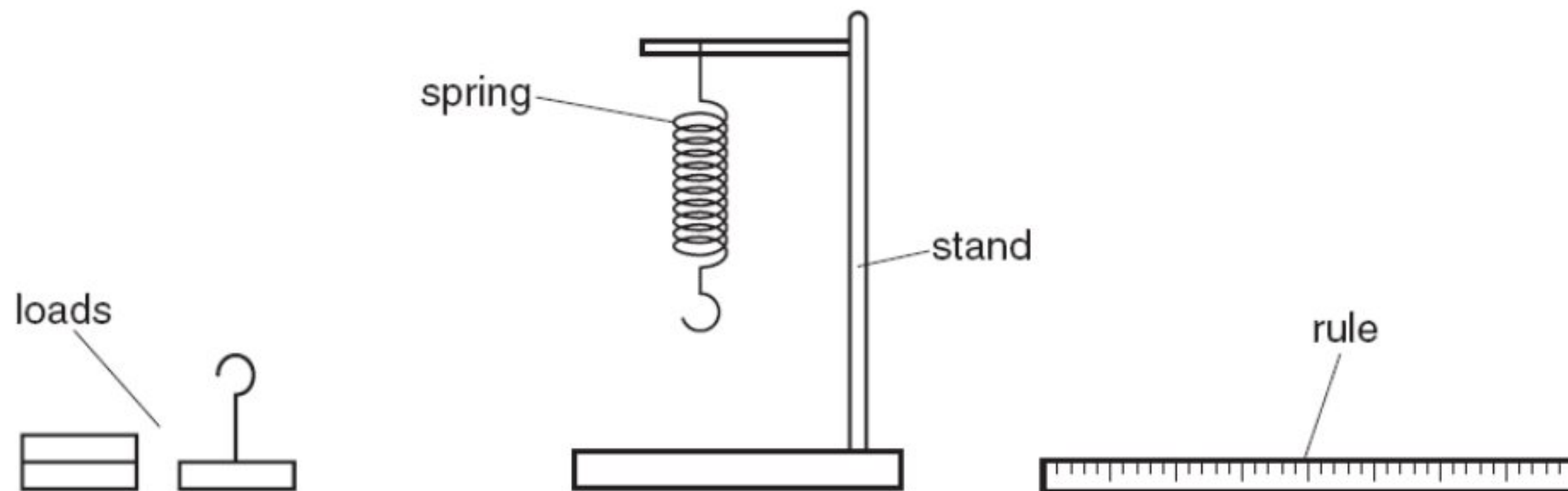
load / N	0	1	2	3
length / cm	15.2	16.2		18.6
extension / cm	0	1.0	2.1	3.4

Which figure is missing from the table?

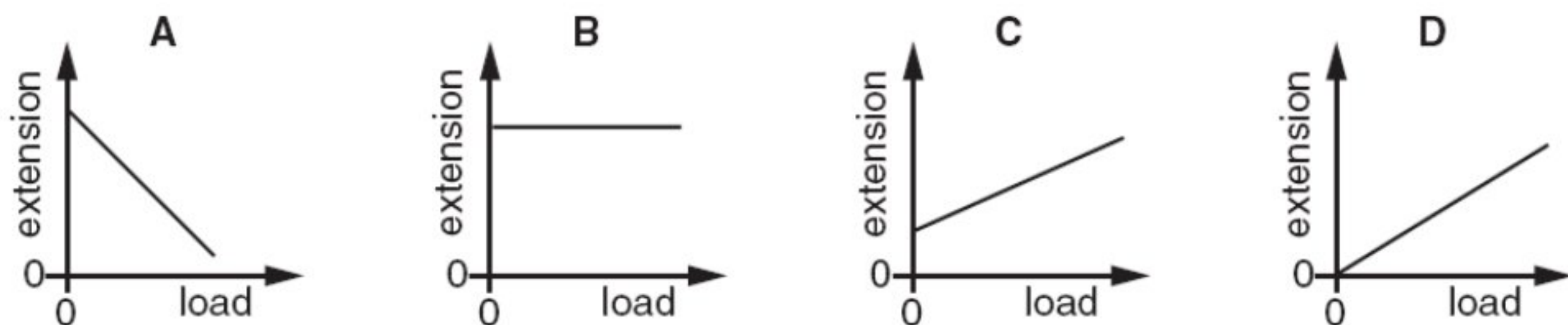
A 16.5**B** 17.3**C** 17.4**D** 18.3

19.

A spring is suspended from a stand. Loads are added and the extensions are measured.

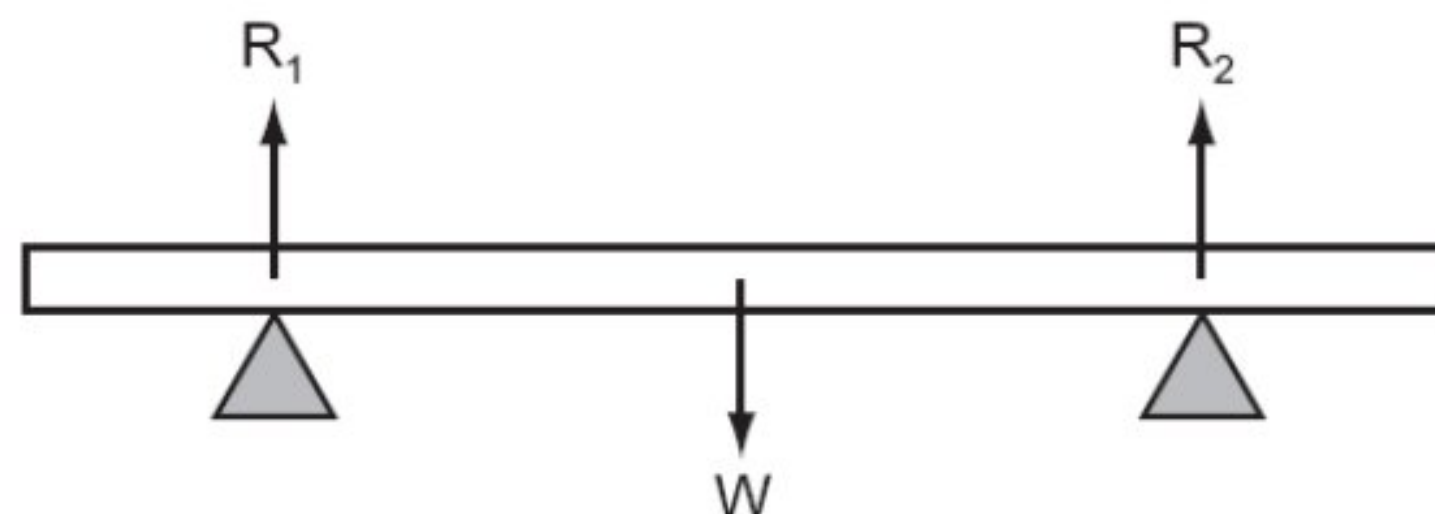


Which graph shows the result of plotting extension against load?



20.

A heavy beam is resting on two supports, so that there are three forces acting on it.



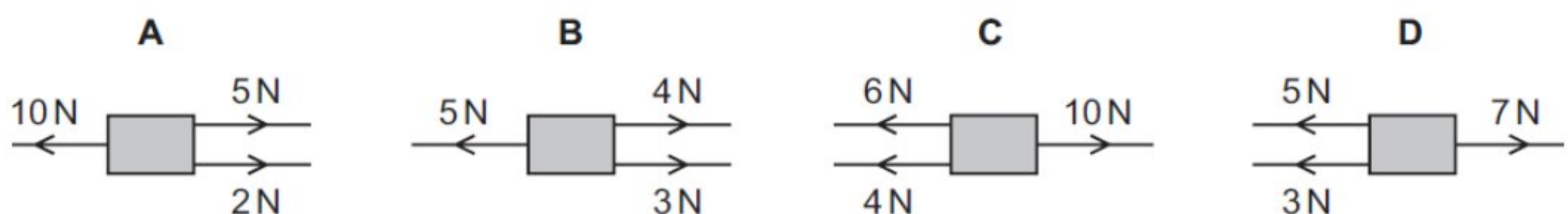
The beam is in equilibrium.

Which statement is correct?

- A All the forces are equal in value.
- B The forces are in one direction and their turning effects are in the opposite direction.
- C The resultant force is zero and the resultant turning effect is zero.
- D The total upward force is twice the total downward force.

21.

Which combination of forces produces a resultant force acting towards the right?

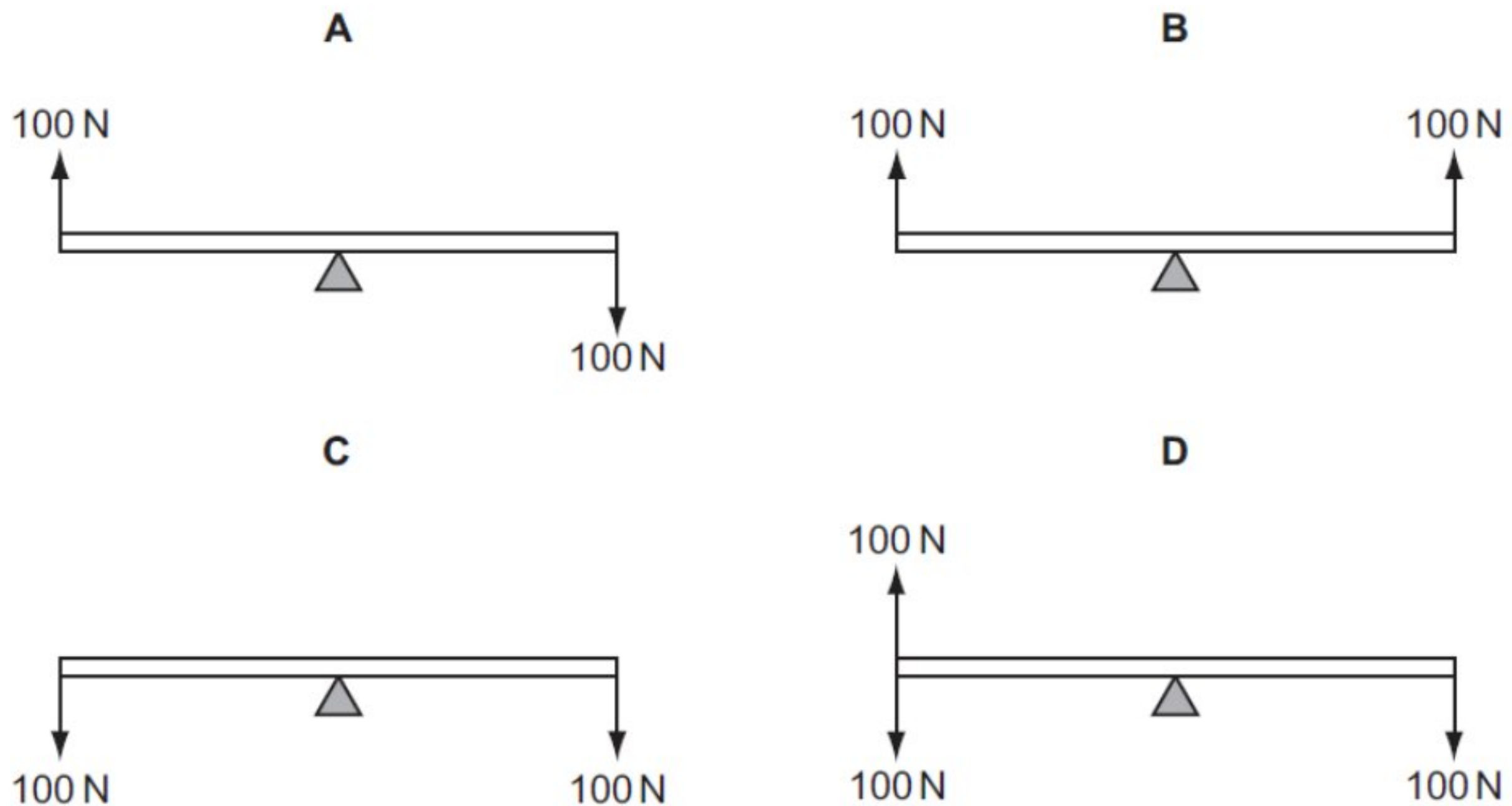


Topic 5.2– Force and moment-turning effect

1.

A uniform rod rests on a pivot at its centre. The rod is not attached to the pivot. Forces are then applied to the rod in four different ways, as shown. The weight of the rod can be ignored.

Which diagram shows the rod in equilibrium?



2.

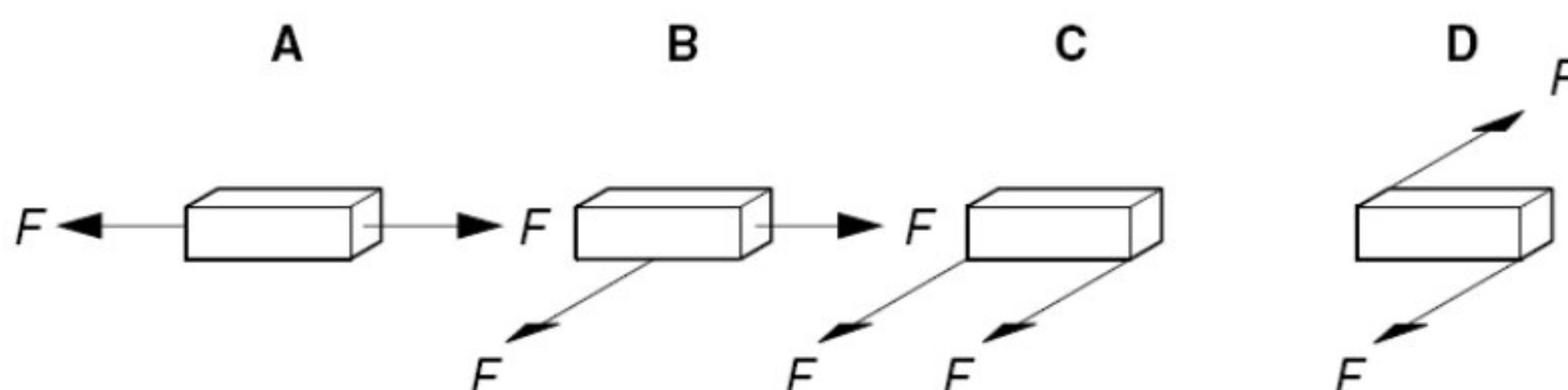
What are the conditions for equilibrium?

	resultant force acting	resultant turning effect acting
A	yes	yes
B	yes	no
C	no	yes
D	no	no

3.

The diagrams show a brick resting on a smooth surface. Two equal forces F act on the brick.

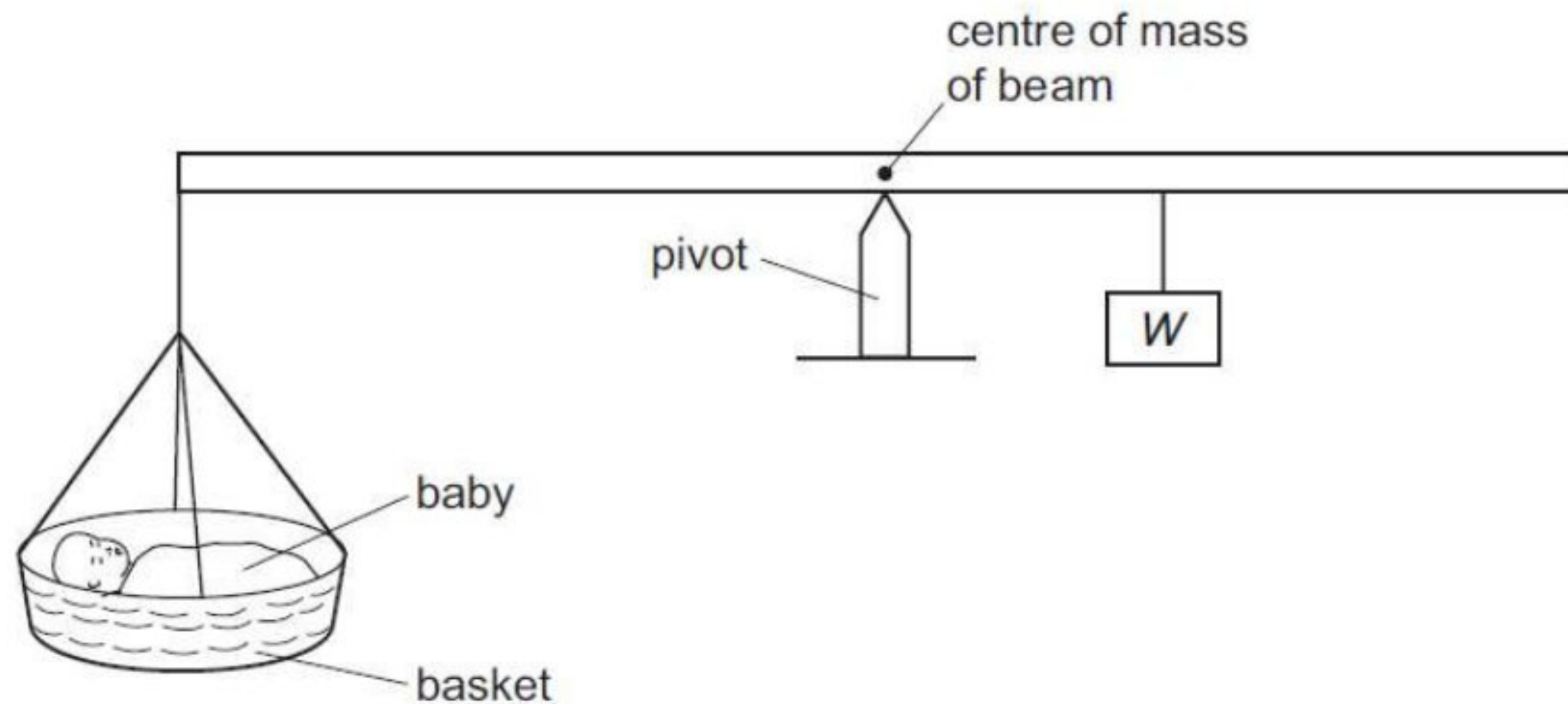
In which diagram does the brick **not** move?



4.

The diagram shows a balance being used to find the weight of a baby. The weight of the basket can be ignored.

At equilibrium, the pivot is nearer to the weight W than to the baby.

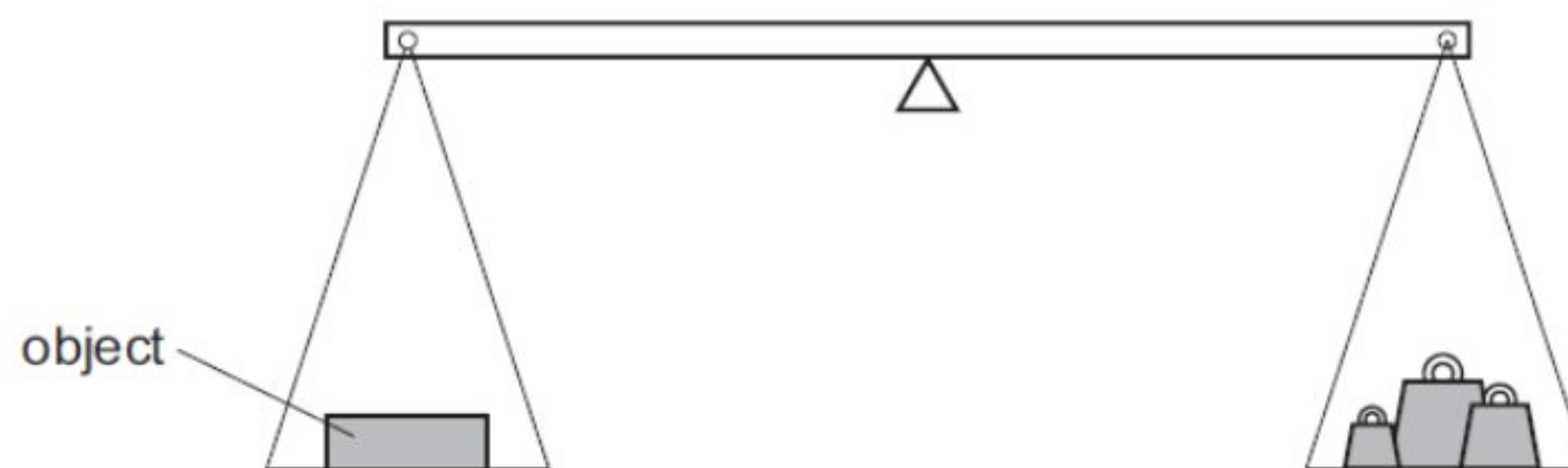


What is the weight of the baby?

- A** less than W
- B** more than W
- C** W
- D** impossible to tell

5.

The weight of an object is to be found using the balance shown in the diagram.



The object is put in the left-hand pan and various standard weights are put in the right-hand pan. These are the results.

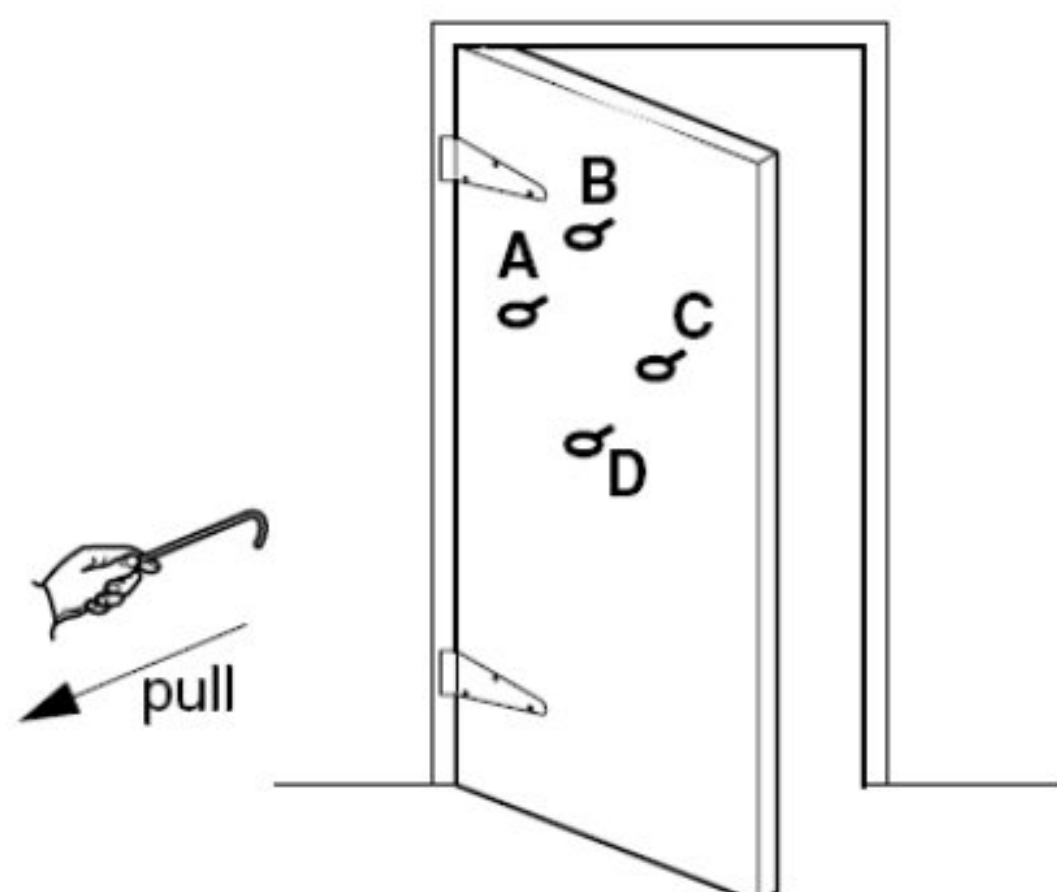
weights in the right-hand pan	effect
0.1 N, 0.1 N, 0.05 N, 0.02 N	balance tips down slightly on the left-hand side
0.2 N, 0.1 N, 0.01 N	balance tips down slightly on the right-hand side

What is the best estimate of the weight of the object?

- A** 0.27 N
- B** 0.29 N
- C** 0.31 N
- D** 0.58 N

6.

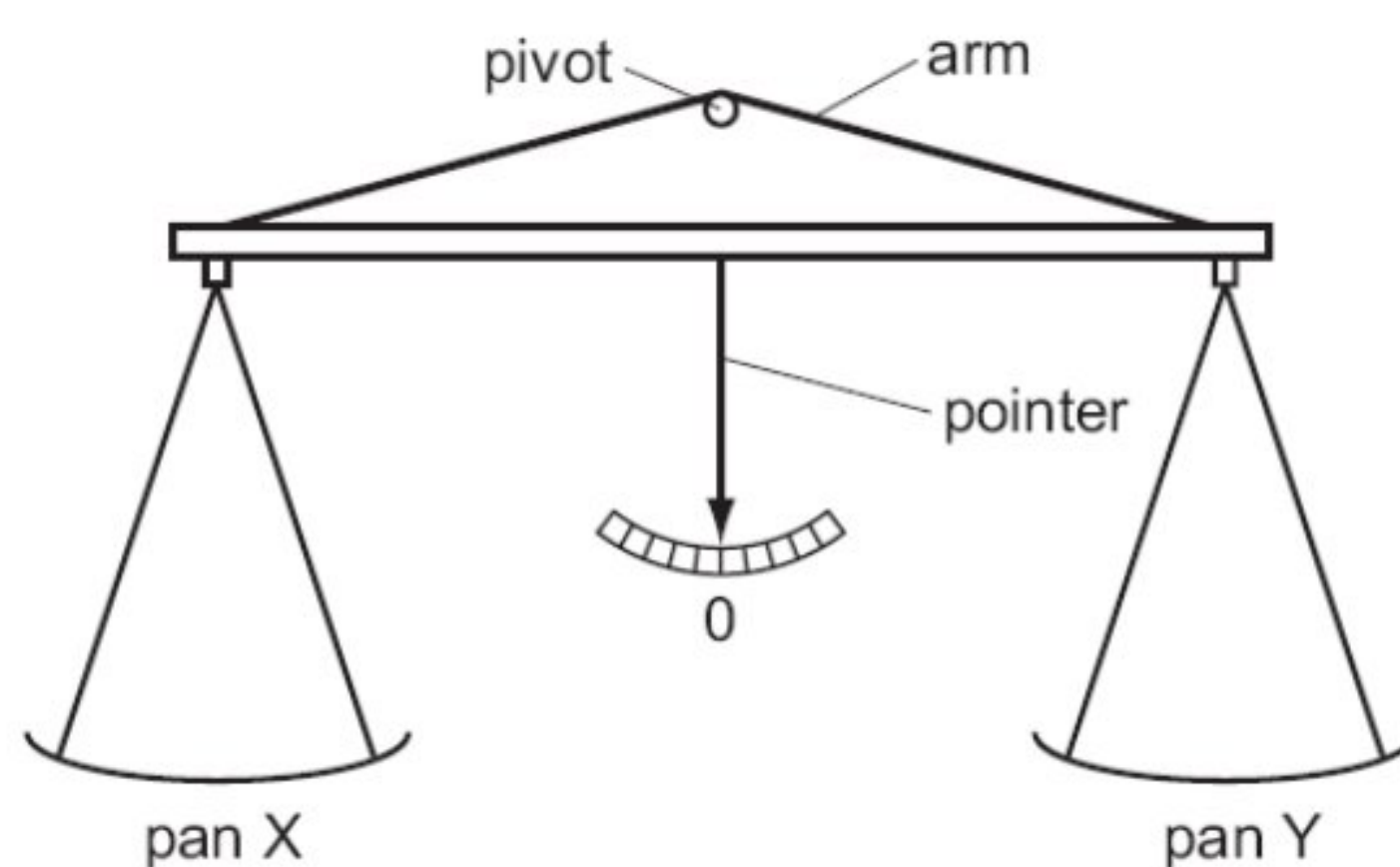
Four rings are screwed into a door, as shown. The door can be opened by putting a hook into one of the rings and pulling.



Which ring should be used if the pulling force is to be as small as possible?

7.

A simple balance has two pans suspended from the ends of arms of equal length. When it is balanced, the pointer is at 0.



Four masses (in total) are placed on the pans, with one or more on pan X and the rest on pan Y.

Which combination of masses can be used to balance the pans?

- A 1 g, 1 g, 5 g, 10 g
- B 1 g, 2 g, 2 g, 5 g
- C 2 g, 5 g, 5 g, 10 g
- D 2 g, 5 g, 10 g, 10 g

8.

The weights of four objects, 1 to 4, are compared using a balance.



Which object is the lightest?

- A** object 1 **B** object 2 **C** object 3 **D** object 4

9.

Two forces act on an object.

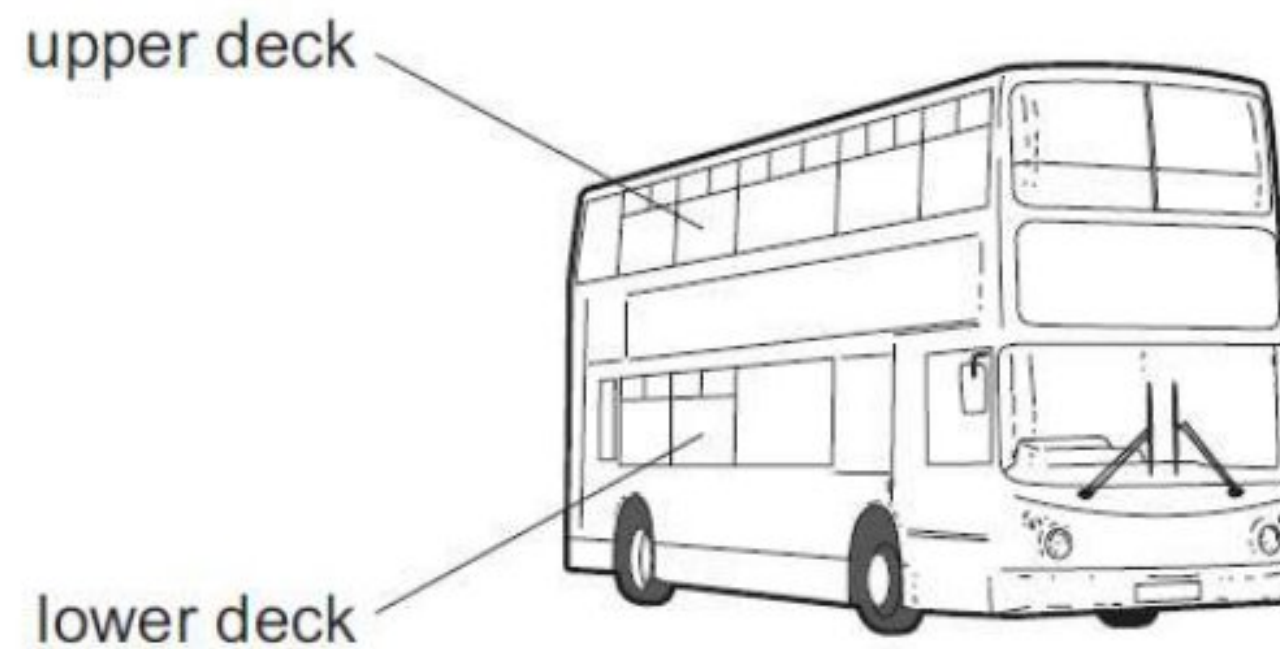
In which situation is it **impossible** for the object to be in equilibrium?

- A** The two forces act in the same direction.
- B** The two forces act through the same point.
- C** The two forces are of the same type.
- D** The two forces are the same size.

Topic 5.3 – Force and moment-centre of mass

1.

Passengers are **not** allowed to stand on the upper deck of double-decker buses.



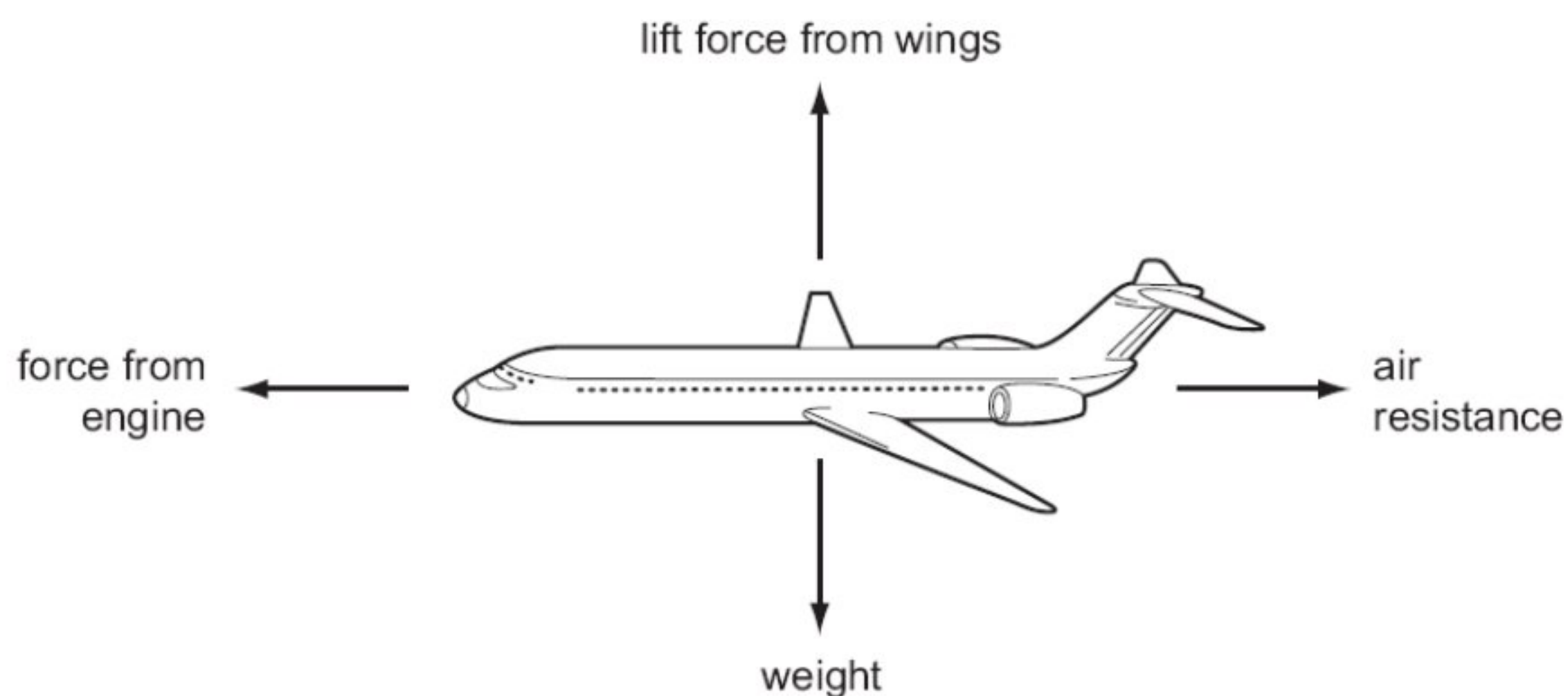
Why is this?

- A** They would cause the bus to become unstable.
- B** They would cause the bus to slow down.
- C** They would increase the kinetic energy of the bus.
- D** They would lower the centre of mass of the bus.

2.

An aeroplane is in equilibrium.

The diagram shows the forces acting on the aeroplane.



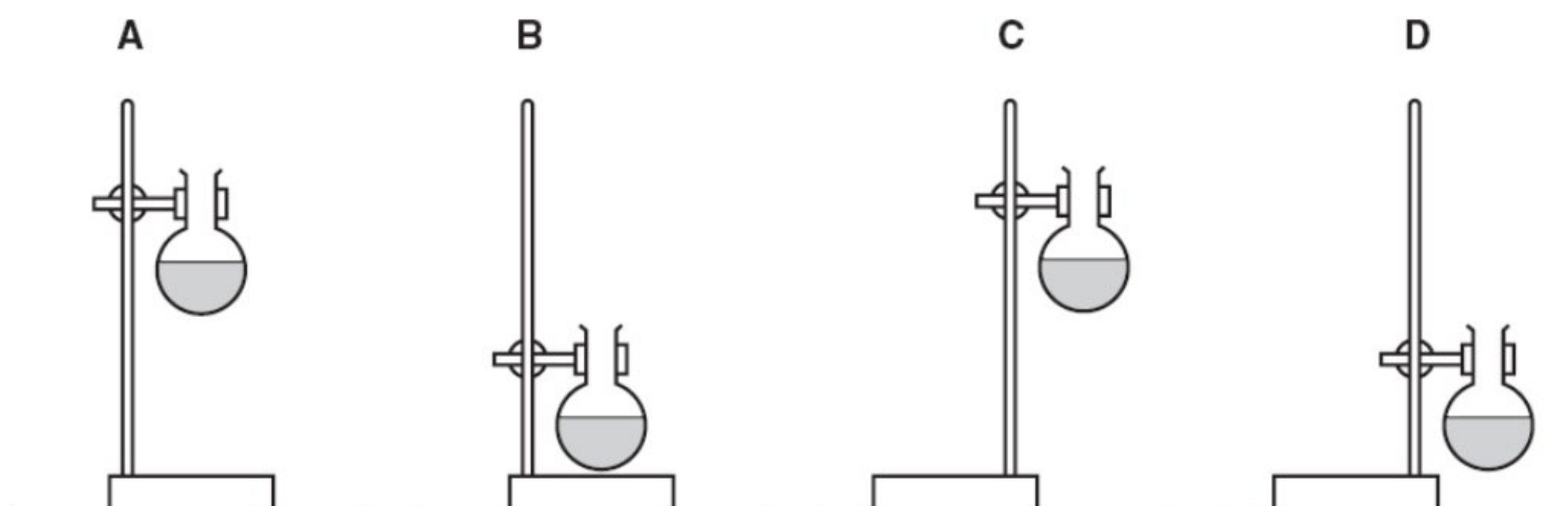
Which statement about the forces is correct?

	force from engine	lift force from wings
A	equal to air resistance	equal to weight
B	equal to air resistance	greater than weight
C	greater than air resistance	equal to weight
D	greater than air resistance	greater than weight

3.

A student uses a stand and clamp to hold a flask of liquid.

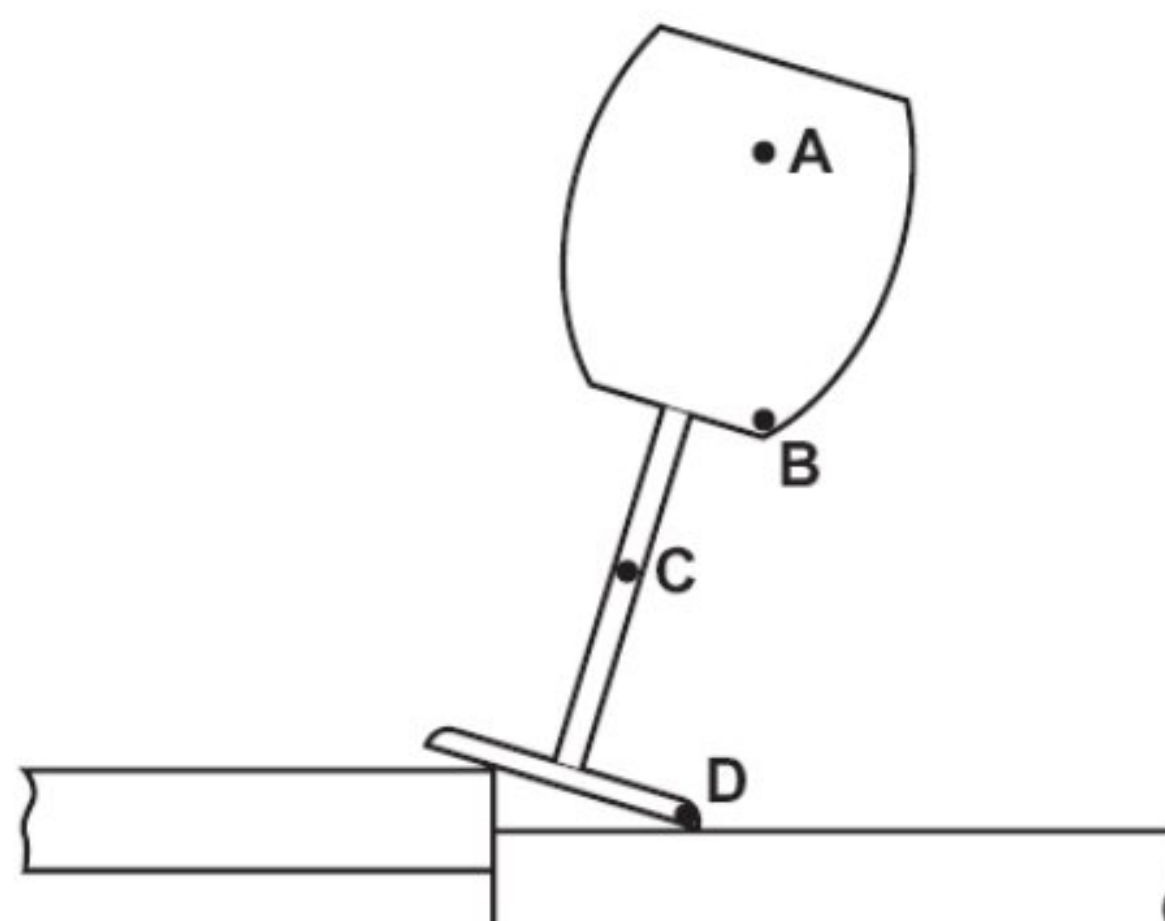
Which diagram shows the most stable arrangement?



4.

An empty glass is placed on a join between two tables as shown. The glass remains stable.

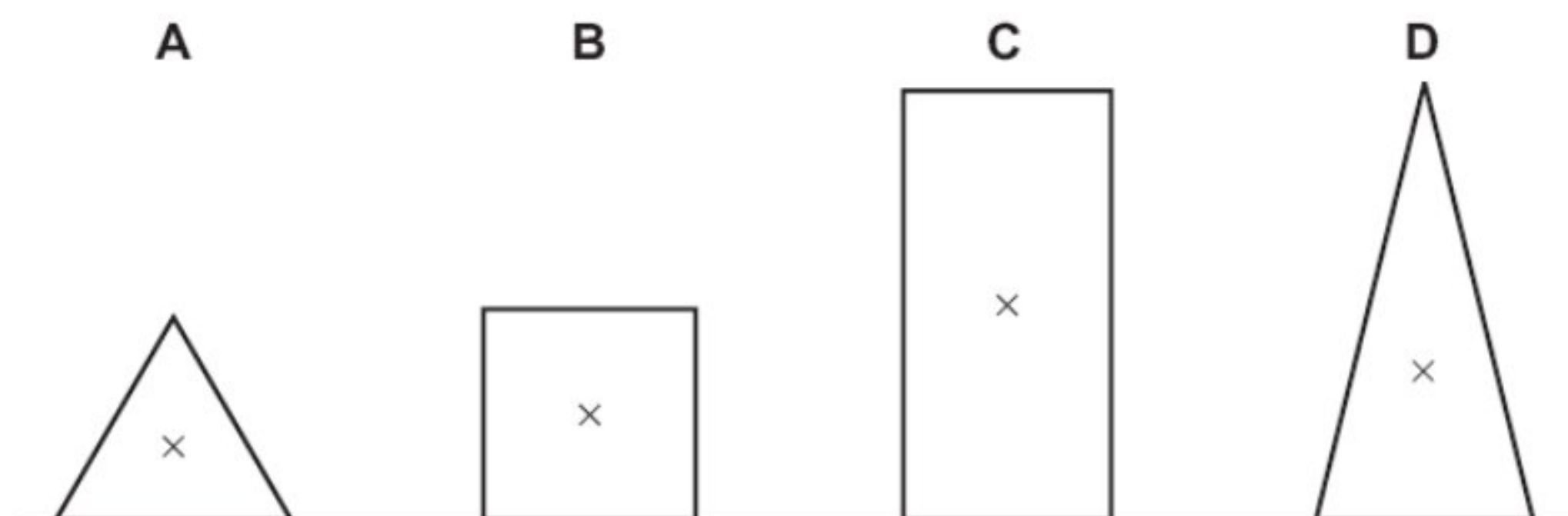
Which point is the centre of mass of the glass?



5.

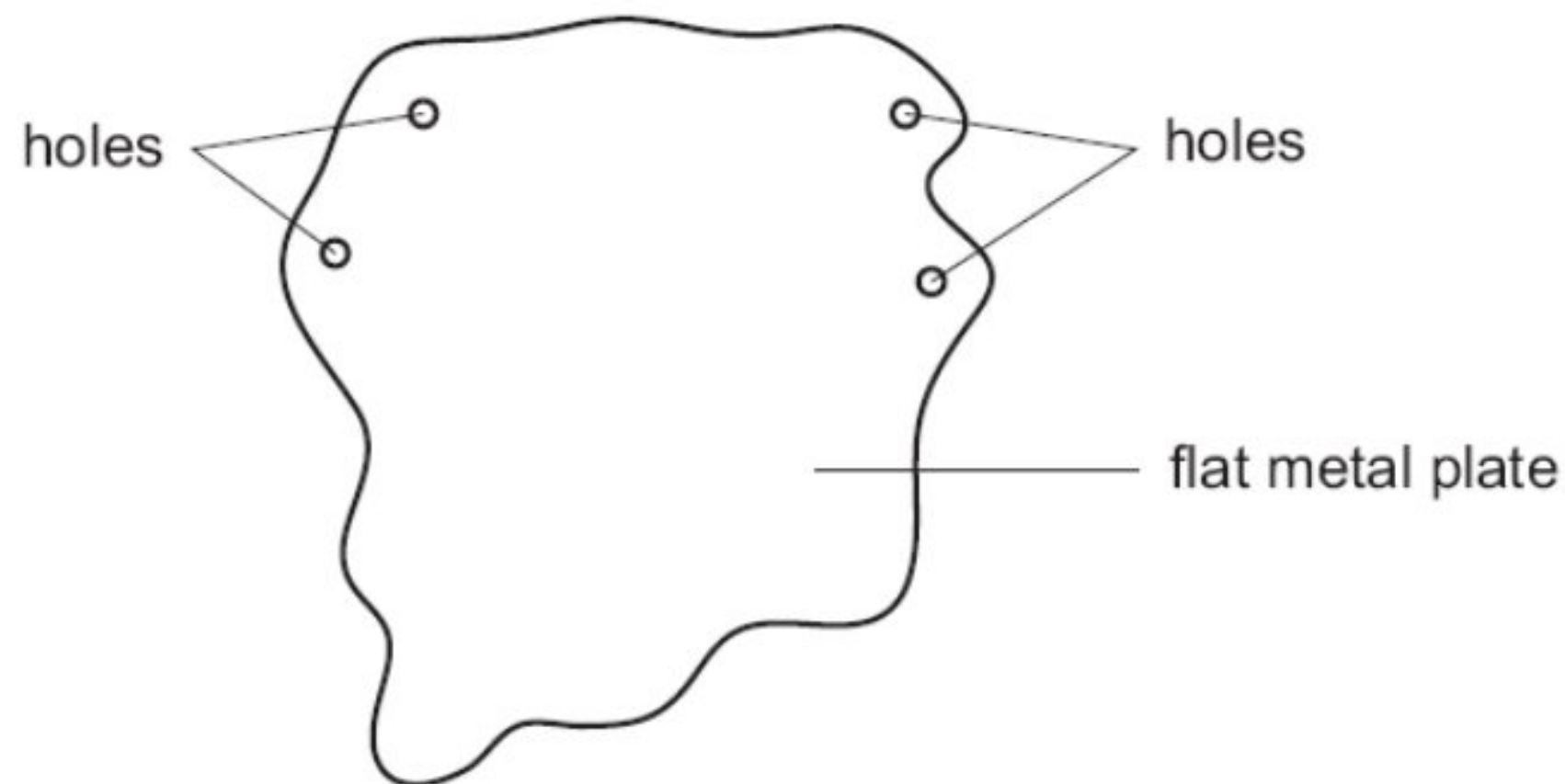
The diagram shows sections of four objects of equal mass. The position of the centre of mass of each object has been marked with a cross.

Which object is the most stable?



6.

The diagram shows a flat metal plate that may be hung from a nail so that it can rotate about any of four holes.



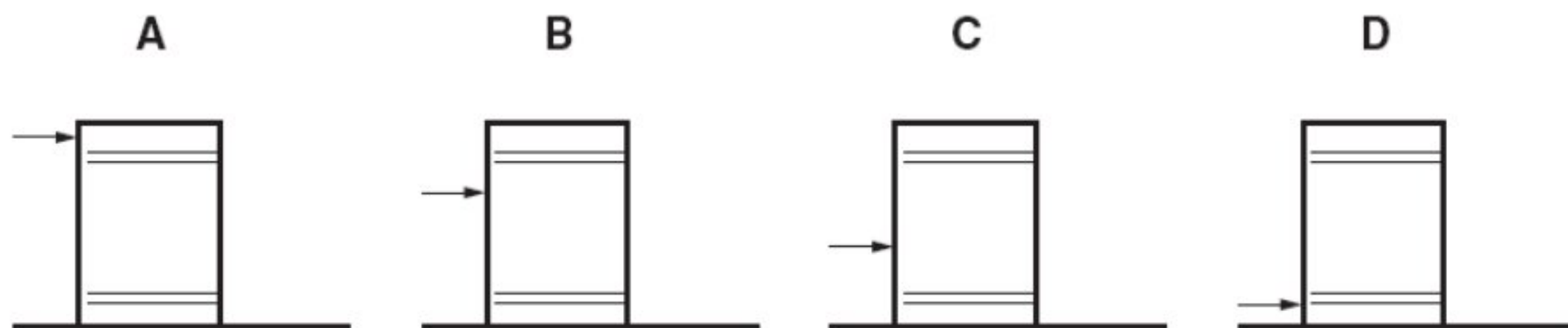
What is the smallest number of holes from which the flat metal plate should be hung in order to find its centre of gravity?

- A** 1 **B** 2 **C** 3 **D** 4

7.

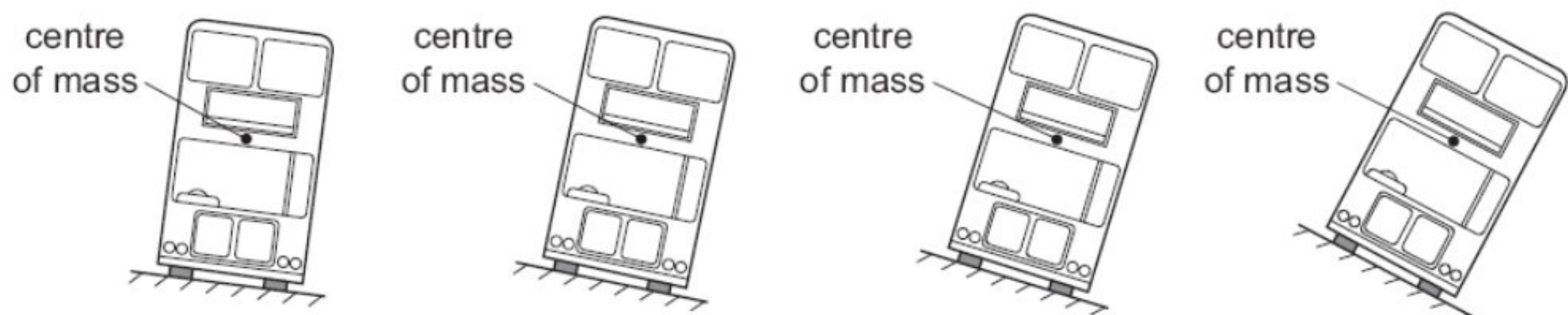
A child tries to push over a large empty oil drum.

Where should the drum be pushed to topple it over with least force?



8.

The diagram shows four models of buses placed on different ramps.



How many of these models will fall over?

- A** 1 **B** 2 **C** 3 **D** 4

9.

The diagram shows four objects standing on a flat surface.

The centre of mass of each object is marked M.

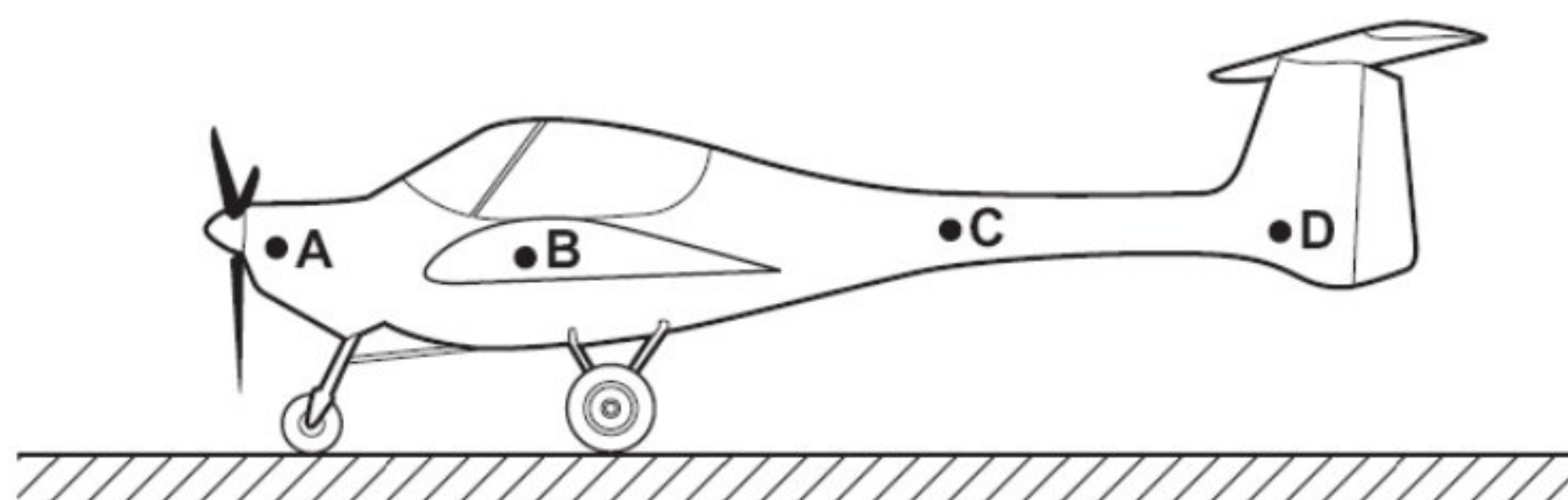
Which object will fall over?



10.

A light aircraft stands at rest on the ground. It stands on three wheels, one at the front and two further back.

Which point could be its centre of mass?



11.

A piece of card has its centre of mass at M.

Which diagram shows how it hangs when suspended by a thread?

