

1.5 Moments/ Centre of Mass

Question Paper

Level	IGCSE
Subject	Physics (0625)
Exam Board	Cambridge International Examinations(CIE)
Topic	General Physics
Sub Topic	1.5 Moments / Centre of Mass
Booklet	Question Paper

Time Allowed: 22 minutes

Score: /18

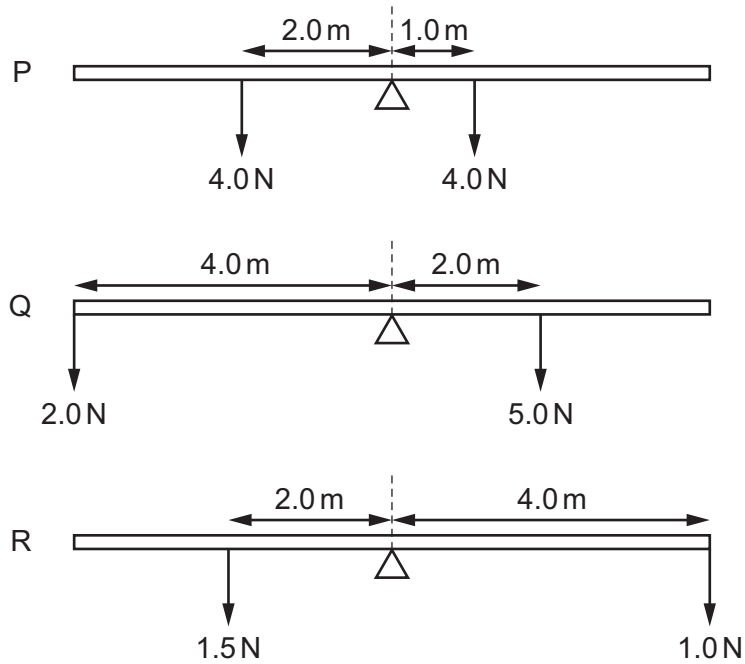
Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 The diagrams show three uniform beams P, Q and R, each pivoted at its centre.

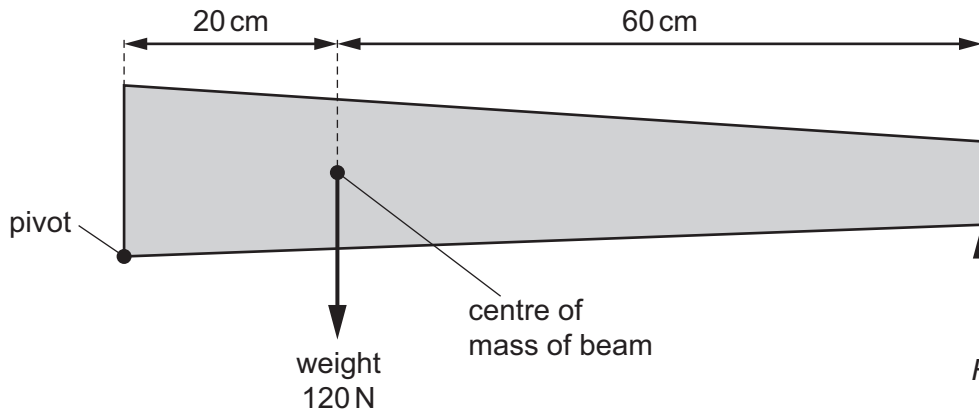
The two forces acting on each beam are also shown.



Which beams rotate clockwise?

- A P and Q only
- B P and R only
- C Q and R only
- D P, Q and R

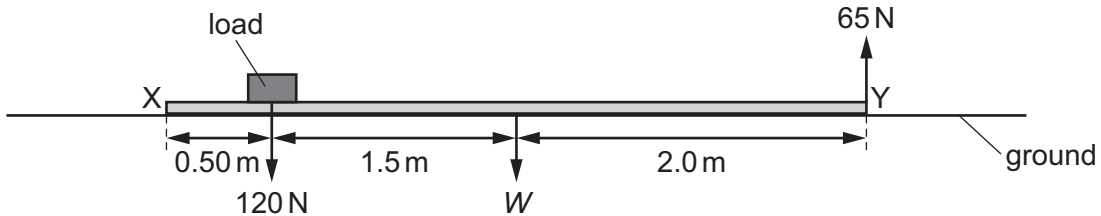
- 2 The diagram shows a non-uniform beam of weight 120 N, pivoted at one end. The beam is kept in equilibrium by force F .



What is the value of force F ?

- A 30 N B 40 N C 360 N D 480 N
- 3 A long plank XY lies on the ground. A load of 120 N is placed on it, at a distance of 0.50 m from end X, as shown.

End Y is lifted off the ground. The upward force needed to do this is 65 N.

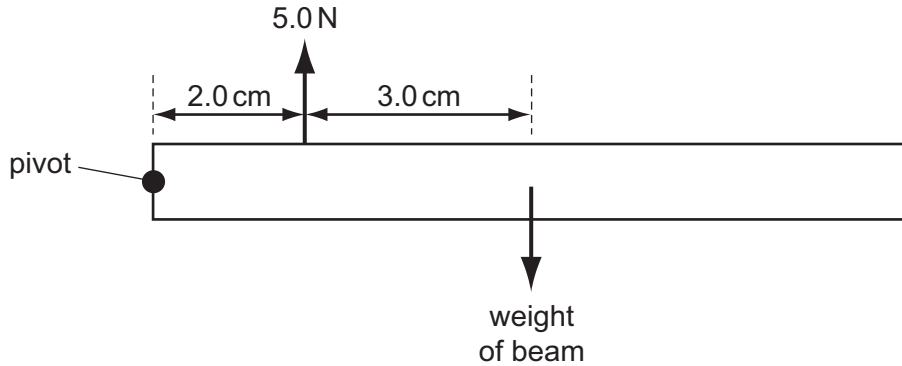


In the diagram, W is the weight of the plank, acting at its mid-point.

What is the value of W ?

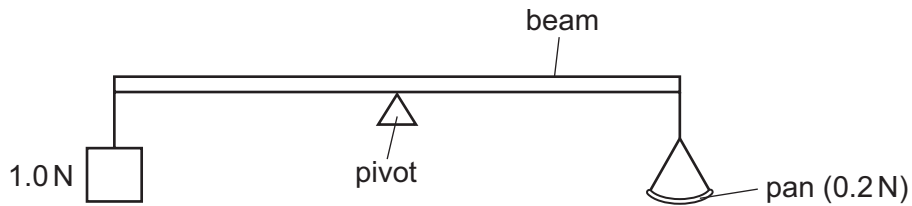
- A 35 N B 47 N C 100 N D 133 N

- 4 A beam pivoted at one end has a force of 5.0 N acting vertically upwards on it as shown. The beam is in equilibrium.



What is the weight of the beam?

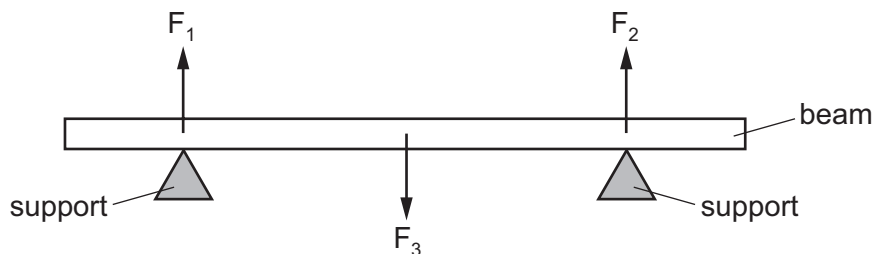
- A** 2.0 N **B** 3.0 N **C** 3.3 N **D** 5.0 N
- 5 The diagram shows a uniform beam being used as a balance. The beam is pivoted at its centre. A 1.0 N weight is attached to one end of the beam. An empty pan weighing 0.2 N is attached to the other end of the beam.



How many 0.1 N weights must be placed on the pan in order to balance the beam?

- A** 5 **B** 8 **C** 10 **D** 12

- 6 A heavy beam rests on two supports. The diagram shows the only three forces F_1 , F_2 and F_3 acting on the beam.



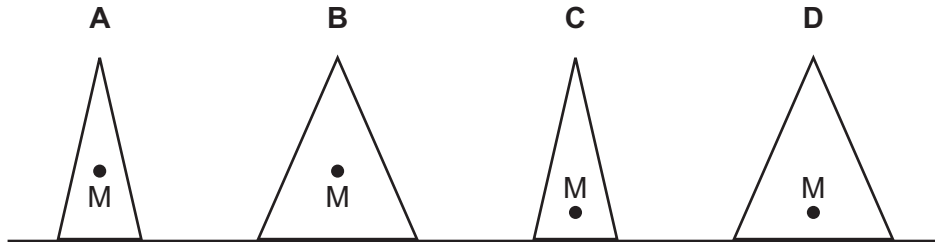
The beam is in equilibrium.

Which statement is correct?

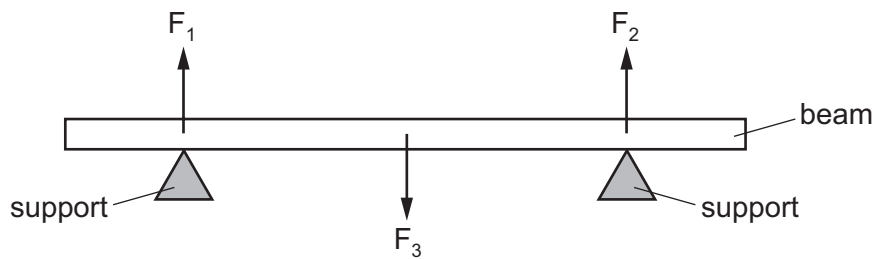
- A** All the forces are equal in size.
- B** The resultant force on the beam is in the opposite direction to the resultant turning effect.
- C** The resultant force on the beam is zero and the resultant turning effect on the beam is zero.
- D** The total upward force is twice the total downward force.

- 7 The diagrams show four solid cones. The centre of mass of each cone is marked by a point labelled M.

Which cone is the most stable?



- 8 A heavy beam rests on two supports. The diagram shows the only three forces F_1 , F_2 and F_3 acting on the beam.



The beam is in equilibrium.

Which statement is correct?

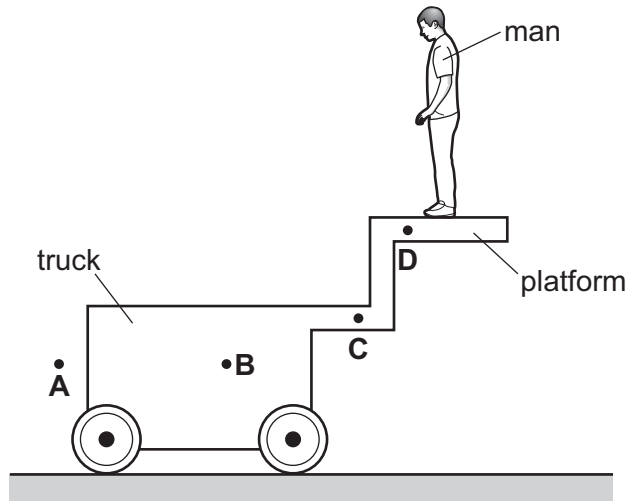
- A All the forces are equal in size.
- B The resultant force on the beam is in the opposite direction to the resultant turning effect.
- C The resultant force on the beam is zero and the resultant turning effect on the beam is zero.
- D The total upward force is twice the total downward force.

9 A heavy truck on wheels has a platform attached to it.

A man stands on the platform.

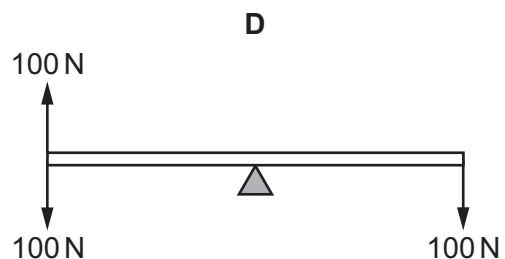
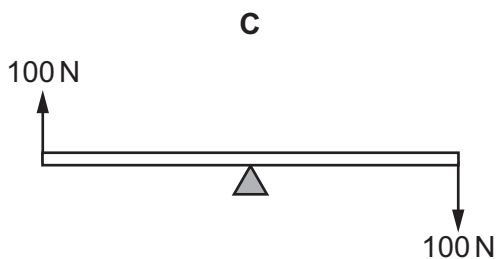
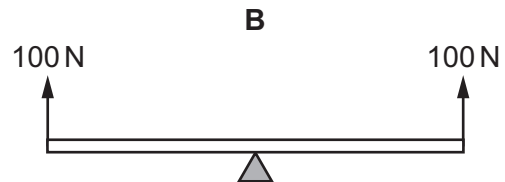
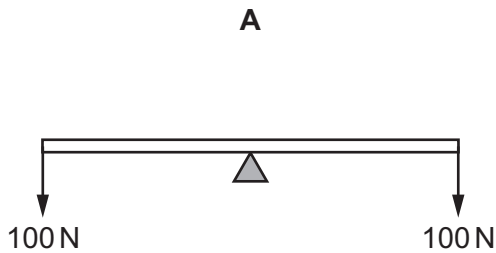
The truck does not fall over.

Which position **A**, **B**, **C** or **D** could be the centre of mass of the whole system (truck, platform and man)?



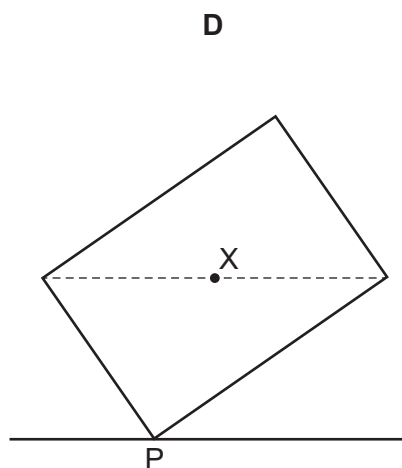
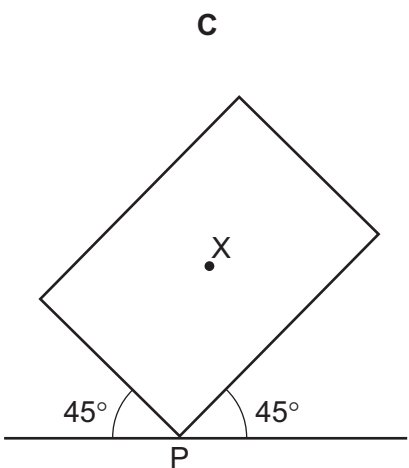
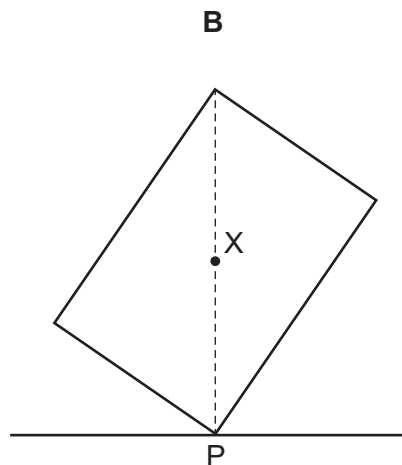
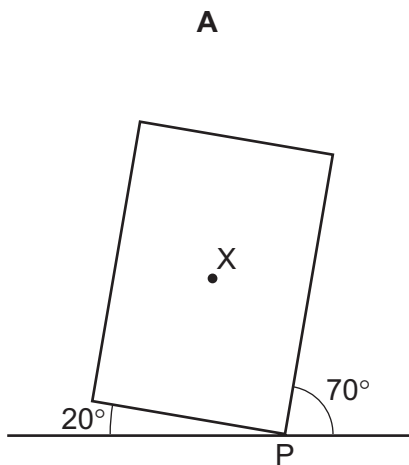
10 A uniform rod rests on a pivot at its centre. The rod is not attached to the pivot. Forces are then applied to the rod in four different ways, as shown. The weight of the rod can be ignored.

Which diagram shows the rod in equilibrium?



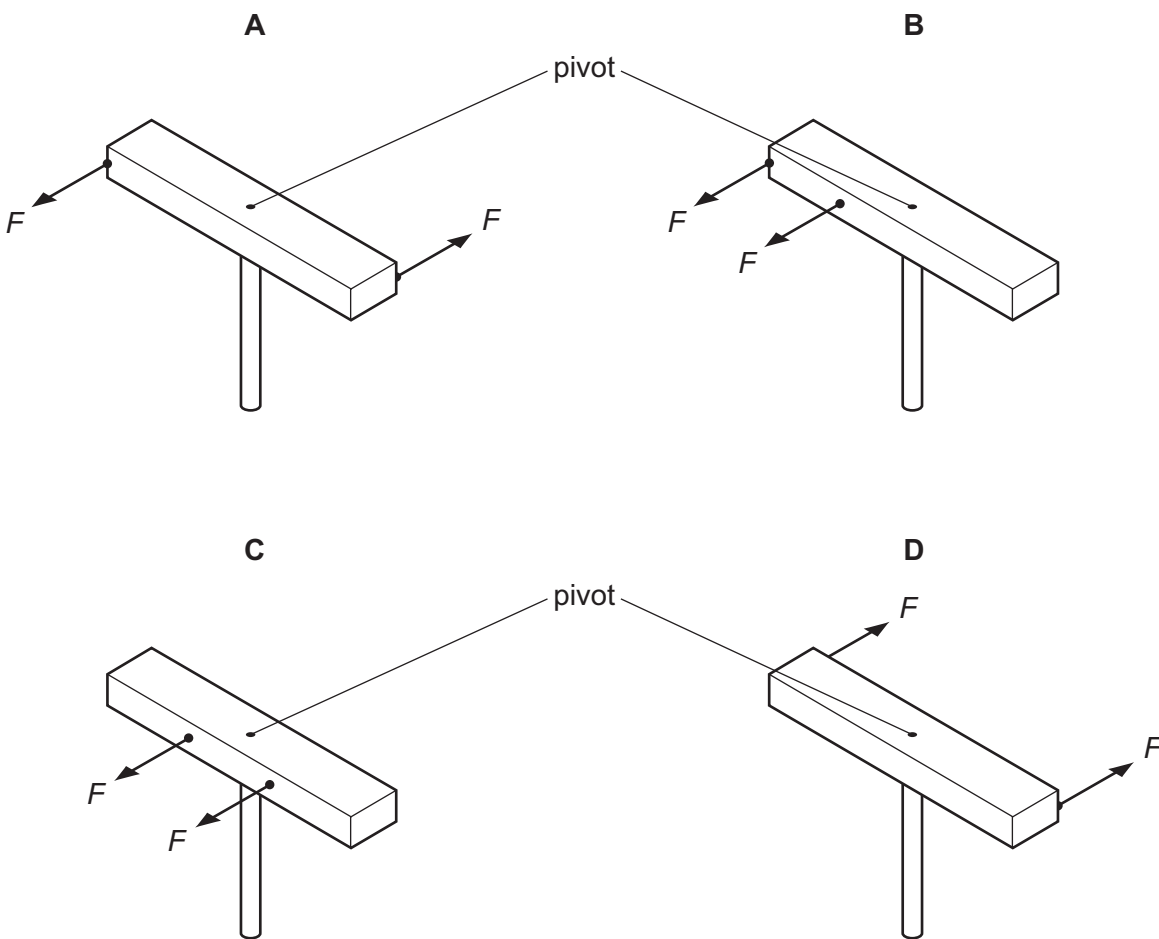
11 A plane lamina with centre of mass X touches the ground at point P .

Which diagram shows the lamina in equilibrium?

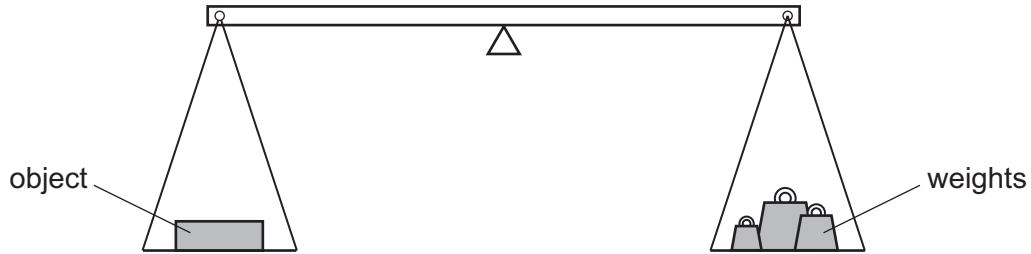


- 12 A wooden bar is pivoted at its centre so that it can rotate freely. Two equal forces F are applied to the bar.

In which diagram is the turning effect greatest?



- 13 The weight of an object is found using the balance shown in the diagram. The object is put in the left-hand pan and various weights are put in the right-hand pan.



These are the results.

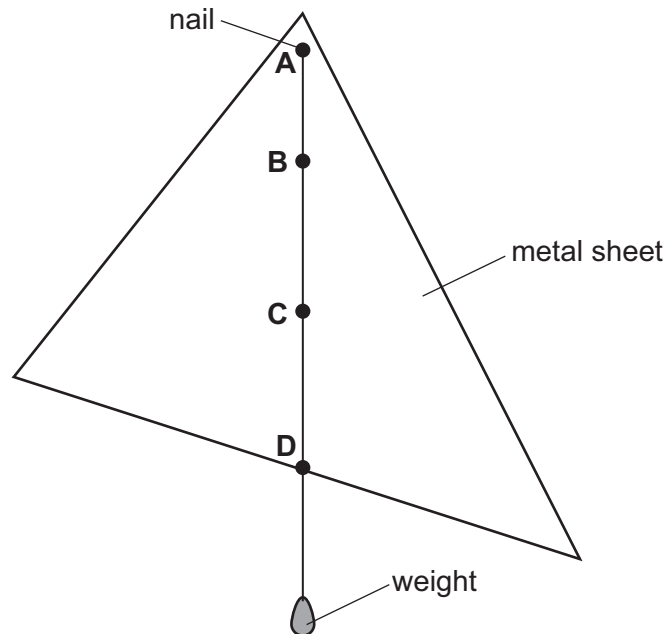
weights in the right-hand pan	effect
0.1 N, 0.1 N, 0.05 N, 0.02 N	balance tips down slightly on the left-hand side
0.2 N, 0.1 N, 0.01 N	balance tips down slightly on the right-hand side

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

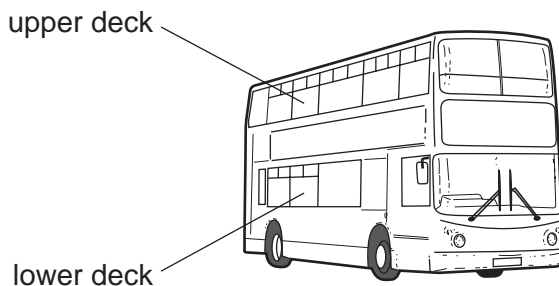
- A** 0.27 N **B** 0.29 N **C** 0.31 N **D** 0.58 N
- 14 The diagram shows a uniform, flat metal sheet hanging freely from a nail at point **A**. A weight also hangs freely on a string tied to **A**.

One of the labelled points is at the centre of mass of the metal sheet.

Which point is at the centre of mass?



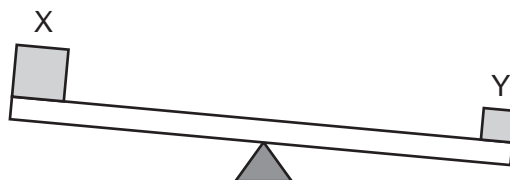
- 15 Passengers are **not** allowed to stand on the upper deck of double-decker buses.



Why is this?

- A They would cause the bus to become less stable.
 - 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.
- 16 Two objects X and Y are placed on a balance.

The balance tilts as shown.

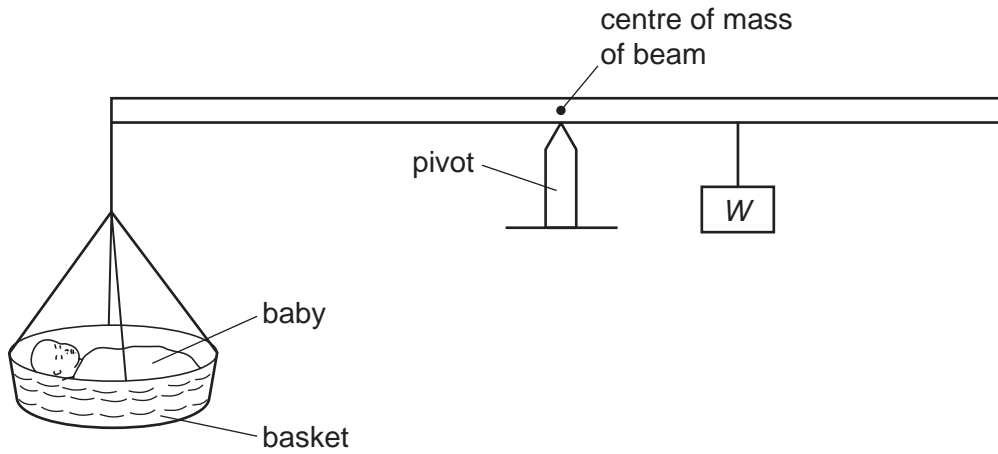


What does this show about the masses and weights of objects X and Y?

	masses	weights
A	X has less mass than Y	X has less weight than Y
B	X has less mass than Y	X has more weight than Y
C	X has the same mass as Y	X has less weight than Y
D	X has the same mass as Y	X has more weight than Y

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

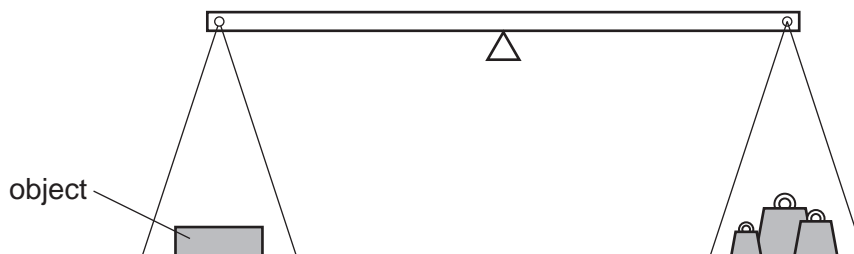
At equilibrium, the pivot is nearer to the weight W than to the baby.



What is the weight of the baby?

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

- 18 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