

# ConcepTest PowerPoints

## Chapter 9

*Physics: Principles with Applications, 6<sup>th</sup> edition*

Giancoli

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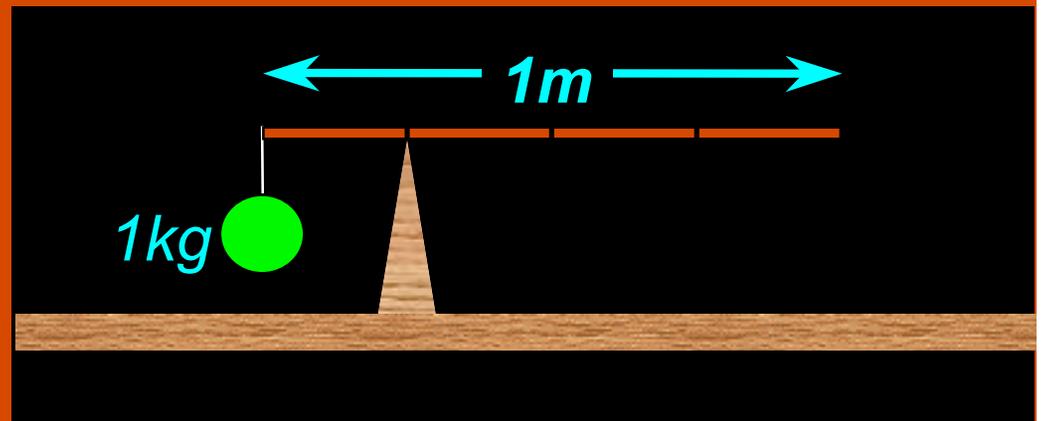
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## ConceptTest 9.1

## Balancing Rod

A **1 kg** ball is hung at the end of a rod **1 m** long. If the system balances at a point on the rod **0.25 m** from the end holding the mass, what is the mass of the rod?

- 1) 1/4 kg
- 2) 1/2 kg
- 3) 1 kg
- 4) 2 kg
- 5) 4 kg



## ConceptTest 9.1

## Balancing Rod

A **1 kg** ball is hung at the end of a rod **1 m** long. If the system balances at a point on the rod **0.25 m** from the end holding the mass, what is the mass of the rod?

1) 1/4 kg

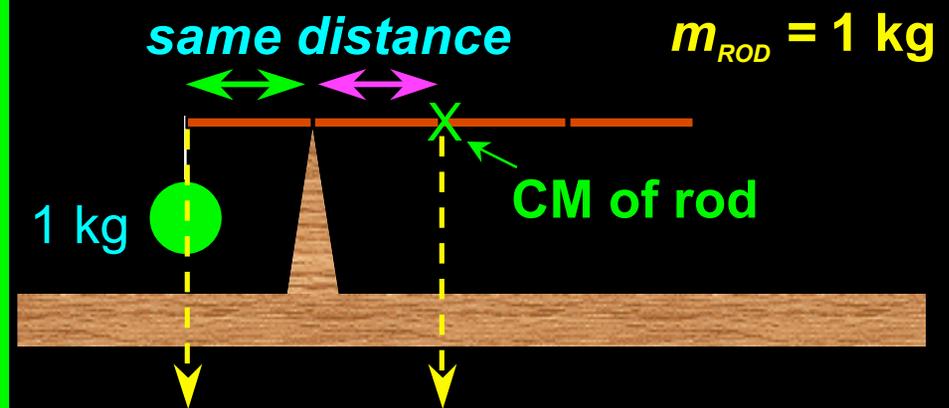
2) 1/2 kg

3) 1 kg

4) 2 kg

5) 4 kg

The total torque about the pivot must be zero !! The CM of the rod is at its center, **0.25 m** to the right of the pivot. Since this must balance the ball, which is the **same distance** to the left of the pivot, the masses must be the same !!

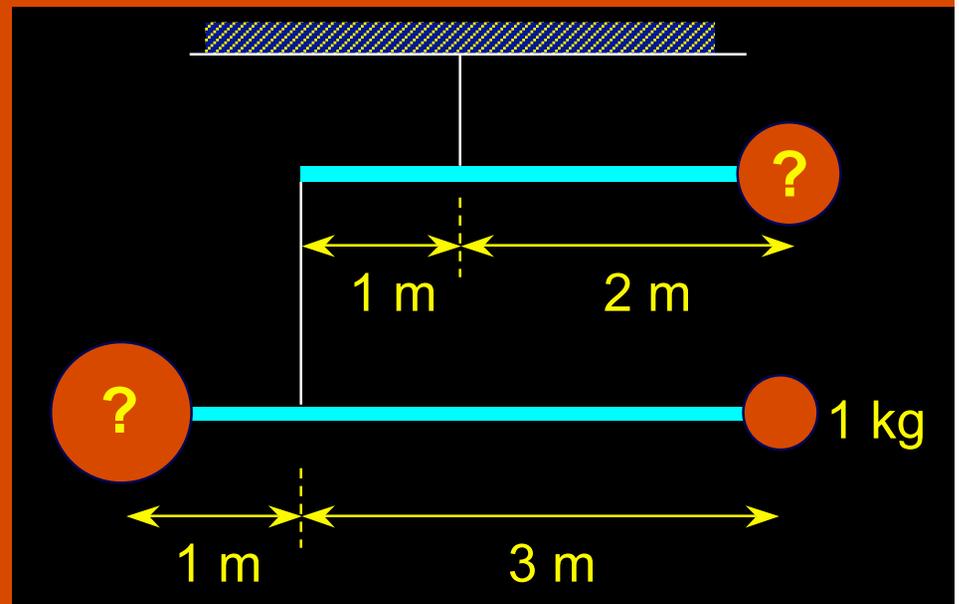


## ConceptTest 9.2

## Mobile

A (static) mobile hangs as shown below. The rods are massless and have lengths as indicated. The mass of the ball at the bottom right is **1 kg**. What is the total mass of the mobile?

- 1) 5 kg
- 2) 6 kg
- 3) 7 kg
- 4) 8 kg
- 5) 9 kg



## ConceptTest 9.2

## Mobile

A (static) mobile hangs as shown below. The rods are massless and have lengths as indicated. The mass of the ball at the bottom right is **1 kg**. **What is the total mass of the mobile?**

1) 5 kg

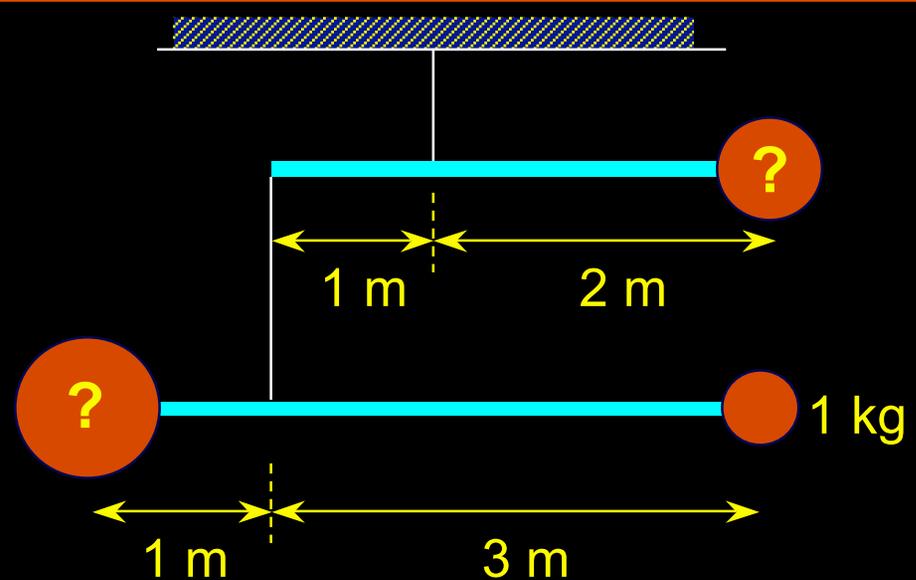
2) 6 kg

3) 7 kg

4) 8 kg

5) 9 kg

Use torques in two steps: (1) find the big mass on the bottom left (lower rod only). (2) use the entire lower rod assembly (with two masses) to find the mass on top right. **Finally, add up all the masses.**

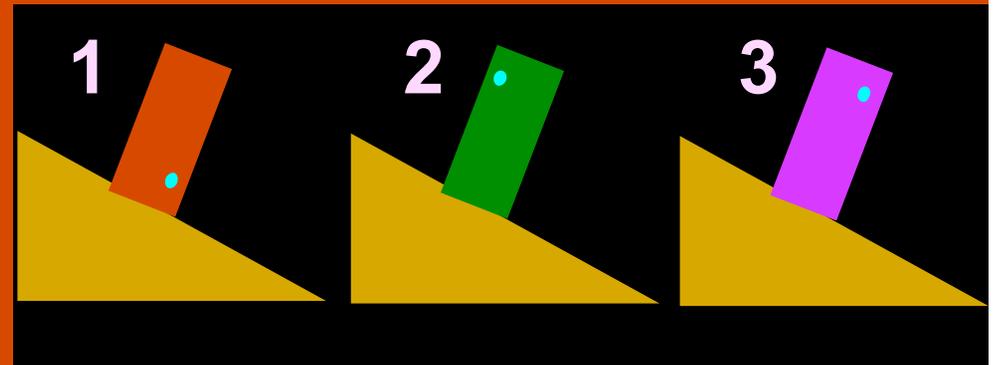


## ConceptTest 9.3a

## Tipping Over I

A box is placed on a ramp in the configurations shown below. Friction prevents it from sliding. The center of mass of the box is indicated by a blue dot in each case. In which case(s) does the box tip over?

- 1) all
- 2) 1 only
- 3) 2 only
- 4) 3 only
- 5) 2 and 3



## ConceptTest 9.3a

## Tipping Over I

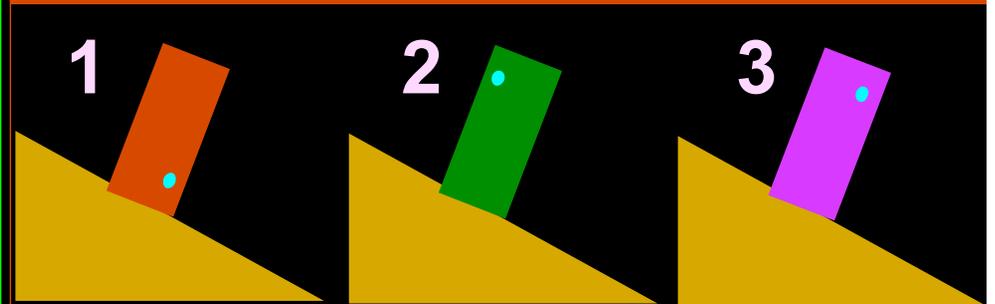
A box is placed on a ramp in the configurations shown below. Friction prevents it from sliding. The center of mass of the box is indicated by a blue dot in each case. In which case(s) does the box tip over?

- 1) all
- 2) 1 only
- 3) 2 only
- 4) 3 only
- 5) 2 and 3

The torque due to gravity acts like all the mass of an object is concentrated at the CM.

Consider the bottom right corner of the box to be a pivot point.

If the box can rotate such that the CM is lowered, it will !!

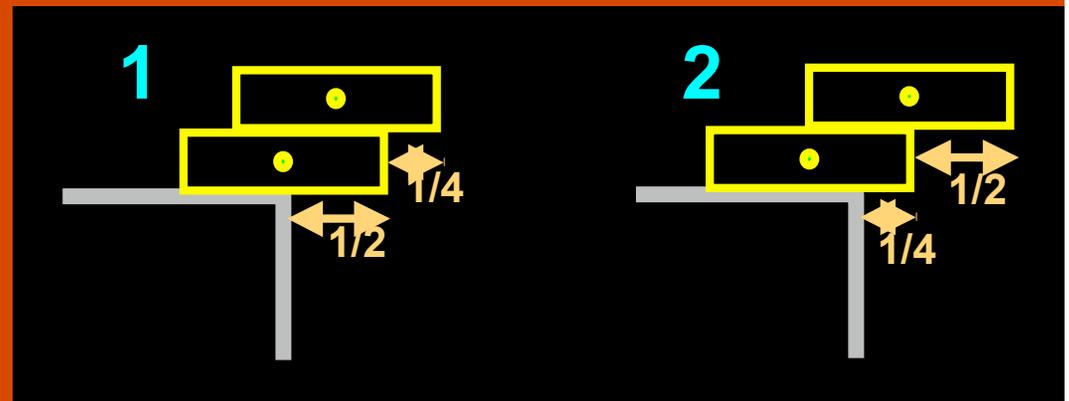


## ConceptTest 9.3b

## Tipping Over II

Consider the two configurations of books shown below. Which of the following is true?

- 1) case 1 will tip
- 2) case 2 will tip
- 3) both will tip
- 4) neither will tip



## ConceptTest 9.3b

## Tipping Over II

Consider the two configurations of books shown below. Which of the following is true?

- 1) case 1 will tip
- 2) case 2 will tip
- 3) both will tip
- 4) neither will tip

The CM of the system is midway between the CM of each book. Therefore, the CM of case #1 is not over the table, so it will tip.

