

## 6A Class Presentation

Michael: Do you know what inertia is?

Today, we are going to show you what inertia is by conducting 3 experiments.

### Experiment 1

Eric: What are you doing, Yvette?

Yvette: Mr Ng told me that these two are different. But I cannot find the differences between them.

Eric: Really? Let me check it... I think they are equal in weight. And their shapes are the same too but one is hollow while the other is not

Raymond: I know the secret, let's do an experiment.

Eric & Yvette: Ok!!

Raymond: We put these two on the inclined plane and let them roll down freely.

Eric: Oh, they do not reach the bottom at the same time.

Yvette: Yeah, that's unbelievable! But why?

Raymond: This is because they have different moment of inertia. This is related to the angular momentum in physics. Let me explain more easily. For the hollow one, its mass concentrates around the sides so its moment of inertia is larger. That's why it rolled slower.

Eric: Let me guess. Another one's mass should distribute evenly, so it has smaller moment of inertia and it rolled faster.

Raymond: Yes, you are right.

### Experiment 2

Austin : Do you know the trick to rotate faster?

Anthony : I don't know. What is it?

Austin : It is to put your hands in front of your chest as a cross shape during rotating.

Anthony : I think there are no differences in the rotating speed by the ways we put our hands during rotating.

Austin : You are wrong! There are differences. Let me show you by an experiment. For safety, the experiment will be carried out on the ground. We are sorry that students at the back may not be able to see the experiment. First, you should sit on this chair and hold two dumbbells in hands. Second, you can start to rotate yourself. When you extend your hands, you will rotate slowly. When you put your hands at the front of your chest as a cross shape, you will rotate faster.

Anthony : That's amazing. What is the principle of this motion?

Austin : It is related to a concept in physics called moment of inertia. It depends on the distribution of the mass. When the mass is distributed to a long distance from the axis of rotation, the moment of inertia of the object increases, it is more difficult to rotate it, and hence the rotating speed decreases.

Anthony : Oh, I got it now!

### Experiment 3

Sherman: Hey! I've got a little test for you two. There are two eggs labelled A and B, can you tell me the difference between the two eggs?

Julie: Um..... There's no big difference from their looks.

May: Let me guess. Is it that one of them is raw and another one is boiled?

Sherman: Yes! You are smart! But can you tell me which the boiled egg is without cracking the shell?

May: I need to carry out a simple experiment to distinguish them. Julie, can you help to spin the two eggs on the desk?

Julie: OK. (spin the eggs) Oh, egg "A" spun very fast and even stood up spinning! But egg "B" only wobbled slowly for a while, and eventually stopped.

May: I know the answer now. Egg "A" is boiled while egg "B" is raw. The boiled egg contains a solid phase inside and the raw egg contains fluid inside. When the raw egg is rotated, the liquid will move away from the centre to the egg shell. So more mass is distributed away from the axis of rotation, the moment of inertia is greater, therefore the raw egg wobbles.

Sherman: You are right! The solid mass in the boiled egg is more concentrated while spinning. There is a uniform motion as the boiled egg spins as one object, the moment of inertia is lower than the raw egg which contains liquid. As a result, the boiled egg spins faster.

Julie: Oh! This raw egg and boiled egg experiment reveals a principle in physics called moment of inertia. It's amazing to explain the daily life phenomena with our knowledge in physics!

All: Thank you.