

TIPPING TRUCK

Target	Teacher: Key Stage 3 (ages 11-14) This lesson plan is not intended to be handed out to students but to be use as a teacher preparation and tutorial.
Description	Investigate the critical point when a truck is tipping over. The position of centre of gravity is crucial for the balance of a body. This lesson allows the student to explore the concept of gravity and to find consequences rising from the position of centre of gravity. The example explores what causes a loaded truck to tip over, when does a book fall off a table and when does a person loose balance.
Learning objectives	Understand and explain the concept of centre of gravity. Understanding consequences of the position of the centre of gravity of an object. Understand and explain why an objects tips over/looses balance. Model a situation which demonstrates tipping over and create an interactive simulation.
Time frame	30-60 min
Keywords	centre of gravity, mass
In class	Discuss the centre of gravity. What makes an object tip over? What does it mean and what consequences does this phenomenon have in real life? Discuss possible situations of "tipping over" in class and put up suggestions on the board. Discuss how this can be visualized and explored in Algodoo using the Classmate PC. Let the students create scenes in Algodoo using the suggestions you came up with together or let them use their own ideas. Help the students make decisions and ask guiding questions. Encourage the students to follow the procedure Create – Predict – Interact – Evaluate. Allow the students to follow-up and share their experiences in class after the simulation.

Create a scene

Create a plane and make sure friction is high enough to prevent sliding. Create a number of "trucks" by using boxes with different density modeling different ways of loading a truck. The truck should be seen from the rear.

Make a prediction

Which truck will tip over first when the plane is tilted?

Run/Interact

Start the simulation. Tilt the Classmate PC and watch the trucks tip over.

Evaluate

Why do the trucks tip over? How should the truck be loaded in order to prevent tipping over? Where is the centre of gravity?

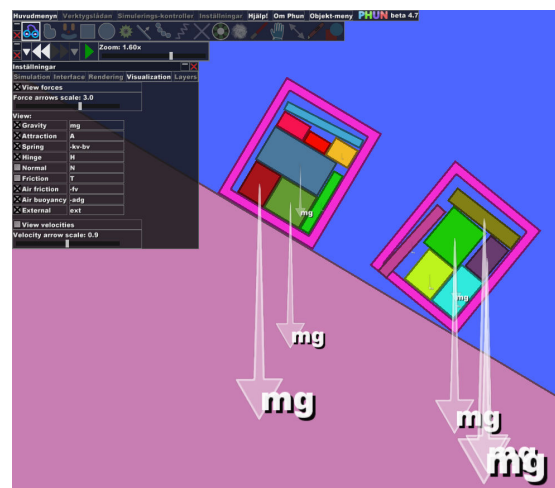
Note: Observe the position of the gravity vector.

Revise scene

Rearrange the loading in the trucks in order to make them more stable.

Make a prediction

How much can the plane be tilted before a truck will tip over? Which truck will tip over first?



Run/Interact

Start the simulation. Tilt the Classmate PC and watch the trucks tip over.

Evaluate

Why do the trucks tip over? How should the truck be loaded in order to prevent tipping over? What consequences may this have in real life situations?