



## Demonstrator # 17

# Circular Motion

### TEACHER NOTES

Activity title:

Motion

Theme:

Circular motion

Student age:

15 years

Time:

**100 min**

Scientific content

*gives needed science background (concepts, definitions, laws etc) including pre-requisite knowledge required and science concepts developed in the activity, includes relevant students' difficulties,*  
Concepts: speed, acceleration, graphic representation, dependent variable/independent variable, angular speed, period, frequency.

Elementary and basic skills: observation, identification of variables, practice graphic representation, registration and use of registered data

Learning Objectives

At the end of the lesson the pupils will be able to :

- ⇒ interpret the graphic of speed and acceleration as a function of time;
- ⇒ recognise different types of motion from the specific registered graphic;
- ⇒ measure and determine different motion' parameters;
- ⇒ exercise critical thinking skills by approaching the study of motion in different imposed conditions;
- ⇒ use accurately the scientific language;
- ⇒ compare different motions.

Inquiry based character of activity

*highlights the IBSE character of the activity, specifies a type of inquiry and lists inquiry-based skills (for details, definitions and terminology to use see 'Short guide for designing inquiry-based teaching materials')*

*Guided Investigation; Blended Investigation*

Teacher guided discovery

Applied Technology (if necessary)

Needed Materials

- **materials:** mechanical school kit, sensors, soft
- **time:** 100 min

Methodological Guide

## Project Number

505519-LLP-1-2009-1-GR-KA3-KA3MP

*describes method, student learning activities (discussions, investigations, data analysis, reflections etc.) and leading questions, includes a suggested time outline*



### Anticipation

- 📖 **Examples of contextual situated problems** – short films or sequences selected previously.
- 📖

### Building Knowledge

*Cube:* Pupils are organized in 6 groups; each group receive a different task as follows:

1. describe what you observed in film sequences,
2. exemplify other similar situations with what they observed in film,
3. apply in exercises
4. analyze each situation
5. represent graphically the speed versus time, associating the graphic with the observed motion in the film,
6. argument.

- 📖 The teacher monitor the quality of discussions between the pupils, their focus on the investigated subject, the relevance, pertinence and accuracy of the scientific language and approach..

### Reflection/Consolidation

- 📖 **Assessment method:** practical evaluation, exercises
- 📖 **Assessment instrument:** written ending sheet

**Alternate ending:** If there is not enough time both to collect and interpret the experimental data and graphs in the classroom, pupils will make that at home.

### Assessment

*provides suggestions how to assess the activity, preferable with concrete questions and expected student answers*

- ✓ Compare two different graphs of circular motion
- ✓ Graphical modelling of motion
- ✓ Oral, conversation
- ✓ Written ending sheet (1. An interesting idea; 2. One question; 3. A short comment)

## STUDENT WORKSHEET

Activity title:

### Circular motion

Introduction

*states a driving (research) question and outlines objectives*

**What kind of motion has a body moving on a circular trajectory?**

**What about the speed of the moving body?**

**Describe and argue.**

Thinking about the question

*if needed provides information about the science addressed*

Materials needed

**Centrifugal machine from the physics lab kit, accelerometers, antenna, computer**

*if needed provides list of materials*

Safety

*If needed lists warnings and cautions concerning the investigation*

## Investigation

1. *Make hypothesis about the speed of the body having a circular motion.*
2. *Observe the motion using the centrifugal machine.*
3. *Model the interactions you identify.*
4. *Argument your ideas and explanations.*

*Depending on the type of inquiry involved provides guidance on how to carry out the investigation*

## Analysis

*If needed suggests analysis that can help interpret data*

## Further investigation

*If needed provides suggestions for a next possible investigation or additional, deeper investigations*

## Assessment

*An artificial satellite is circling the globe at the equator, going eastward at constant speed. Its acceleration is:*

- a) *zero;*
- b) *eastward;*
- c) *northward;*
- d) *downward;*
- e) *upward.*

*A tennis ball is struck into a high lob. As it travels it will have a constant:*

- a) *horizontal velocity;*
- b) *vertical velocity;*
- c) *horizontal acceleration;*
- d) *net velocity;*
- e) *net acceleration.*

*In the spin cycle of a washing machine the clothes must be accelerated at  $75 \text{ m/s}^2$  in order squeeze the water out of them. If the radius of the basket is 30 cm how many revolutions must it makes per minute?*

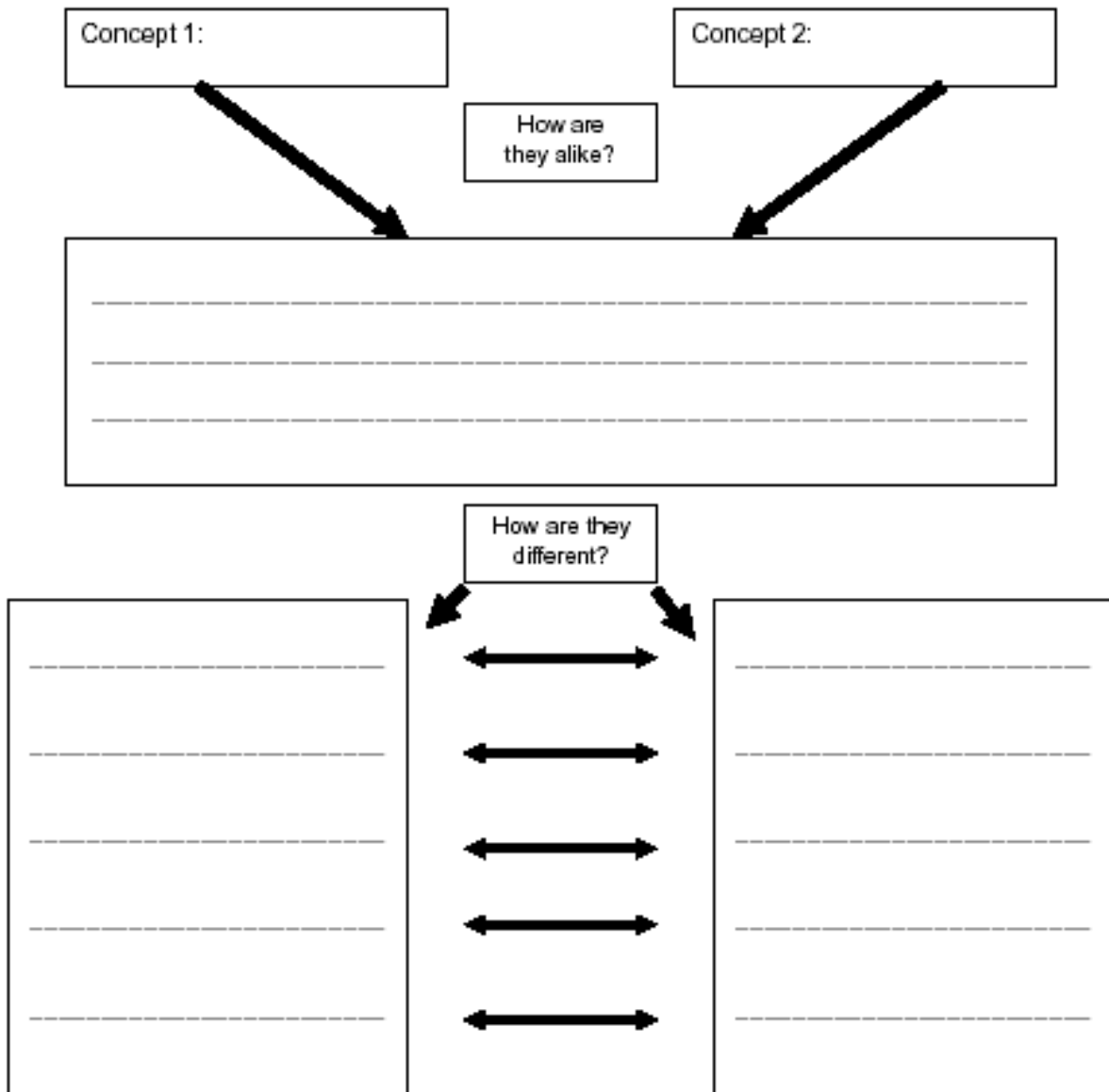
*If needed includes student assessment*

Name \_\_\_\_\_ Date \_\_\_\_\_

## Comparing Concepts

Directions: Use this compare/contrast organizer to explore analogous as well as non-analogous characteristics of two concepts related to a given topic.

Topic: \_\_\_\_\_



Concept 1:

Concept 2:

How are they alike?

How are they different?