3-5 years

pri-sci-net

inquire
investigate
evaluate
connect

Science Content:
Physical Science: magnets

Target Concepts/Skills:
Magnetism and the action of magnets on different materials, acquisition of experiences with magnets/engagement with the process of making systematic observations of the interaction between magnets and other objects /formulation of an operational definition of a magnet

Target Age group:
3-5 years

Duration of activity:
80 minutes

Summary:
Children work in groups of 4-5 (depending on the number of children in the class). They are given a box with a number of wrapped objects, including a magnet, and are asked to find out which the magnet is, without unfolding the wrappings. Children are then asked to present what they did and give instructions to the teacher in order to help her identify a magnet. The teacher intentionally tries to misinterpret children's' instructions so as to help them appreciate the need to give clearer instructions and engages them in the process of refining their instructions. Finally, the children, under the guidance of the teacher, formulate an operational definition of a magnet, that is a procedure for distinguishing magnets from other objects.

Objective:
By the end of the activity children should be able to:

- Develop and use an operational definition of magnets
- Appreciate magnetism as a property of some objects that enables them to interact with (attract) other objects made of iron
- Communicate and give instructions to others
- Refine instructions given by themselves or others so as to avoid misinterpretations
- Follow/ Perform a set of instructions

Resources:
for each group of children: a box, 5-7 objects wrapped with opaque material from which 1 needs to be a magnet, 2-3 need to be made of iron and 2-3 non-iron objects.

How can we find the magnet?

Authors: *Initial Version*
C. P. Constantinou, G. Feronymou, E. Kyriakidou and Chr. Nicolaou
Science in the Kindergarten: a resource for the pre-school educator.
2nd edition
Ministry of Education and Culture, Nicosia, Cyprus, 2004.
Adaptation:
M. Kambouri, N. Papadouris, C. P. Constantinou.

European Commission

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CAPACITIES

How can we find the magnet?

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Lesson plan (with inclusion of teacher notes) - Description of activity

Activity 1 (5-10 minutes): Children's engagement: the teacher brings a box to the class which includes 5-7 wrapped objects. She explains to the children that a friend of hers has her birthday and that she bought for her a magnet. She give details about ordering the magnet from a shop (e.g. by phone or online) and asked them to wrap the magnet and send it to her. But her order got mixed up with some other wrapped objects and she needs their help to find the magnet without unwrapping them. She listens to children's ideas about what they can do to find the magnet and she uses questions to help them elaborate their ideas. Then she explains that they will work in groups to try and test their ideas and see if they can find the magnet in the box.

Activity 2 (25 minutes): the teacher divides the children into groups of 4-5. She gives to each group a box similar to the one that she had and each box includes 5-7 wrapped objects from which: 1 is a magnet, 2-3 are iron-made objects and 2-3 are non-iron objects. This is the point at which children will have the opportunity to test their ideas and try to find the magnet in the box without unwrapping the objects. Children will be able to experience how the different objects interact between them. The teacher needs to move between the groups, guide children during this activity and encourage them to test the ideas they came up with. The teacher asks children to verbalize the steps of the procedure they followed for identifying the magnet and intentionally seeks to misinterpret what they say and encourages them to refine and become clearer and more specific..

Activity 3 (25 minutes): The teacher initiates a conversation with the children by asking questions about how they managed to find the magnet, how can they be sure that the object they found is a magnet and not something else. It is expected that children will identify that some objects are attracted (the magnet will attract the iron objects). The teacher asks questions to help children think how they can find which one of the two attracted objects is the magnet and which is not. (Possible questions that the teacher can use: How many magnets do we have in the box? Which object is the magnet? How do you know? How can you be sure which one of the two objects is the magnet and which one is not?) The teacher can also encourage children to try how the object that they identified to be a magnet interacts with other objects in the classroom, which are not wrapped with opaque material.

Activity 3 (5-10 minutes): The children return to their seats and the teacher invites a visitor to the class (this can be a real person or a doll). The visitor was not present during the lesson and asks children about the box that the teacher brought and is still on the table. This will help the children remember the initial problem that they need to solve by telling to the visitor what they have been doing. They are then encouraged to give instructions to the visitor of how to find the magnet in the box. The visitor intentionally seeks to misinterpret children's instructions with the intent to engage them in a process of refining their rules so as to become clearer and more specific. Finally, the children draw a diagrammatic representation (with the help of the teacher) depicting the instructions that they developed for identifying a magnet (i.e., the operational definition).

1. Engage (Forming Hypotheses)

Decide which question to investigate (=the challenge)

What do children already know? What are their ideas? (ensure that the question to be investigated is meaningful for the children): Children know what a magnet is, they have already seen some magnets in the past or earlier that day and have some kind of experience with magnets (e.g. touch, feel a magnet)

The teacher provides children with a box that includes a number of wrapped objects. She explains that she ordered a magnet from a shop but her order got mixed up and she needs their help to find the magnet without unwrapping the objects. Questions that the teacher can use: What can we do to find the magnet? / How can we find the magnet without unwrapping the objects?
Children revisit this problem at the end of the activity.
and temperature.

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2. Inquiry (Designing and running experiments and observations)

Plan and conduct investigations in order to collect data

1) How can I identify the magnet without unwrapping the object? The children work in small groups. Each group is given a set of wrapped objects and children are informed that one of these objects is a magnet (the teacher ensures that the box includes a magnet and some objects made of iron). They are asked to interact with the materials so as to identify the magnet. They are encouraged to test how the various objects interact with each other and they are expected to use their observations (attraction/ lack of any interaction) as a basis for generating rules for distinguishing magnets from other objects. Their ultimate objective is to come up with a procedure that allows identifying the magnet (i.e., an operational definition for magnets), which could then be applied for solving the problem introduced in the opening activity. The children test the procedures they came up with, with the teacher, who intentionally seeks to misinterpret their instructions with the intent to engage them in a process of refining their rules so as to become clearer and more specific.

2) Children are asked to remain in groups and exchange their box with another. This means that each box will contain a number (e.g., 5-7) of different objects including a magnet, objects made of iron and also objects made of other material (e.g. wood or cloth). All objects are still wrapped with opaque material. Each group is asked to find out which is the magnet. The teacher moves between the groups and offers guidance to the children. Children are expected to use the operational definition formed during the previous activity. This procedure aims to engage children with the process of consistently following a set of instructions.

3. Evaluation (evaluate evidence)

- Conclusion: use data to construct knowledge and generate evidence.
- Demonstrate understanding of concepts and/or ability to use inquiry skills

The teacher returns to the problem, which was stated at the beginning of the lesson, and asks children to help her out. Children are expected to apply the operational definition they developed so as to find the magnet. The teacher engages children in a discussion about the objects that they think could be magnets. She asks questions like: Which object is the magnet? How do you know? How can you be sure?

The children draw a diagrammatic representation (with the help of the teacher) depicting the instructions that they developed for identifying a magnet (i.e., the operational definition).

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