

Electric fields 3: Properties of fields

Components

NAME	DESCRIPTION	AUDIENCE	
	<i>Properties of fields</i> teachers guide	This provides the teacher with information on how to use the video, and how to prompt further student research on fields.	teachers
	<i>Thoughts on fields</i> video	Professor Ian McArthur, physicist at The University of Western Australia, introduces some advanced ideas about the nature of fields.	students

Purpose

The video, *Thoughts on fields*, is an alternative way of presenting some interesting information, about advanced thinking on electric fields, that can be used to motivate students to perform further research into the topic.

Outcomes

Students:

- explain that electrical, gravitational, magnetic and nuclear fields share common properties;
- describe characteristics shared by fields that 'act at a distance';
- describe how the theory of relativity can be used to describe the existence of electric and magnetic fields; and
- explain that electric fields are present in a variety of situations and applications.

Activity summary

ACTIVITY	POSSIBLE STRATEGY
Show the video and discuss issues arising.	individuals or whole class
Students research issues arising from discussions following the video.	individuals or groups using a WebQuest

Teacher notes

Prior to showing the video a KWL could be conducted to focus students' attention on the importance of electric fields.

The video presents an advanced view of how electric fields are produced by charged particles. Einstein's theory of relativity is used to explain how fields that surround charged particles exchange energy when they interact. This information may be used to encourage students to engage in further research about electric and other types of fields, such as: magnetic, gravitational and nuclear.

Suggested research foci include:

- where the field occurs,
- relative strength of the field,
- direction of the field,
- limitations of the field,
- shielding the field, and
- other relevant facts about the field.

Creating a WebQuest

A WebQuest generally contains several steps that need to be followed to ensure successful outcomes. For example, a WebQuest on applications of electric fields, would include the following:

- an introduction that draws attention to the topic;
- a focus task, such as 'Select an industrial situation where the application of an electric field is important';
- resources that include internet links or key words/phrases such as 'Faraday cage', 'pulsed electric fields', 'beneficiation of iron ore', 'high-tension power lines', 'microwave ovens' and 'electrofiltration';
- suggestions about how the WebQuest can be resourced, and a timeline for its completion; and
- an evaluation conducted by the teacher to establish whether students have followed the guidelines and produced a WebQuest that can be reasonably followed by other students.

Technical requirements

The video, *Thoughts on fields*, is provided in two formats: on a standard DVD-video disk and as a QuickTime movie. QuickTime version 7 or later is required to view the movie. This is a free download from www.apple.com/quicktime.

The teachers guide requires Adobe Reader (version 5 or later), which is a free download from www.adobe.com.

Acknowledgements

Designed and developed by the Centre for Learning Technology, The University of Western Australia.
Production team: Leanne Bartoll, Alwyn Evans, Bob Fitzpatrick, Trevor Hutchison, Gary Thomas and Michael Wheatley with thanks to Roger Dickinson, Jenny Gull and Wendy Sanderson.

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Associated SPICE resources

Electric fields 3: Properties of fields may be used with related SPICE resources to address the broader topic of electric fields.

DESCRIPTION	LEARNING PURPOSE
<i>Electric fields (sequence overview)</i> This learning pathway shows how a number of SPICE resources can be combined to teach the topic of electric fields.	
The sequence overview for <i>Electric fields</i> contains a suggested Engage activity suitable for use at this point.	Engage
<i>Electric fields 1: Exploring fields</i> Students explore properties of electric fields through a laboratory experiment.	Explore
<i>Electric fields 2: Drawing fields</i> An interactive learning object shows the pattern of field lines around different arrangements of charged particles and plates.	Explain
<i>Electric fields 3: Properties of fields</i> A theoretical physicist explains current thoughts on the nature of fields.	Elaborate