

Physics - Key Stage 4 - Electricity

Case Study - Benjamin Franklin and Sparks Worksheet

Miss Walrond



Q1.

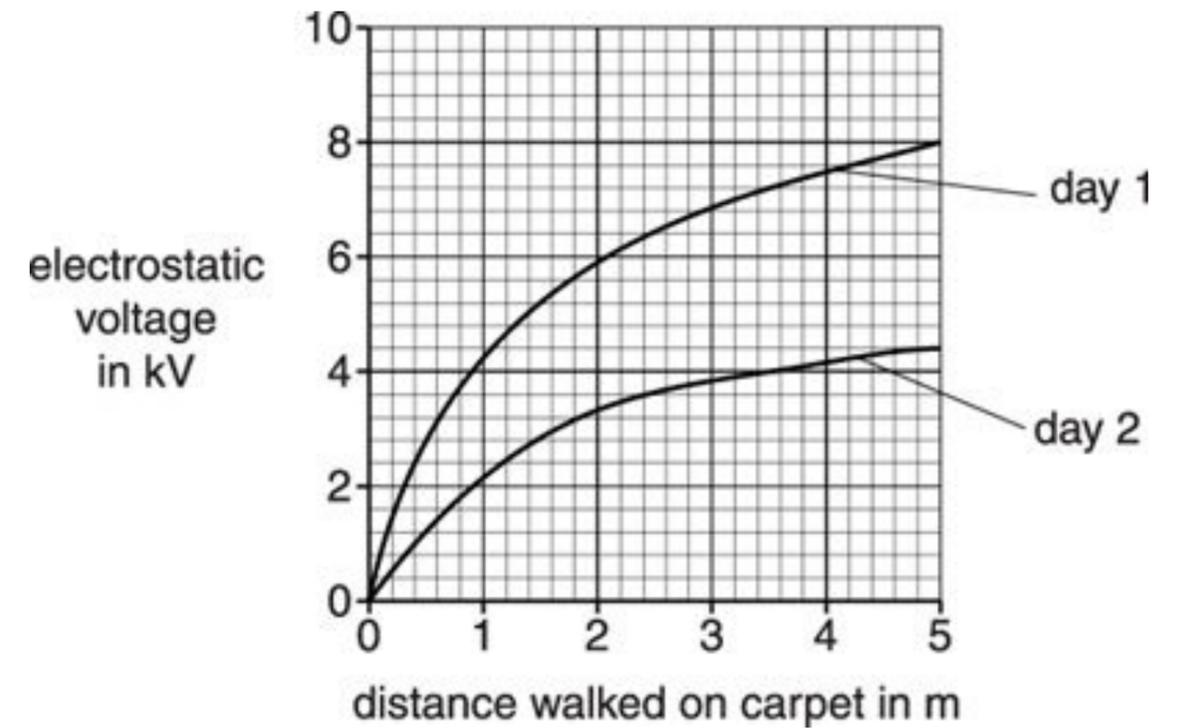
Patrick walks on a nylon carpet.

He becomes negatively charged.

His electrostatic voltage is measured when he walks on the carpet on different days.

i. Use the graph to explain what happens on day 1. **[2]**

ii. Suggest what is different on day 2. **[1]**



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Answers



Q1. Answers

1. i. **Any two from:**

Voltage increases with distance [1]

Voltage is related to the charge / electrons [1]

The increase in voltage is faster at the start **or** slower at the end [1]

ii. **More moisture** in the air / surroundings / clothing / shoes / carpet [1]

Or idea of more conductive air / surroundings / clothing / shoes / carpet [1]

Or less friction / rubbing. [1]



In lesson questions



Independent Task - The Kite Experiment

Describe Benjamin Franklin's Kite experiment

Benjamin Franklin hypothesised that ...

He designed an experiment to test this. He used a kite in a ...

He saw that sparks jumped from ...



Independent Task - Lightning

1) Explain how charge builds up in a cloud.

Ice particles in the cloud ...

This results in the bottom of the cloud becoming...

1) Explain why lightning travels from the cloud to the Earth

The Earth's surface becomes ...

This happens because the electrons in the ground ...

The electrons in the cloud ...



Independent Task - Sparks part 1

(a) Tanida jumps up and down on a trampoline.

The jumping surface of the trampoline is an insulating material.

Tanida is wearing synthetic socks.

When Tanida gets off the trampoline she gets an electrostatic shock as she touches the ground.

Explain why Tanida gets an electrostatic shock.

[2]

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Independent Task - Sparks part 2

(b) Tanida's parents want to reduce her risk of an electrostatic shock.

Look at the information they find on the internet.

How to reduce risk	Probability of an electrostatic shock
jump barefoot	32%
wear cotton clothing	46%
only use the trampoline when there is moisture in the air	24%

Suggest which change they should make to reduce the risk the most.

Describe how this method works.

[2]

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Answers



Independent Task - The Kite Experiment

Describe Benjamin Franklin' Kite experiment

*Benjamin Franklin hypothesised that **lightning** was **electricity**.*

*He designed an experiment to test this. He used a kite in a **storm that had the potential to be a lightning storm**.*

*He saw that sparks jumped from the **clouds** to the **kite**.*



Independent Task - Lightning

1) Explain how charge builds up in a cloud.

*Ice particles in the cloud **collide** and they become **charged by friction**.*

*This results in the bottom of the cloud becoming **negatively charged**.*

1) Explain why lightning travels from the cloud to the Earth

*The Earth's surface becomes **positively charged** due to **charging by induction**.*

*This happens because the electrons in the ground are **repelled** away from the cloud.*

*The electrons in the cloud then jump to the ground, causing a **spark**.*



Review - Independent Task - Sparks part 1

(a) Tanida jumps up and down on a trampoline.

The jumping surface of the trampoline is an insulating material.

Tanida is wearing synthetic socks.

When Tanida gets off the trampoline she gets an electrostatic shock as she touches the ground.

Explain why Tanida gets an electrostatic shock.

[2]

Tanida has become charged.

When she gets off the trampoline charge flows from her to the Earth.

Answers as discussed in the next slide have not been seen or verified by OCR.

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Review - Independent Task - Sparks part 1

How to reduce risk	Probability of an electrostatic shock
jump barefoot	32%
wear cotton clothing	46%
only use the trampoline when there is moisture in the air	24%

Suggest which change they should make to reduce the risk the most.

Describe how this method works.

Only use the trampoline when there is moisture in the air. Moisture is not an insulator so the charge leaks away.

Answers as discussed in the next slide have not been seen or verified by OCR.
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