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Activity

Practice-for-exam questions

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Use the questions below either in class or for individual work after students have read the articles in the magazine. Some of the questions require additional data. Students should either make reasonable estimates of quantities, or look up values using a data book or websites. Suggested outline answers to questions are provided in a separate document.

Viking navigation

- 1 The Sun compass shows the path of the shadow of the gnomon (Figure 2 in the article). Describe and explain why the shadow would follow a different path at a more northern latitude.
- 2 The article describes how polarising sunglasses can be used to show that scattered sunlight is polarised. Describe how you would demonstrate that broadcast radio waves are polarised.

Isotopes of hydrogen

- 1 Explain why, during electrolysis, deuterium ions will move more slowly in the electric field than ^1H ions.
- 2 Tritium is a rare isotope in nature, but is produced industrially and readily combines with OH^- ions to form tritiated water. Explain why tritiated water is a greater risk to health if ingested, compared with the risk from the use of tritium in phosphorescent plastics.

Skillset: Measuring the Planck constant

- 1 In the experiment described, students are determining the threshold potential difference V of the different LEDs. Read about Method 1 and suggest why different students may record different values of V for the same LED. How would you improve the accuracy of your results if this were the case?
- 2 For both methods described, the students have to make a judgement as to when the threshold voltage has been reached. If just one LED of known frequency f and the observed value of V were used, would the calculated value for h be more likely to be smaller, or larger, than the accepted value? Explain your reasoning.

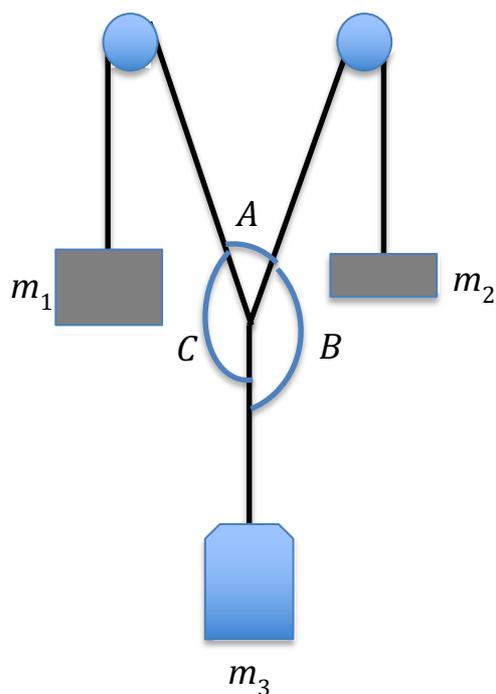
Radiation: not so simple

- 1 Explain why emission of beta radiation by an isotope results in a change in chemical properties of the parent nucleus.
- 2 Use a periodic table to identify the elements produced when the following emissions occur. Write the nuclear equations that describes the changes.

${}_{90}^{232}\text{Th}$ decays by alpha emission, ${}_{90}^{228}\text{Th}$ decays by alpha emission, ${}_{91}^{233}\text{Pa}$ decays by beta emission.

Mathskit: Forces and free-body diagrams

The diagram shows a load m_3 supported by two masses m_1 and m_2 suspended on strings, which run freely over pulley wheels.



Use the labelling on the diagram to answer these questions.

1 Calculate the load m_3 that can be supported when:

$$m_1 = 0.60 \text{ kg}$$

$$m_2 = 0.40 \text{ kg}$$

$$A = 51^\circ$$

$$B = 149^\circ$$

$$C = 160^\circ$$

2 Calculate the angle A when:

$$m_1 = 0.80 \text{ kg}$$

$$m_2 = 0.50 \text{ kg}$$

$$m_3 = 0.99 \text{ kg}$$

$$B = 127^\circ$$

$$C = 150^\circ$$

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