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| **Fuel poverty calculation** |
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| Use mathematics to identify households that will be most affected by fuel poverty |
| **Subject(s):** Science, Design & Technology, Mathematics**Approx time:** 60 mins |  | **Key words / Topics:** * functional maths
* contextual maths
* interpreting data
* fuel poverty
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| **Suggested Learning Outcomes** |  |  |
| * To understand that mathematics is used as a tool in a wide range of contexts
* To recognise that mathematical insight should be used to probe published facts and figures
* That mathematical modelling is a simplification; future planning encompasses a range of factors, which are difficult to predict with any degree of certainty
* To use mathematics to interpret the impact of energy costs on different sections of society
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| **Introduction** |  |  |
| In the Fuel Poverty scheme of work, students investigate the topical issue of the cost and efficient use of energy. Using functional mathematics, they will analyse and interpret published facts and figures.  |
| **Purpose** |
| In this activity, students will investigate what is meant by fuel poverty. They will interpret graphs to identify trends and who is affected by this issue. This could be used as a main lesson in maths. |
| **Activity** |  | **Teacher notes** |
| Show the class slide 4 of the presentation. Divide the students into pairs, and ask them to identify what the trend is and how many households they believe will be in fuel poverty by 2016. They should share their conclusions with the class and the class should agree a figure.Show the class slide 5. Ask them to interpret the graphs to identify the characteristics of the households that will be most affected by fuel poverty. Again, the conclusions should be shared with the class and a consensus reached.Ask each pair to suggest ways in which the number of people in fuel poverty be reduced. These should be specific actions, rather than generalities. As a class, collect all the suggested actions and rate them in terms of how easy they are to implement and how big an effect they would have.Finally, the class should agree a rank order for the actions – if they were tasked with addressing this problem, what order would they do the actions in? And why? |  | The graphs suggest that the ‘average’ person lives alone in a house they own, and the youngest person in the house is most likely to be in the age range 25–59 (though almost 50% are 60 years or older).**Note:** RSLs refer to Registered Social Landlords, i.e. Housing Associations. A report by *Help the Aged* found that people living in homes that were not energy efficient were more likely to live in fuel poverty, that nearly 1.5 million homes containing someone over the age of 65 did not have adequate insulation and heating, and that 22% of households containing someone over the age of 75 had no central heating at all. For example, this could include reducing fuel bills, increase incomes for lower paid or those who do not work, increase energy efficiency. One effective way to do this is to have the actions on sticky pads, and draw a graph of ease and effect on the board. Pairs could each in turn position one of their suggestions, justifying where they are locating it. The class could agree to the location or debate where it should be moved to. |
| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| The initial activities (identifying the trend and characteristics of those most affected) could be handled as a guided group discussion rather than a paired activity.A list of actions to reduce fuel poverty could be provided, so the class would only need to carry out the rating and ranking activity. Emphasis could be placed on the potential impact, with questioning used to probe and develop students understanding of the ease of implementation. |  | The following website from the Committee on Fuel Poverty could be used as a basis to extend the discussion:<https://www.gov.uk/government/organisations/committee-on-fuel-poverty>. For example, what differential structure could the energy companies put in place so that the fuel is more affordable for those in this position?The pairs could use the internet to quantify the potential impact of the actions that they have suggested, along with the costs of implementation. Subsequently, they could revise the rank order, if necessary.The pairs or class could prepare a podcast or multimedia presentation summarising the problem and what they think needs to be done to address it. |
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * Projector/Whiteboard
 |  | icon-ppt Fuel Poverty calculation presentation |
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options)* VIDEO: Power House
* ACTIVITY: Keeping Warm 1
* ACTIVITY: Fuel Poverty 1

**Main** (Options)* ACTIVITY: Keeping Warm 2
* ACTIVITY: **Fuel Poverty 2**
* ACTIVITY: Heating through the Ages
 | **Main (cont.)*** ACTIVITY: Burning Water 1 (Practical)
* ACTIVITY: Burning Water 2 (Research)

**Plenary*** Opportunities within activity for presentations, peer/self assessment
* Reflection on Objectives and PLTS skills used
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| **The Engineering Context** film |
| * **The story** Power House
* **How it works?** Baxi’s Ecogen Boiler
* **Who makes it work?** David Willets
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| **Curriculum links and PLTS** |
| **England**Science * KS3 23d, 23e

Design & Technology * KS3 3d

Mathematics* KS3 1a, 1e, 1g, 2a, 2f, 2g, 3b, 4l, 9b
 | **Northern Ireland**Technology & Design(Objective 1) Developing pupils as Individuals* Respond to a personal design challenge in relation to their own lifestyle

(Objective 3) Developing pupils as Contributors to the Economy and the Environment* Economic Awareness

Learning Outcomes* Show deeper understanding by thinking critically and flexibly, solving problems and making informed decisions, using Mathematics and ICT where appropriate
* Work effectively with others
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| **Scotland**Technologies* TCH 3-15a
 | **Wales** |
| **GCSE D&T**AQA D&T* 3.3.1

Edexcel D&T* 1.13

Eduqas D&T* 2.2 Core: 1, 2

OCR D&T* 1.1
 | **GCSE Mathematics**AQA Mathematics* S2

Edexcel Mathematics* S2

Eduqas Mathematics* FS3, HS3

OCR Mathematics* 12.02a
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| **GCSE Statistics**AQA Statistics* 3.3.3 C2
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| **Personal, learning & thinking skills (PLTS)** |
| * Creative thinker
* Independent enquirer
* Effective participator
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