

Worksheet 1.3.1 Understanding energy transfer by fuels and food

1 Energy use in the home



Rearrange the letter tiles on page 4 of this worksheet to give a sentence about fuels and energy in the home.

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2 Energy content of food



The British Nutrition Foundation defines 'Energy density' (energy content) as the amount of energy per gram of food. It puts food into four categories, according to their energy density:

| | | | |
|----------|-----|--------|------|
| Very low | Low | Medium | High |
|----------|-----|--------|------|

Look at the information on the chart on page 2.

a) Calculate the range of energy density, in kilojoules per gram, for each of the Foundation's four categories (1 kcal = 4200 J or 4.2 kJ).

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b) Calculate the energy content in kJ/g, of a meal that consists of:

- i) 150 g of grilled chicken breast, a 200 g baked potato, 100 g of carrots and 100 g of broccoli
- ii) 150 g of steak and 200 g of French fries (chips), followed by 50 g of chocolate mousse.

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c) The amount of food you eat is a measure of your energy intake. Energy transferred from stores in the body during metabolism, digestion and absorption of food, and physical activity is often called energy expenditure.

Explain the importance of balancing energy intake and energy expenditure.

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| Energy density (kcal/g) | | | | |
|--------------------------|--|--------------------------|-----------------------------------|-----|
| 0 | 0.6 | 1.5 | 4.0 | 9.0 |
| VERY LOW | LOW | MEDIUM | HIGH | |
| Cucumber 0.10 | Vegetable stir fry with noodles 0.63 | Strawberries & cream 1.6 | Crackers 4.1 | |
| Chicken noodle soup 0.19 | Baked beans 0.81 | Chocolate mousse 1.8 | Regular hard cheese 4.2 | |
| Broccoli 0.33 | Cornflakes with semi-skimmed milk 1.10 | Steak 1.9 | Chocolate biscuits 4.9 | |
| Carrot 0.35 | Baked potato 1.36 | Grilled salmon 2.2 | Crisps 5.3 | |
| Apple 0.47 | Grilled chicken breast (without skin) 1.48 | French fries 2.8 | Mayonnaise 6.9 | |
| Vegetable soup 0.52 | | Croissant 3.7 | Vegetable, olive or seed oils 8.9 | |

(Source: The British Nutrition Foundation *Feed Yourself Fuller Chart*)

The full chart can be downloaded from the Foundation’s website (www.nutrition.org.uk).

3 Useful or wasted?



A device such as a light bulb needs energy in order for it to work. When it is being used, energy is being transferred away from it both as heat and light. We know that a light bulb glows and you’re probably aware it will get hot as well. We can think of the electricity as the input and the heat and light as the output.

- a) If we added up the total amount of energy transferred out of the bulb and compared it with the amount supplied, how do you think the two amounts would compare?

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- b) Thinking about the outputs, which of these is usually regarded as the useful one?

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- c) Modern low energy light bulbs transfer less energy as heat compared with a filament light bulb of the same brightness. Why is this an advantage?

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- d) A popular children’s toy for many years has been the Easy-Bake Oven, which children could use to bake cakes. It used filament light bulbs to supply heat; the output is sufficient to bake a cake from cake mix. How does this application change what is seen as the useful output and the wasteful output from a bulb?

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| E | L | I | N | T | E | R | M | E | S | |
| I | T | Y | E | O | A | N | D | M | E | |
| A | S | U | | | | | | | | |
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