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**Efficiency Calculations** If you know the amount of input energy and useful energy from an energy transfer, you can calculate the efficiency using the following equation:  $\text{efficiency} = \frac{\text{useful output energy}}{\text{total input energy}}$ . Remember that the total energy is equal to the sum of the useful energy and the wasted energy.  $\text{total energy} = \text{useful energy} + \text{wasted energy}$ . You can also calculate efficiency using the total power input and the useful power input using the following equation:  $\text{efficiency} = \frac{\text{useful power output}}{\text{total power input}}$ . GCSE Combined Science Foundation Combined Science Higher Physics Foundation Physics Higher AQA Increasing Efficiency The efficiency of an energy transfer can be increased by reducing the amount of wasted energy. How we do this depends on the system and the types of energy store involved. For example, by using oil as a lubricant in a car engine, less heat is produced by friction. Therefore, less energy is wasted as heat and so more energy is converted to useful energy and the engine is more efficient. We always want to make a process more efficient because this will save energy and money.

GCSE Combined Science Higher Physics Higher AQA Example: Calculating Efficiency A lightbulb is switched on for a period of time. During this time, the lightbulb uses 100 J of energy and 20 J of heat energy is produced by the lightbulb. Calculate the efficiency of the lightbulb. [3 marks]

$\text{useful energy output} = \text{total input energy} - \text{wasted energy output}$

$\frac{80}{100} = 0.8$  GCSE Combined Science Foundation Combined Science Higher Physics Foundation Physics Higher AQA Efficiency Example Questions

$\text{efficiency} = \frac{\text{useful output power}}{\text{total input power}} = \frac{4}{6} = 0.67$  Save your answers with Gold Standard Education

$\text{useful energy output} = \text{total energy input} - \text{waste energy output} = 100\% - 30\% = 70\%$  Save your answers with Gold Standard Education

Any one from: Increase the thickness of the walls of the kettle Make the kettle from a more insulating material Wrap the kettle in an insulating material (cotton wool, bubble wrap etc). Save your answers with Gold Standard Education

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The following physics revision questions are provided in support of the physics tutorial on Power and Efficiency. In addition to this tutorial, we also provide revision notes, a video tutorial, revision questions on this page (which allow you to check your understanding of the topic) and calculators which provide full, step by step calculations for each of the formula in the Power and Efficiency tutorials. The Power and Efficiency calculators are particularly useful for ensuring your step-by-step calculations are correct as well as ensuring your final result is accurate. Not sure on some or part of the Power and Efficiency questions? Review the tutorials and learning material for Power and Efficiency Work, Energy and Power Learning Material Tutorial ID Title Tutorial Video Tutorial Revision Notes Revision Questions 5.5 Power and Efficiency Power and Efficiency Revision Questions 1. The engine of a car produces 12000 J of energy every second. From this amount, 4500 J convert into heat, 100 J into sound energy and 200 J into light energy. What is the efficiency of the engine? (Hint: The rest is the mechanical energy of the car) Correct Answer: B 2. An electric motor shows the value 2000 W stamped on its back. Its owner turns off all the other electric appliances except the motor and finds out the motor has drawn 150 000 J electrical energy from the main source in one minute. What is the efficiency of this electric motor? Correct Answer: A 3. A crane can lift a 1.2 t heavy object at h = 10 m in 20 s. Its input power is 10 kW. What is the crane's efficiency? (Take g = 10 N/kg. Also, 1 t = 1000 kg and 1 kW = 1000 W). Correct Answer: B What's next? Enjoy the "Power and Efficiency" practice questions? People who liked the "Power and Efficiency" practice questions found the following resources useful: Practice Questions Feedback. Helps other - Leave a rating for this practice questions (see below) Work, Energy and Power Physics tutorial: Power and Efficiency. Read the Power and Efficiency physics tutorial and build your physics knowledge of Work, Energy and Power Work, Energy and Power Revision Notes: Power and Efficiency. Print the notes so you can revise the key points covered in the physics tutorial for Power and Efficiency Check your calculations for Work, Energy and Power questions with our excellent Work, Energy and Power calculators which contain full equations and calculations clearly displayed line by line. See the Work, Energy and Power Calculators by iCalculator™ below. Continuing learning work, energy and power - read our next physics tutorial: Work and Energy. Types of Energy Help others Learning Physics just like you We hope you found this Physics tutorial "Power and Efficiency" useful. If you did it would be great if you could spare the time to rate this physics tutorial (simply click on the number of stars that match your assessment of this physics learning aide) and/or share on social media, this helps us identify popular tutorials and calculators and expand our free learning resources to support our users around the world have free access to expand their knowledge of physics and other disciplines. Work, Energy and Power Calculators by iCalculator™

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