

Efficiency Dissipation

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

A lamp is supplied with 60 J of energy and transfers 12 J Calculate its efficiency percentage. (2 marks)

Step 1 · Write the equation

$$\text{efficiency} = \text{useful output energy} \div \text{total input energy}$$

Step 2 · Substitute

$$\text{efficiency} = 12 \div 60 = 0.20$$

Step 3 · Convert to a percentage

$$0.20 \times 100 = 20\%$$

Answer: 20% (0.20)

Check: The other 48 J is dissipated by heating the surroundings.

2. Now try one with the steps

A television is supplied with 200 J. It transfers 70 J and sound and the rest heats the surroundings. Calculate the wasted energy and the efficiency. (3 marks)

Step 1 · Wasted energy

Step 2 · Efficiency

Step 3 · Percentage

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Define efficiency. [1]

2. Write the equation that links efficiency, useful output energy and total input energy. [1]

3. A motor is supplied with 500 J and transfers 350 J usefully. Calculate its efficiency percentage. [2]

4. A lamp is supplied with 60 J and gives out 12 J of light. Calculate the energy wasted, in joules. [1]
-
-
5. Write an efficiency of 0.85 percentage. [1]
-
-
6. Give two ways of reducing unwanted energy transfers in a machine with moving parts. [2]
-
-
7. Explain why saucepan handles are made of a material with a low thermal conductivity. [2]
-
-
8. Explain why no device can have an efficiency greater than 100%. [2]
-
-
9. A motor has a total power input of 250 W and a useful power output of 200 W. Calculate its efficiency percentage. [2]
-
-
10. A kettle is 90% efficient. It is supplied with 200 000 J. Calculate the useful energy transferred to the water, in joules. [2]
-
-
11. Describe how the thickness and the thermal conductivity of a building's walls affect how quickly it cools down. [2]
-
-
12. A motor is 40% efficient and transfers 300 J of useful energy. Calculate the total energy input in joules. [3]
-
-
-
13. A power station has a fuel energy input of 1200 MW and an efficiency of 35%. Calculate its useful electrical power output in MW. [2]
-
-

14. Explain how oiling a bicycle chain increases the efficiency of the bicycle.

[2]

4. Before you hand it in

efficiency = $500 \div 350 = 1.43$

Useful output goes on top: $350 \div 500 = 0.70$. An efficiency above 1 (100%) is impossible, so check your answer.

Writing 0.7% for an efficiency of 0.7

0.7 decimal is 70% percentage. Do not add a % sign to a decimal.

Multiplying by 75 instead of 0.75

Convert the percentage to a decimal ($\div 100$) before using it to find an input or output.

"Insulation stops heat escaping."

Say insulation reduces the rate of energy transfer, so the building cools more slowly.