3.17 Efficiency, Power and Energy Resources: 10-minute Pack

AQA 8464 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A kettle is supplied with 240000 J of electrical energy. It transfers 180000 J of this energy usefully to heat the water in the kettle. The rest of the energy is wasted to the surroundings.
efficiency = useful output energy transfer / total input energy transfer

(a) Calculate the efficiency of the kettle. Give your answer as a decimal. **(2)**

.....

(b) Calculate the efficiency of the kettle as a percentage. **(1)**

.....

(Total for Question 1 is 3 marks)

2 A car engine's moving metal parts are coated with a layer of oil (a lubricant). Many UK homes have loft spaces filled with a thick layer of mineral wool insulation.

(a) Explain, in terms of energy, how the oil reduces the amount of energy wasted between the moving parts in the engine. **(2)**

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(b) Explain how the mineral wool insulation reduces the rate of energy transfer by heating from the house. **(2)**

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(Total for Question 2 is 4 marks)

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Mark scheme · 3.17 Efficiency, Power and Energy Resources: 10-minute Pack

Question 1

(a) 180000 / 240000 (correct substitution) **M1**

(a) 0.75 cao **A1**

(a) Answer: 0.75

(b) 75%, ft their value from (a) * 100 **B1**

(b) Answer: 75%

Question 2

(a) the layer of oil reduces friction between the moving surfaces, oe **B1**

(a) so less energy is transferred (dissipated) to the thermal energy store of the surroundings/engine casing, i.e. less energy is wasted as heat and/or sound, oe **B1**

(a) Answer: The oil reduces friction between the moving parts, so less energy is wasted (transferred to the thermal energy store of the surroundings) by heating.

(b) the insulation traps pockets/layers of air within it, oe **B1**

(b) air is a poor conductor of heat (thermal energy), so this reduces the rate of energy transfer by conduction through the roof/ceiling, oe **B1**

(b) Answer: The insulation traps pockets of air, and air is a poor thermal conductor, so it reduces the rate of energy transfer through the loft.

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