

GCSE Physics A (Gateway)

J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 3

1

Look at the information about different electric motors.

Electric motor	Energy input per hour (J)	Useful energy output per hour (J)	Energy 'wasted' per hour (J)
A	72 000	60 000	12 000 ← 0.166
B	54 000	36 000	18 000 ← 0.33
C	18 000	15 000	3 000 ← 0.166
D	60 000	48 000	12 000 ← 0.2
E	54 000	48 000	6 000 ← 0.11

- (a) (i) Calculate the energy input per hour in J for electric motor D.

$$48000 + 12000 = 60000$$

[2]

- (ii) Which electric motor has the **lowest** 'wasted' energy in one hour?

Motor E

[1]

- (iii) Which electric motor has the **highest** 'wasted' energy in one hour?

Motor B

[1]

- (iv) Describe how energy is 'wasted' in an electric motor.

It is lost to the environment as heat energy.

[1]

- (v) Suggest how this 'wasted' energy can be reduced in an electric motor.

Use more lubricant between the motor's parts to reduce friction.

[1]

- (b) Calculate the % efficiency of electric motor E.

Use the equation: Efficiency = Useful output energy transfer / Input energy transfer

Give your answer to 2 significant figures.

$$\frac{48000}{54000} \times 100 = 88.9\%$$

[3]

Total Marks for Question Set 3: 9

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