Oxford Cambridge and RSA

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	12000 ← 0.166
B	54 000	36 000	18000 ← 0.33
C	18 000	15000	3 000 ← 0.166
D	60000	48 000	12 000 ← 0.2
E	54 000	48 000	6000 ← 0.11

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

48000 + 12000 = 6000

[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