Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/04 Physics A P5-P8 and P9 (Higher Tier)

Question Set 27

Multiple Choice Questions

P7: Energy

1 A radio transfers 30 J of potential energy to 27 J of useful energy.

What is the efficiency and energy loss for the radio?

	Efficiency	Energy loss
A	10%	3J
B	10%	27J
C	90%	3J
D	90%	27J

Your answer ☐

[1]

2 A boy kicks a football with a mass of 400 g.

What is the potential energy of the football when it is 0.8 m above the ground?

gravitational field strength (g) = 10 N / kg.

A 0.032 J

B 3.2 J

C 320 J

D 3 200 J

Your answer ☐

[1]

3 Which row would result in an increase in the efficiency of a machine?

	Increase the energy losses due to friction	**Increase the work output without changing the work input**
A	Yes	Yes
B	Yes	No
C	No	No
D	No	Yes

Your answer ☐

[1]

4 A gas fire, used to heat a room, has an input energy transfer of 180 000 J per minute.

The fire has an efficiency of 0.8.

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

Calculate the useful output energy transfer per minute.

A 600 J

B 2400 J

C 36 000 J

D 144 000 J

Your answer ☐

[1]

5 A pump lifts 500 kg of water to a water tank at the top of a building.

The water gains 240 000 J of gravitational potential energy.

The gravitational field strength is 10 N/kg.

Use the equation: Potential energy = Mass × Height × Gravitational field strength

Calculate the height of the water tank.

A 4.8 m

B 48 m

C 240 m

D 480 m

Your answer ☐

[1]

6 A boiler has an input power of 12 kW from the gas it burns.

Its efficiency is 0.75.

Which row in the table shows the correct values for this boiler?

	Useful output power (kW)	**Wasted output power (kW)**
A	3	9
B	8	4
C	9	6
D	9	3

Your answer ☐

[1]

7 A car has a mass of 1000 kg and a kinetic energy of 12 500 J.

Calculate its speed.

Use the equation: kinetic energy = 0.5 × mass × (speed)2

A 3.5 m / s

B 5.0 m / s

C 6.3 m / s

D 25.0 m / s

Your answer ☐

[1]

Total Marks for Question Set 3: 7

Equations in physics

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance

change in thermal energy = mass × specific heat capacity × change in temperature

thermal energy for a change in state = mass × specific latent heat

energy transferred in stretching = 0.5 × spring constant × (extension)^2

potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil

Higher tier only –

force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length