Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: Energy (High Demand)

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Mark Schemes

Q1.

(a) black (paint) is a good absorber of (infrared) radiation

allow 'heat' for radiation
ignore light / sunlight / energy
allow black (paint) is a good emitter of (infrared) radiation to the water

1

copper pipes are
good conductors (of energy)

1

the pipes have a large surface area to absorb (a lot of) energy

allow 'heat' for energy
ignore light / sunlight for energy

1

(b) (i) any **one** from:

- energy is available 24 hours a day
- constant supply of energy all year around
- works at night.

ignore no visual pollution

1

(ii) *Student A*:

***max** 3 marks if conclusions for student A and Student B are written in the wrong places.*

nothing can be more than 100% efficient

1

(because the law of conservation of energy states that) energy cannot be created (or destroyed)
or
(because) some energy is always wasted to the surroundings

1

Student B:
the output heat energy is 3 to 4 times greater than the (electrical) energy input

1

so the efficiency is 3 or 4 which is 300 − 400 %
or
because additional energy is provided by the warm water from the ground

allow a correct calculation of efficiency using either 3 or 4 joules for useful energy output

Downloaded from www.merit-minds.com

1

(iii) 94 (kg)

*allow **3** marks for an answer with more than 2 significant figures that rounds to 94 kg*

*allow **2** marks for*
19 000 000 = m × 4200 × 48
or
m = 19 000 000 / (4200 × 48)
or
m = 19 000 000 / 201 600
or
correctly calculated mass using an incorrect temperature change.

*allow **1** mark for a temperature rise of 48 °C*

*allow **1** mark for a correct substitution using an incorrect temperature change provided some evidence of working out the temperature change is shown*

*allow **1** mark for an incorrect answer correctly rounded to two significant figures, provided some evidence of working is shown*

4

[12]

Q2.

(a) any **four** from:

similarities:

(both) heat water to produce steam (which turns a turbine linked to turning a generator)

(both are) reliable / can generate electricity 24 hours per day.

allow (both) provide base load energy / power

differences:

- nuclear power uses nuclear <u>fission</u> to release energy
- fossil fuels are burnt
- fossil fuels releases carbon dioxide
- nuclear fuels produce radioactive waste
- nuclear fuels generate more energy per kilogram.

allow nuclear fuels transfer nuclear energy to thermal / electrical energy but fossil fuels transfer chemical energy to thermal / electrical energy

for full marks similarities and differences must be given

ignore they are both non-renewable

4

(b) (i) any **two** from:

- nuclear power stations have high commissioning / decommissioning costs

  allow fossil fuel power stations do not have high commissioning / decommissioning costs
- nuclear fuels produce <u>radioactive</u> waste

  allow there is no <u>radioactive</u> waste produced from fossil fuels
- storage / disposal of (nuclear) waste a problem.

  ignore cost and availability of fuel

  allow (nuclear) waste takes many years to decay

  allow nuclear power stations have a longer start-up time

  *allow for **2** marks (nuclear) waste stays radioactive for many years*

2

Downloaded from www.merit-minds.com

(ii) any **two** from:

- an increase in use of renewable energy sources

  allow increased use of nuclear fuels

  allow named examples of renewable energy sources
- supply of fossil fuels is decreasing
- improved technologies for storing (nuclear) waste **or** decommissioning of (nuclear) power stations
- to meet targets for reduction of greenhouse gases.

  allow to reduce carbon dioxide emissions

  *allow for **2** marks: fossil fuels will become more expensive as the supply decreases.*

2

(c) to increase the voltage

*do **not** allow power / energy for voltage or current*

1

(so) reduce current

1

(which) reduces energy losses (due to heating effects in the cables)

allow "heat" for energy

allow more efficient energy transfer / transmission

*do **not** allow stops energy losses*

1

(d) any **three** from:

- chemicals used are a risk to health

  eg contaminated water supply may make people ill
- (more) traffic on the roads would cause pollution / danger to locals
- (Earth tremors) could damage buildings / houses
- the sites may spoil the landscape / destroy habitats
- the sites may devalue properties
- money will be spent on fossil fuels rather than renewables so CO_2 emissions don't reduce.

  no credit given for just repeating points given in the question.

3

[14]

Downloaded from www.merit-minds.com