

GCSE Combined Science: Trilogy

Worksheet: Ways of reducing the use of resources

TIME 25 min	TOTAL 23 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Ways of reducing the use of resources

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1

Which of these is an example of 'reducing' resource use, rather than reusing or recycling?

Tick (✓) **one** box.

Refilling a glass bottle

☐

Melting down scrap steel to make new steel

☐

Buying a smaller, more efficient product that needs fewer raw materials to make

☐

Crushing glass to make new bottles

☐

[1 mark]

0 1 . 2

Give **one** example of a metal that is very commonly recycled.

.....

.....

[1 mark]

0 2

0 2 . 1

Which is an example of reusing a product?

Tick (✓) **one** box.

Washing and refilling glass milk bottles

☐

Melting scrap steel to make new steel

☐

Crushing glass bottles to make new glass

☐

Burning plastic waste to generate electricity

☐

[1 mark]

0 2 . 2

Give **two** benefits of reducing the use of, reusing and recycling materials.

.....

.....

.....

.....

[2 marks]

0 2 . 3

Glass bottles that cannot be reused are crushed and melted to make new glass products.

Give **one** advantage of this compared with making glass from raw materials.

.....

.....

[1 mark]

0 3

0 3 . 1

Put these in order of preference for sustainability, most preferred first: recycle, reduce, reuse.

.....

.....

.....

.....
[1 mark]

0 3 . 2

Explain why this is the preferred order.

[1 mark]

0 4

Paper is made from wood fibres. Each time paper is recycled, the fibres are cut shorter.

0 4 . 1

Suggest why paper cannot be recycled an unlimited number of times to make the same quality of paper.

[2 marks]

0 5

Table 1 shows the percentage of energy saved by making materials from recycled materials instead of from raw materials.

Table 1

Material	Energy saved by recycling in %
Aluminium	95
Steel	70
PET plastic	60
Glass	25

0 5 . 1

Making 1 tonne of aluminium from its ore uses 170 GJ of energy.
Calculate the energy used to make 1 tonne of aluminium from recycled aluminium.

.....

.....

.....

.....

Energy = GJ

[2 marks]

0 5 . 2

Suggest why recycling glass saves a smaller percentage of energy than recycling aluminium.

.....

.....

[1 mark]

0 5 . 3

A student said:
'We should only recycle aluminium, because it saves the most energy.'
Evaluate this statement.

.....

.....

.....

.....

[2 marks]

0 6

Making 1 tonne of new glass from raw materials uses 15 GJ of energy. Making glass from recycled glass uses 30% less energy.

0 6 . 1

Calculate the energy used to make 1 tonne of glass from recycled glass.

.....

.....

.....

.....

Energy = GJ

[2 marks]

0 6 . 2

Give **one** reason, other than saving energy, why glass is recycled.

.....

.....

[1 mark]

0 7

Metals are produced from limited raw materials.

0 7 . 1

Describe how metals are recycled.

.....

.....

[1 mark]

0 7 . 2

Some scrap steel is added to the iron produced in a blast furnace.
Give **one** advantage of doing this.

.....

.....

[1 mark]

0 7 . 3

Scrap aluminium used to make new drinks cans must be separated from other metals.
Explain why.

.....

.....

.....

.....

[2 marks]

0 7 . 4

Give **one** environmental impact of obtaining raw materials by mining and quarrying.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Ways of reducing the use of resources · 23 marks

Question 1 (2 marks)

01.1 [1 mark]

Correct: Buying a smaller, more efficient product that needs fewer raw materials to make

01.2 [1 mark]

- aluminium (allow: steel / iron, copper, gold) (1)
-

Question 2 (4 marks)

02.1 [1 mark]

Correct: Washing and refilling glass milk bottles

02.2 [2 marks]

- reduces the use of limited resources (1)
- reduces the use of energy sources (1)
- reduces waste / landfill (1)
- reduces environmental impacts (e.g. of quarrying and mining) (1)

Any 2 of the points above.

02.3 [1 mark]

- less energy is needed / fewer raw materials (sand, limestone, sodium carbonate) are used / less quarrying (1)
-

Question 3 (2 marks)

03.1 [1 mark]

Answer: reduce, reuse, recycle

- reduce, reuse, recycle (1)
-

03.2 [1 mark]

- reducing use avoids needing the resource at all; if a product is still needed, reusing it avoids reprocessing; recycling uses more resources than the other two, since it still requires collecting and reprocessing material (1)
-

Question 4 (2 marks)

04.1 [2 marks]

- after several recycling cycles the fibres become too short / weak to bind together into good-quality paper (1)
 - so new (virgin) wood fibres must be added, or the recycled material is used for lower-quality products (e.g. cardboard) (1)
-

Question 5 (5 marks)

05.1 [2 marks]

Answer: 8.5 GJ

- energy used = 5% of 170 / 170×0.05 (1)
 - 8.5 (GJ) (1)
-

05.2 [1 mark]

- recycled glass still has to be melted at a high temperature / making glass from raw materials needs relatively little energy compared with extracting aluminium by electrolysis (1)
-

05.3 [2 marks]

- aluminium recycling does save the most energy (95%) (1)
 - but recycling the other materials also saves energy and reduces the use of limited raw materials / waste in landfill, so they should be recycled too (1)
-

Question 6 (3 marks)

06.1 [2 marks]

Answer: 10.5 GJ

- 15×0.70 (or $15 - 4.5$) (1)
- 10.5 (GJ) (1)

Notes: 4.5 (the energy saved) scores 1 mark.

06.2 [1 mark]

- it reduces the use of raw materials (e.g. sand and limestone), which are limited / it reduces the amount of waste going to landfill (1)
-

Question 7 (5 marks)

07.1 [1 mark]

- they are melted and recast / reformed into different products (1)
-

07.2 [1 mark]

- it reduces the amount of iron that needs to be extracted from iron ore (1)
-

07.3 [2 marks]

- other metals would change the composition of the aluminium (alloy) (1)
- so the new metal would not have the properties needed for drinks cans (1)

Notes: Allow 'the amount of separation needed depends on the properties required of the final product'.

07.4 [1 mark]

- destroys habitats / scars the landscape / noise / dust / large amounts of waste rock / uses energy (1)
-