

GCSE Combined Science: Trilogy

Worksheet: Waste management

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Waste management

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

A new landfill site can hold 480 thousand m³ of waste. Each year, 40 thousand m³ of household waste is added to the site.

0 1 . 1

Calculate the number of years for which the site can be used.

.....

.....

.....

Time = years

[1 mark]

0 1 . 2

The town starts to recycle more of its waste, so the volume added to the site each year falls by 20%.
Calculate the number of years for which the site could now be used.

.....

.....

.....

.....

Time = years

[2 marks]

0 1 . 3

Give **one** way in which a landfill site can pollute the environment.

.....

.....

[1 mark]

0 2

A growing human population produces more waste, which can pollute the air, water and land.

0 2 . 1

Table 1

Source of pollution	Mainly pollutes air, water or land
Sewage	
Smoke	
Landfill	
Acidic gases	

Table 1 lists four sources of pollution. Complete Table 1 by writing **air**, **water** or **land** to show what each one mainly pollutes.

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[4 marks]

0 2 . 2

Give **one** way that households can reduce the amount of waste sent to landfill.

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[1 mark]

0 3

A family recorded the mass of waste it threw away in one week:

- general waste bin, which is sent to landfill: 6.1 kg (this included 1.8 kg of food waste)
- recycling bin: 7.0 kg.

0 3 . 1

Calculate the percentage of the family's waste that was sent to landfill.
Give your answer to 3 significant figures.

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.....

Percentage = %

[2 marks]

0 3 . 2

The family starts to compost all of its food waste.
Calculate the percentage decrease in the mass of waste the family sends to landfill.
Give your answer to 3 significant figures.

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.....

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.....

Percentage decrease = %

[2 marks]

0 3 . 3

Food waste in landfill sites decays and releases methane.
Explain why methane is released, and why this is harmful.

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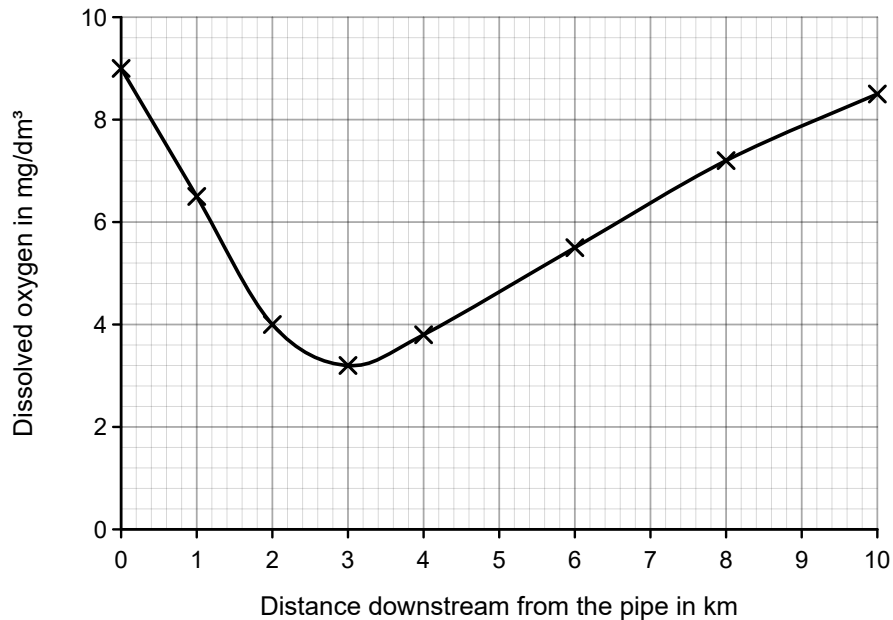
.....

[2 marks]

0 4

Untreated sewage entered a river from a pipe. Scientists measured the concentration of dissolved oxygen at different distances downstream of the pipe. Figure 1 shows the results. The scientists also found 18 species of invertebrate just upstream of the pipe, 4 species 3 km downstream and 15 species 10 km downstream.

Figure 1



0 4 . 1

At what distance downstream of the pipe was the concentration of dissolved oxygen lowest?

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.....

.....

Distance = km

[1 mark]

0 4 . 2

Explain why the concentration of dissolved oxygen fell downstream of the pipe.

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[3 marks]

0 4 . 3

Suggest **two** reasons why the concentration of dissolved oxygen increased again further downstream.

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[2 marks]

0 4 . 4

Explain why fewer species of invertebrate were found 3 km downstream.

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.....

.....

.....

[2 marks]

.....

0 5

Table 2 shows the population of one country and the total mass of household waste produced there each year.

Table 2

Year	Population in millions	Household waste produced in millions of tonnes per year
2000	20	4.0
2020	30	9.0

0 5 . 1

How many kilograms of household waste were produced per person in 2020?
1 tonne = 1000 kg

.....

.....

.....

.....

Mass per person = kg

[2 marks]

0 5 . 2

Calculate the percentage increase in the total mass of household waste between 2000 and 2020.

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.....

Percentage increase = %

[2 marks]

0 5 . 3

In 2000, the mass of waste produced was 200 kg per person.
Use this and your answer to the first part to explain why the total mass of waste increased.

.....

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.....

.....

[2 marks]

0 5 . 4

Explain how an increase in waste could reduce biodiversity if the waste is not handled properly.

.....

.....

.....

.....

[2 marks]

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: Waste management · 31 marks

Question 1 (4 marks)

01.1 [1 mark]

Answer: 12 years

- $480 \div 40 = 12$ (years) (1)
-

01.2 [2 marks]

Answer: 15 years

- volume added each year = $40 \times 0.8 = 32$ thousand m^3 (1)
- $480 \div 32 = 15$ (years) (1)

Notes: An answer of 14.4 (adding 20% to the time) scores 1 mark.

01.3 [1 mark]

- toxic chemicals can leak into the soil or into groundwater and rivers (1)
- decaying waste releases methane, a greenhouse gas (1)
- litter / smells / pests such as rats (1)

Any 1 of the points above.

Question 2 (5 marks)

02.1 [4 marks]

Answer: water; air; land; air

- sewage: water (1)
 - smoke: air (1)
 - landfill: land (1)
 - acidic gases: air (1)
-

02.2 [1 mark]

- recycle materials such as glass, paper, metal or plastic (1)
- compost food and garden waste (1)
- reuse items / buy fewer products with packaging (1)

Any 1 of the points above.

Question 3 (6 marks)

03.1 [2 marks]

Answer: 46.6%

- $6.1 \div (6.1 + 7.0) \times 100$ (1)
- 46.6 (%) (1)

Notes: An answer of 46.56 (not given to 3 significant figures) scores 1 mark.

03.2 [2 marks]

Answer: 29.5%

- $1.8 \div 6.1 \times 100$ (1)
- 29.5 (%) (1)

Notes: An answer of 29.51 (not given to 3 significant figures) scores 1 mark.

03.3 [2 marks]

- there is no oxygen inside a landfill site, so the waste decays anaerobically (producing methane) (1)
 - methane is a greenhouse gas, so it contributes to global warming (1)
-

Question 4 (8 marks)

04.1 [1 mark]

Answer: 3 km

- 3 (km) (1)

04.2 [3 marks]

- sewage contains organic matter, which is food for bacteria (1)
- the number of bacteria / decomposers increased (1)
- the bacteria used oxygen in aerobic respiration as they decayed the sewage (1)
- the sewage made the water cloudy, so there was less photosynthesis by water plants (1)

Any 3 of the points above.

04.3 [2 marks]

- the sewage had been broken down / diluted, so less oxygen was being used by bacteria (1)
- oxygen dissolves into the water from the air (1)
- water plants / algae photosynthesise and release oxygen (1)

Any 2 of the points above.

04.4 [2 marks]

- many invertebrate species need a high concentration of oxygen for respiration, so they died or moved away (1)
 - only species that can tolerate low oxygen survived, so biodiversity was lower (1)
-

Question 5 (8 marks)

05.1 [2 marks]

Answer: 300 kg

- $9.0 \div 30 = 0.30$ tonnes (1)
 - 300 (kg) (1)
-

05.2 [2 marks]

Answer: 125%

- $(9.0 - 4.0) \div 4.0 \times 100$ (1)
 - 125 (%) (1)
-

05.3 [2 marks]

- the population increased (from 20 million to 30 million) (1)
 - each person produced more waste (200 kg to 300 kg), because the standard of living increased and more resources were used (1)
-

05.4 [2 marks]

- more land is used for landfill, destroying habitats (1)
- toxic chemicals from the waste pollute the land or water and kill organisms (1)
- the decay of waste in landfill releases methane, which contributes to global warming (1)

Any 2 of the points above.
