M1.(a) (i) central block

1

(ii) conducts electricity

1

(b) any **two** from:

- visual pollution
- noise pollution
- dust pollution
- habitat destruction.

2

(c) (i) to concentrate the ore / copper carbonate

or

to remove / separate the rock

1

(ii) 12 (tonnes)

If answer is incorrect allow one mark for (127 + 132) − 247 or 259 - 247

2

(iii) any **one** from:

- so no reactant is wasted / left unreacted
- so they know how much product they will make
- need to record / compensate for the carbon dioxide produced

allow so they can work out their carbon footprint.

1

[8]

M2. (a) atoms

1

(b) mixture

1

metal

1

structure

1

smart

1

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

- saves raw materials / iron ore
- saves energy / fuels
  accept cheaper / saves money
- make new / useful items
- make money / it is economic
- <u>reduces</u> pollution
  allow less harmful for the environment
- decreases cost of steel cans
- reduces carbon dioxide emissions
- decreases waste materials / use of landfill

2

(ii) any **one** from:

- provide information / education of the need to recycle
- legislate against / charge for waste
- reward / pay people to recycle
  accept fine people for not recycling
- put labels on the cans
- provide recycling bags / bins / areas

1

[8]

M3. (a) (i) C_2H_4

1

(ii) poly(ethene)

1

(b) (i) is not biodegradable

1

(ii) not enough landfill sites / space

*accept landfill sites are filling up **or** plastics remain for <u>years</u> **or** plastics not broken down*

ignore cost / waste of resources / not biodegradable / wildlife

1

(iii) less (crude) oil / fuels / energy used

accept (crude) <u>oil</u> is a non-renewable resource

1

[5]

M4. (a) (i) monomers

1

(ii) crude oil

1

(b) any **three** from:

- metal may not corrode away / remains
- plastic remains / does not break down (decay) / not affected by microorganisms
  accept non-biodegradable
- should recycle / conserve resources / mend the kettle / burn (plastic) as a fuel
  accept it is a waste of materials / resources
- landfill sites are limited / filling up
- water pollution
  *ignore harms wildlife / habitats **or** problems caused by burning the kettle*

3

[5]

M5. (a) (i) hydrogen

must be name

1

(ii) a line of four or more ethene molecules joined to the original two with single bonds

*at least two other ethene molecules joined to the original two in a chain gains **1** mark*

2

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

- non-biodegradable
  accept remains a long time
- landfill sites are filling up / limited
  accept land / space used up
- waste of a resource / could be recycled / reused
  ignore references to tablets / animals

2

(ii) any **one** from:

- (two) different polymers / plastics / materials
- need to be separated
- limited collection points / many need to be collected
- tablets may still be present

1

[6]

M6. (a) (i) poly(ethene)

accept polythene

1

(ii) cracking

1

(iii) hydrogen

1

(b) (i) bar labelled 9

1

bar drawn to correct height

1

(ii) (boiling point) increases

1

(iii) heat / evaporate (the crude oil)

accept separate by boiling point

1

cool / condense (hydrocarbons at different temperatures)

accept smaller molecules go to top / larger molecules stay at bottom

*accept fractional distillation for two marks **or** distillation / fractionation for **one** mark*

1

(c) **yes**

any **two** from:

- because plastic does not biodegrade **or** running out of space for landfills **or** land cannot be used for a long time
- it provides heat energy
- which can be used to generate electricity / heat homes or greenhouses
- any other advantage of burning
- any other disadvantage of landfill

or

no

- burning plastic produces carbon dioxide / carbon emissions / toxic gases

  accept landfill does not produce
  carbon dioxide / carbon emissions

- causes global warming / climate change / increase greenhouse effect / global dimming / acid rain

- any other disadvantage of burning

- any other advantage of landfill

2

[10]