

( Life cycle assessments (LCAs) )

Q1. a). ( 2020 )

any **two** from:

energy used in:

- extraction of raw materials
- processing raw materials
- manufacturing
- transportation
- cleaning  
non-disposable plates
- disposal
- recycling

Q1. b). ( 2020 )

**Raw materials**

- Trees are renewable
- Crude oil and clay are finite

**Manufacturing and packaging**

- Paper plates use the least packaging so conserve raw materials
- Paper plates need less transportation overall as more plates in a 10 dm<sup>3</sup> cardboard box

**Use and operation**

- Paper plates are single use so must be replaced most often
- Ceramic plates last longer than polymer plates so must be replaced less often

**Disposal**

- Polymer / ceramic plates take up landfill which is running out
- Paper / polymer plates can be used to make new products
- Recycling conserves raw materials

**Reasoned judgement**

Q2. ( 2020 )

(wet) clay is shaped

(and) heated in a furnace

Q3. ( 2022 )

**raw materials**

- crude oil is finite
- quarrying / mining pollute the environment
- glass uses more energy to process raw materials

**manufacturing**

- glass uses more energy to make bottles
- glass is heavier so takes more energy to transport

**use and operation**

- glass bottles are reusable
- reuse of glass conserves (natural) resources
- reuse of glass consumes energy during washing
- reuse of glass consumes water during washing

**disposal**

- both glass and polymer bottles can be recycled
- recycling polymer conserves finite resources
- recycling glass and polymer uses less energy than making new glass and polymer
- both methods reduce use of landfill

**other points**

- energy needed may be derived from fossil fuels
- use of fossil fuels causes (specified) pollution
- total energy for glass (bottle) (7500 kJ) is greater than total energy for polymer (bottle) (1800 kJ)

**reasoned judgement**

Q4.( 2024 )

## Using Resources

<http://www.pcfgstudy.com>

- bamboo is renewable
- aluminium is a finite resource
- growing bamboo uses up agricultural land
- mining aluminium ore is a polluting activity
- cost of aluminium alloy is lower
- (so) can be replaced more frequently
- aluminium alloy is stronger
- (so) can withstand larger forces
- aluminium alloy has lower mass
- (so) bicycle is faster
- (so) is easier to carry / transport
- the aluminium alloy frame lasts less long
- (so) bicycle must be replaced more frequently
- aluminium alloy is recyclable (so) aluminium ores are conserved
- bamboo can provide renewable heat energy
- (so) less overall contribution to global warming
- (and) is carbon neutral
- neither material may reach landfill
- both materials have a sustainable disposal method