## Suggested answers:

1. **Describe the trend of plastic waste production and plastic recycled from 2010**

## to 2016. [2]

Plastic waste production has been generally increasing from 2010 to 2016 [1m] and the rate of plastic recycled has been generally decreasing from 11% to less than 5% [1m].

## Explain the probable price elasticity of demand for plastic bags in the UK. [3]

* + **Definition:** PED measures the responsiveness of the quantity demanded to a change in the price of the good, ceteris paribus. [1m]
  + **Identification:** PED of plastic bags in the UK is **price elastic**. [1m]
  + **Justification:** As mentioned in Extract 2, UK consumers are price sensitive (or the significant fall in 85% of plastic usage due to the 5p charge). This shows that UK consumers are very responsive to any change in plastic bag price. Hence, an increase in price of plastic bags will lead to a more than proportionate fall in quantity demanded of plastic bags in the UK. [1m]

## (i) Explain the source of market failure for the plastic bag market mentioned in Extract 1.

* + **Identify source** of MF: **Negative externality** due to **consumption.** [1m]
  + **Evidence with analysis:** From Extract 1, the damage to irrigation system and dam; contamination of drinking water, causing farmers living near the damaged dam to lose their livelihood and people who consumed the contaminated water to suffer from deteriorating health and incurring medical costs. [1m]

**[2]**

## (ii) With the use of a diagram, illustrate how free provision of plastic bags worsens the issue of market failure identified above.[5]

1. Explain how market failures occur due to the presence of negative externality produced by the use of plastic bags.

2. Explain how the extent of market failure in this industry worsen by this free use of plastic bags.

3. draw and explain the diagram

4. Analysis -

* MPB: Convenience of using the plastic bags to carry goods and can be used for other purposes, such as trash bags.
* MPC: Price of purchasing the plastic bag (in a free market, there should be a price for plastic bag) and the opportunity costs of using plastic bags
* MEC: Identified in (c)(i) [1m]
* MSC = MPC + MEC
* Correct identification of QE and QS. [1m]
* Provide condition of market output that maximise net private benefit: MPB

= MPC @ QE

* Provide condition of socially optimal output that maximise net social benefit: MSC = MSB @ QS with the DWL shaded in red.[1m]
* When plastic bags are provided for free, MPC = 0 (assuming no opportunity cost), market output @ QE’ with the DWL shaded in blue, which is greater than before. [1m]

## With reference to Extract 3 and any other data, comment on the effectiveness of the solutions proposed by the environmental advocates to reduce

**consumption of plastic bags in Singapore. [8]**

## Solutions proposed by environmentalist (Ext 3):

Encourage recycling of plastic bags and use of alternative carrier such as biodegradable or compostable bags for single-use purposes, paper bags for single-use purposes, reusable bags made from low density polyethylene (LDPE) or non-woven polypropylene, and cotton tote bags

* + **Objective**: Provide environmentally friendly solution to encourage the public to reuse the plastic bags or/and replace the use of plastic bags with compostable/paper bags/cotton tote bags.
  + **How it works**: This will reduce the demand (fall in MPB) for plastic bags due to the availability of alternative carrier bags to substitute plastic bags, causing consumers to switch to these alternatives, effectively reducing the market output to QS.

## However…

* + For recycling (‘reused’) of plastic bags, figure 1 shows declining recycling rate in Singapore. Possibly due to poor public education on recycling and weak government effort to encourage recycling.
  + For paper bags for single-used, figure 2 shows the increase in fresh water consumption due to paper bag production and extract 3 mentions the harm to environment when these paper bags are recycled.
  + For reusable bags made from LDPE, and cotton tote bags, figure 2 shows the increase in water consumption due to the washing of reusable bags.
  + Given that water is a scarce resource, especially in Singapore, the increase in water consumption might pose a greater challenge to the Singapore government than the negative externality caused by plastic bags.
  + Effort to encourage recycling should step up to minimise impact of plastic bag usage on the environment.

## Assess the factors the Singapore government should consider when deciding between imposing a ban and a tax on plastic bags. [10]

The aim of the corrective policies is to correct market failures. As such, the objective of the Singapore government in relation to the issue of over-usage of plastic bags must first be established. The factors to consider in ascertaining which policy works better in Singapore should take into account of the costs and benefits of each policy, constraints faced by the government and unintended consequences of the respective policies, all in Singapore context.

* + **Objective**: reduce plastic bag usage
  + **Cost-Benefit analysis**: [Key argument]
    - examine the costs and benefits of a ban and taxation.

Explain how the two policies work (briefly )

* + Indirect tax that is equivalent to the MEC will increase the MPC of consumers in the usage of plastic bags, reducing the market level of consumption from Qe to QS.
  + In this case, the use of ban will create a larger deadweight loss on society and taxation (= MEC) might be a better solution to reduce usage of plastic bags to QS and the tax revenue collected could be diverted to public education on recycling.

* + In this case, the use of a ban might be a better solution due to the large MEC involved and the benefit of its implementation will most likely outweigh the administrative costs involved. The use of taxation in this case would be dependent on the government’s ability to accurately measure the MEC, and would most probably involve some trial and error before socially optimal level of plastic bags usage could be achieved.
  + **As such, the size of the MEC will determine whether a ban or taxation is a more appropriate measure.**
  + In Singapore context, the size of MEC is unlikely to be too large as compared to countries that focus on agricultural productions and are dependent on domestic water sources. As such, given a generally low MEC, taxation might be a better solution for Singapore.

## Constraints:

* + - Due to the implementation costs of taxation and ban, government’s budget in the implementation of both measures must be considered. For governments with budget constraint, the policy with a relatively higher costs of implementation will incur significant opportunity costs which might undermine the economic development of an economy. **Hence, the policy with a lower implementation costs might be chosen.**
    - However, given the accumulated surpluses from the Singapore government, funding for its implementation would not be an issue.

## Information:

* + - The choice of appropriate policy measure and the amount of taxation required to achieve socially optimal outcome is dependent on the MEC. However, MEC is difficult to measure due to the intangible costs involved which make it difficult to monetise the effects on third party. As such, the ability of Singapore government to accurately measure the value of MEC is paramount to her decision in choosing the policy measure or/and amount of taxation to ensure maximum social welfare.
    - It is also important to determine the PED of consumers on plastic bags as it would affect the effectiveness of taxation in reducing plastic bag usage. For example, if Singaporeans are not responsive to any price change for plastic bags (inelastic PED – due to habit of using plastic bags when purchasing groceries), the tax imposed will not be effective in reducing plastic bag usage significantly unless the amount of taxation is significantly large.

However, if Singaporean consumers are to behave similarly as UK consumers (extract 2), PED for plastic bags will be price elastic. In this case, taxation will be effective to curb consumption of plastic bags.

## Unintended consequences:

* + - Issues of switching to paper bags or reusable bags [refer to (d)]

## Judgment:

* + - The most important factor to consider might be the accuracy of information collected on the monetary value of MEC. If the Singapore government believe that the MEC of plastic bag usage is large, a ban might be an appropriate measure as the benefits of implementation will outweigh any costs involved. However, if the MEC is considered to be low and only refinement to consumers’ consumption habit is needed, a tax might suffice. If Singapore government is to implement a tax on plastic bag usage, consumers’ PED for plastic bag has to be taken into account to ascertain the amount of taxation required to achieve the socially desired level of plastic bag consumption.

**One factor to consider whether taxation and ban is a better choice would depend …………….**