Name: _____

Date: _____

Class: _____

IB ESS

# 8.1 Human population dynamics

**Significant ideas:**

A variety of models and indicators are employed to quantify human population dynamics.

Human population growth rates are impacted by a complex range of changing factors.

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## Quantifying Population Dynamics

1. Define the following terms:

*Crude Birth Rate (CBR)*

*Crude Death Rate (CDR)*

*Natural Increase Rate (NIR)*

*Total Fertility Rate (TFR)*

*Doubling Time (DT)*

2. Look at the data for the nation below and answer the questions. Assume that there is no immigration or emigration.

| Country Profile – 2010 data | |
|---|---|
| Population | 5 000 000 |
| Births per year | 30 000 |
| Deaths per year | 10 000 |

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Calculate the following and show your working where appropriate:

i) The crude birth rate (CBR).

CBR= _____.

ii) The crude death rate (CDR).

CDR= _____.

iii) The natural increase rate (NIR).

NIR= _____.

iv) In which year will the population be 10 000 000? (Think about "doubling time")

Year: _____.

3.

a) Explain the term "replacement fertility"

b) Replacement fertility is higher than 2. State why this is.

c) Replacement fertility is about 2.16 in LEDCs, but only 2.03 in MEDCs. Explain this difference.

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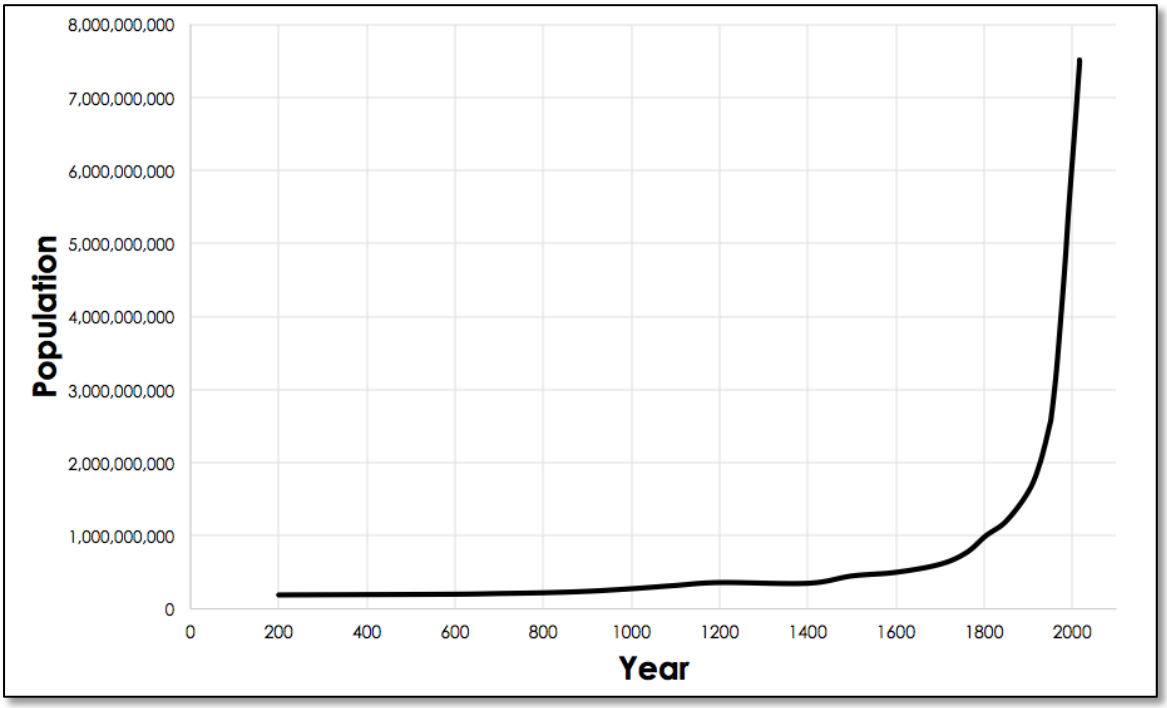
## Population Growth

1. The diagram below shows the change in world population over about the past 2000 years.




*Graph 1.1*

*World population growth 200AD to 2017 (Source: Worldometers)*

a) Describe the data

b) Thomas Malthus (1766 – 1834) believed that food production only increased at a linear rate, but human population can increase faster than this. Explain the consequences on the future of the human population if Malthusian theory is accurate.

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c) Esther Boserup (1910-1999) believed that an increase in population would result in an increase in food production, because we humans would recognize the necessity to provide more, and use new technologies to meet the demand. Explain the consequences on the future of the human population if Boserup's theory is accurate.

d) In your opinion, how will the human population change in the future? Justify your response and try to be specific

2. Describe the consequences of exponential population growth. Use the headings to guide your answer.

*Resource requirements*

*Waste*

*Living standard expectations*

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## Population Pyramids

1. The data in the table below shows the population with respect to age and gender for a nation in a given year.

| Age | Female | Male |
|---|---|---|
| 81 to 90 | 500 | 500 |
| 71 to 80 | 3500 | 3500 |
| 61 to 70 | 7000 | 7000 |
| 51 to 60 | 8700 | 8700 |
| 41 to 50 | 9000 | 9000 |
| 31 to 40 | 8700 | 8700 |
| 21 to 30 | 9500 | 9500 |
| 11 to 20 | 9000 | 9000 |
| 0 to 10 | 7000 | 7000 |

a) Present this information on population pyramid below.

b) Based on the graph, what can you conclude about this population's...

i) birth rate?

ii) death rate?

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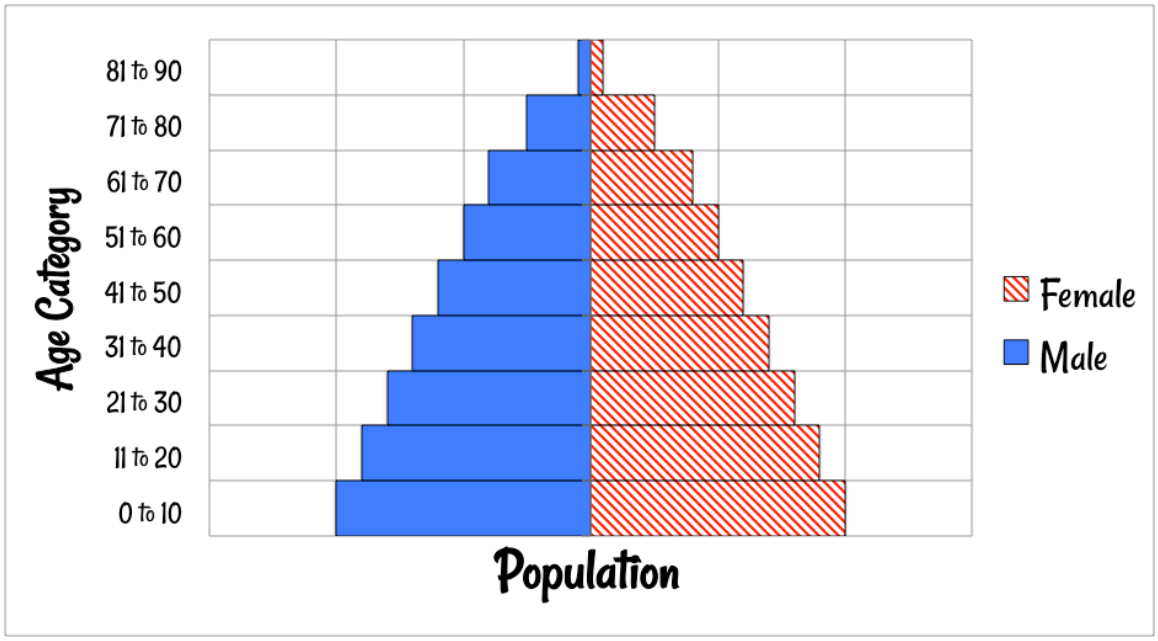
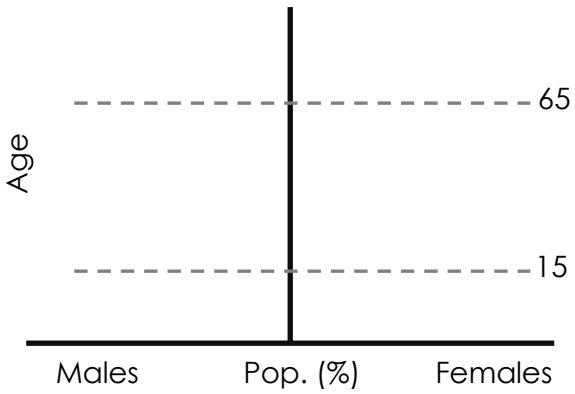
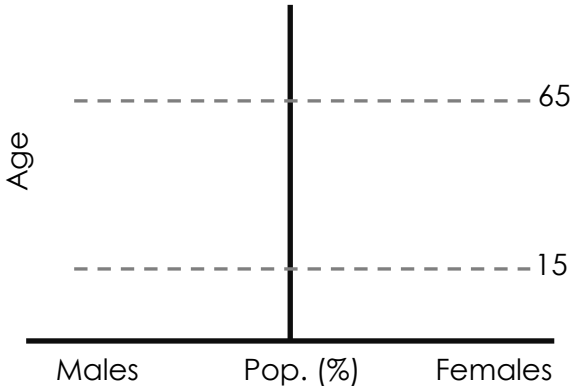
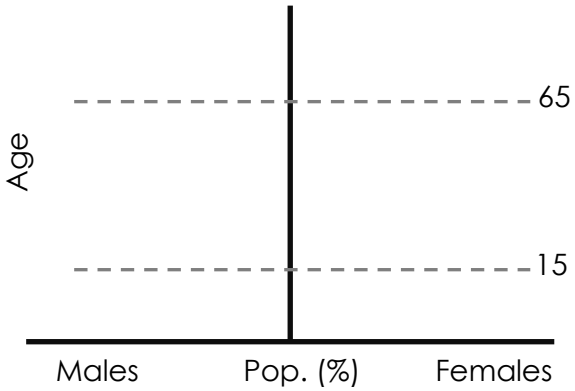
Look at the population pyramid below for a different population.




c) Compare this population with the one presented in question 1 a)

## The Demographic Transition Model and Age/Sex Pyramids

1. Complete table below to summarize the demographic transition model. **Briefly explain** the changes in birth rate, death rate, and population:

| | |
|---|---|
| **Stage 1: High stationary**<br>Birth rate:<br>Death rate<br>Population change: | Population pyramid:<br>  |
| **Stage 2: Early expanding**<br>Birth rate:<br>Death rate<br>Population change: | Population pyramid:<br>  |
| **Stage 3: Late Expanding**<br>Birth rate:<br>Death rate<br>Population change: | Population pyramid:<br>  |

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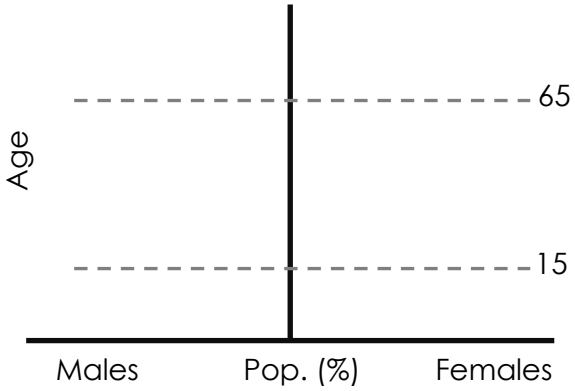
| **Stage 4: Low stationary** | Population pyramid: |
|---|---|
| Birth rate: |   |
| Death rate | |
| Population change: | |

2. The original demographic transition model had only four stages more recently a fifth stage has been proposed.

Summarise the fifth stage of the demographic transition model.

*Note: there is more than one possible answer as different suggestions exist as to what the fifth stage is. If you use further research, remember to cite your source.*

3. Discuss the limitations and criticisms of the demographic transition model.

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## Factors Influencing Population Changes

1. Explain how the following factors influence the average family size of a nation:

*Infant/childhood mortality rates*

*The need for care-giving in old age*

*Children as workers*

*Status of women*

*Availabililty and cost of contraception*

2. Explain how the following measures can act to reduce family size:

*Education*

*Make contraceptives available*

*Improved health care*

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3. Using the bubble diagrams below, summarise the national and international policies that can be used to reduce and increase population growth rates.

Policies that may reduce population growth rates

Policies that may increase population growth rates

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