



88126301



**ENVIRONMENTAL SYSTEMS AND SOCIETIES  
STANDARD LEVEL  
PAPER 1**

Tuesday 13 November 2012 (afternoon)

1 hour

Candidate session number

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Examination code

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**INSTRUCTIONS TO CANDIDATES**

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all questions.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is *[45 marks]*.



0120

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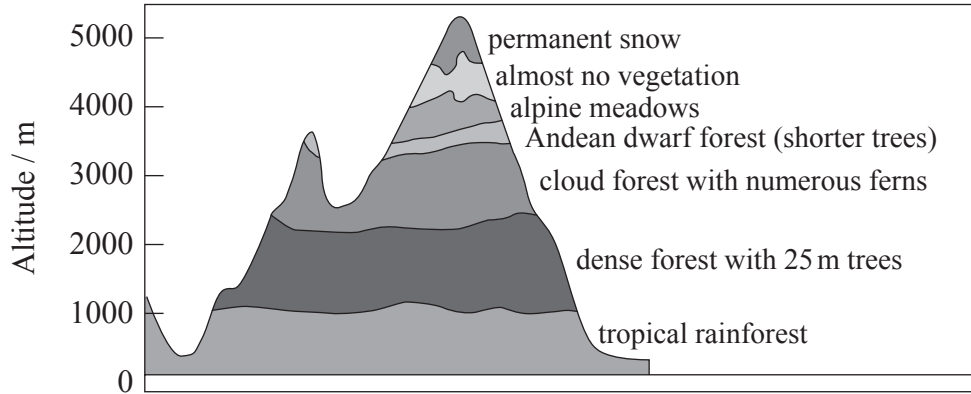
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- 1. Figure 1 shows how vegetation changes with altitude in the Andean mountain chain in South America.

Figure 1



[Source: Zonation of the vegetation belts in the South American Andes presently and during the climatic minimum of the last continental glaciation of the northern hemisphere – when each of the zones was about 1,200 m lower. (After Perlmutter, M. A. and Matthews, M. D., 1990, Global cyclostratigraphy – a model, in Cross, T. A., ed., *Quantitative dynamic stratigraphy*: Prentice Hall, Englewood Cliffs, New Jersey, pp. 233–260.)

- (a) State the term for the pattern of vegetation shown in Figure 1. [1]

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- (b) Identify **two** limiting factors affecting the vegetation in the alpine meadows. [2]

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- (c) Suggest **one** way in which the pattern of vegetation shown in Figure 1 might change as a result of global warming. [1]

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2. Figure 2 shows Japanese Knotweed (*Fallopia japonica*), a large plant native to eastern Asia. It is an invasive species that has been successful in colonizing North America and Europe. The most effective method of control of Japanese Knotweed is by herbicide application.

[Source: adapted from Wikipedia.]

Figure 2



[Source: © Mde at Wikimedia Commons, CC-BY-SA 3.0 German  
<http://de.wikipedia.org/wiki/Benutzer:Mde>  
[http://en.wikipedia.org/wiki/File:Fallopia\\_japonica\\_Mde\\_2.jpg](http://en.wikipedia.org/wiki/File:Fallopia_japonica_Mde_2.jpg)]

- (a) Japanese Knotweed can be described as a pioneer species. Define the term *pioneer species*. [1]

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- (b) State **one** impact of an invasive species on the functioning of an aquatic ecosystem. [1]

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*(Question 2 continued)*

- (c) Outline **two** problems caused by the use of herbicides to control invasive species such as Japanese Knotweed. [2]

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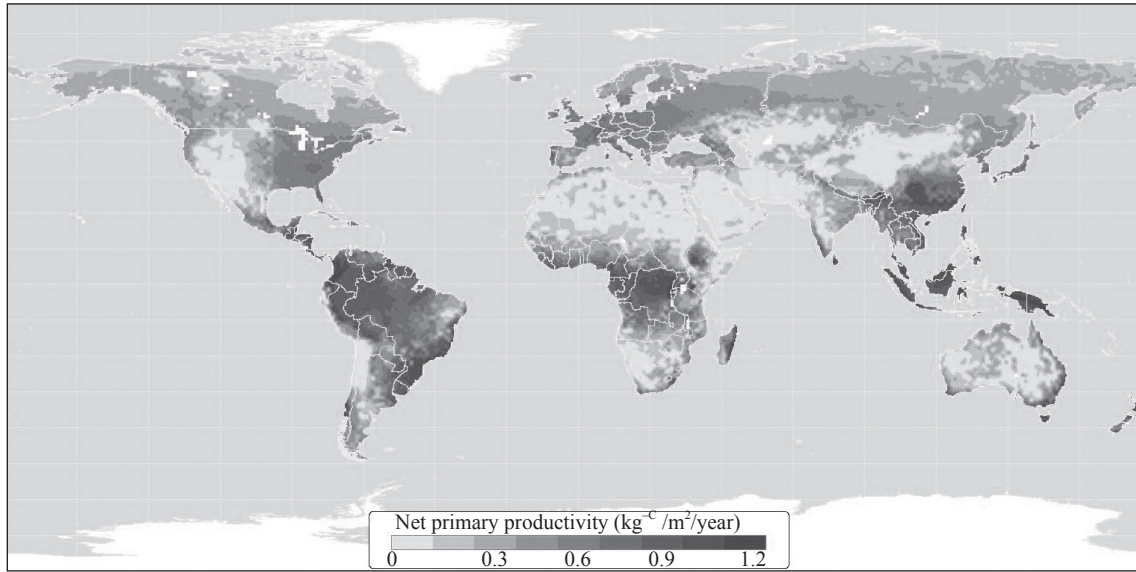
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3. Figure 3 shows rates of net primary productivity (NPP) for different biomes around the world.

**Figure 3**



[Source: Used with permission from the Center for Sustainability and the Global Environment (SAGE), Nelson Institute for Environmental Studies, University of Wisconsin-Madison, USA.]

- (a) Define the term *net primary productivity*. [1]

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- (b) Explain why rates of net primary productivity are higher in some parts of the planet than others. [2]

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*(Question 3 continued)*

- (c) Suggest **two** ecological reasons why certain ecosystems are considered more biologically significant than others. [2]

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- (d) Outline **one** human activity threatening a **named** area of biological significance. [1]

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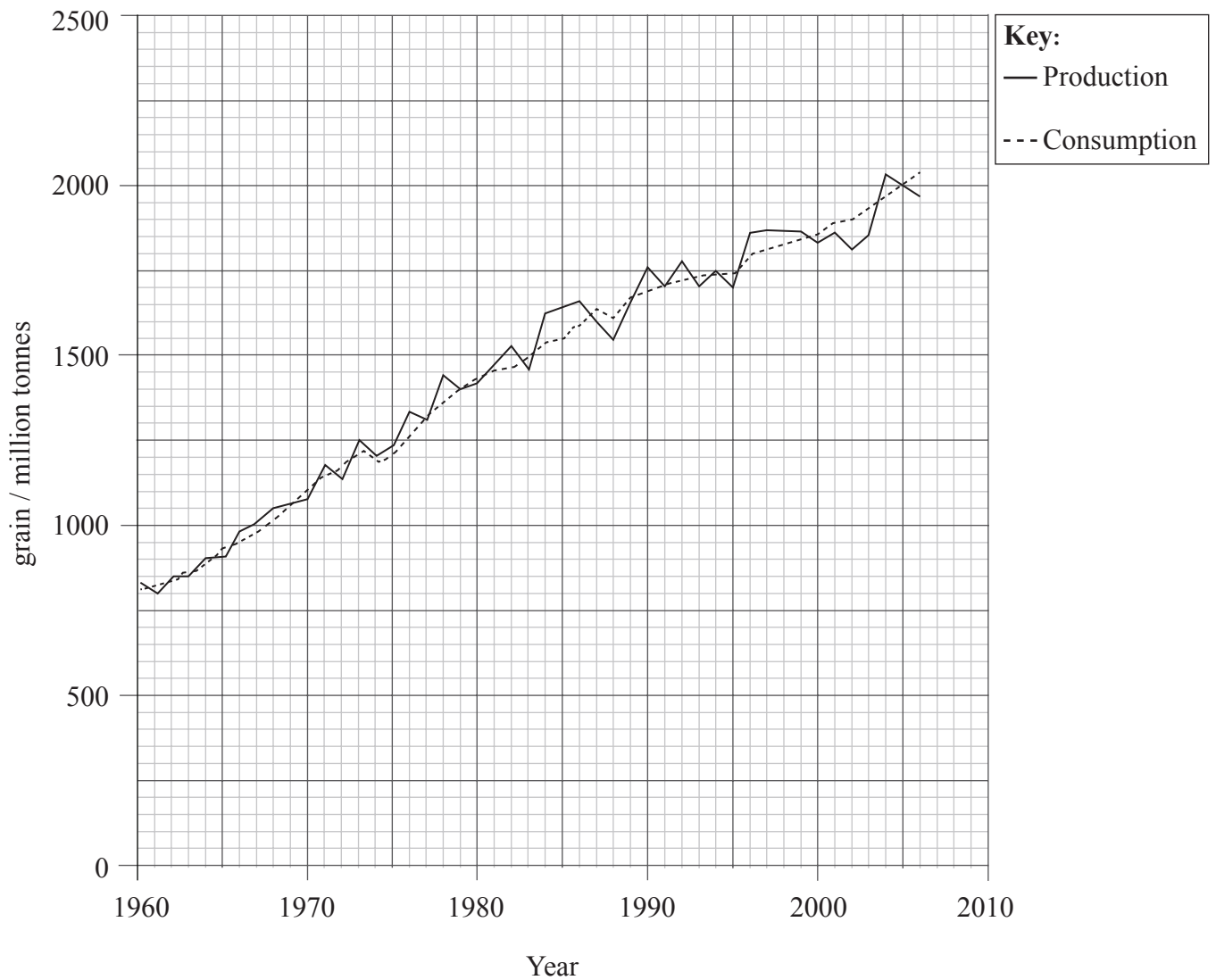
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4. Figure 4 shows changes in world grain production and consumption between 1960 and 2006.

**Figure 4**



[Source: [http://www.jennifermarohasy.com/blog/archives/2006\\_ProductionConsumption.gif](http://www.jennifermarohasy.com/blog/archives/2006_ProductionConsumption.gif)  
U.S. Department of Agriculture.]

- (a) Calculate the percentage increase in grain production between 1967 and 2005. [1]

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*(Question 4 continued)*

- (b) Construct a simple diagram to show **three** inputs that can lead to increases in **two** outputs in a food production system. [3]

- (c) Outline **two** negative environmental impacts of increasing food production. [2]

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- (d) Explain how the size of the ecological footprint of individuals may be affected by their diet. [2]

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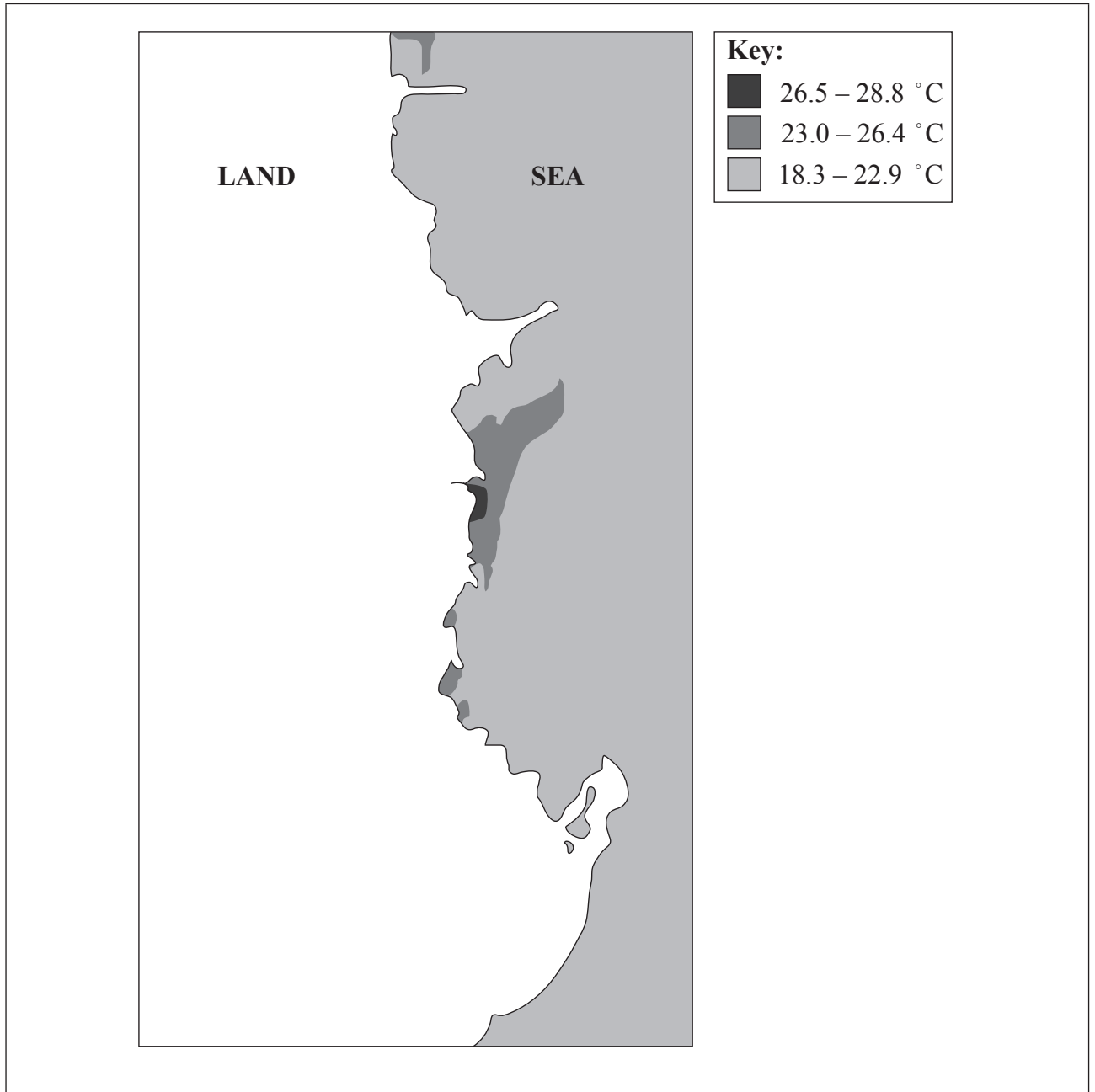
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5. Figure 5 below shows a range of coastal seawater temperatures at different distances from a nuclear power station. Nuclear power stations may be responsible for localized thermal pollution of coastal waters. Thermal pollution is caused by warmer water being released into a colder body of water.

**Figure 5**



[Source: © International Baccalaureate Organization, 2013]

- (a) Label a point on Figure 5 to show the likely location of the power station responsible for the thermal pollution of local waters. [1]

*(This question continues on the following page)*



(Question 5 continued)

- (b) Thermal pollution lowers the dissolved oxygen content of water. Suggest the effect of this on a **named** transformation process. [2]

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- (c) Identify **one** local factor which can affect the choice of pollution management strategy, and **one** national factor. An international factor has been shown as an example. [2]

	Factor affecting choice of pollution management strategy
International	<i>International agreements to set targets to reduce amounts of atmospheric pollutants that can be released.</i>
Local	..... .....
National	..... .....

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Turn over

*(Question 5 continued)*

- (d) International agreements are one way in which governments can respond to environmental problems. In the table below, state the issue to which each agreement relates. [2]

<b>Agreement</b>	<b>Issue</b>
Montreal protocol	.....
Kyoto protocol	.....
CITES	.....



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- 6. Figure 6 below shows data on the risks to life and property by coastal flooding in several major cities as a result of global warming.

**Figure 6**

Country	City at risk	Estimated number of citizens at risk / thousands	Estimated value of property at risk / billion dollars
India	Mumbai (Bombay)	2787	46.20
China	Guangzhou	2718	84.17
China	Shanghai	2353	72.86
USA	Miami	2003	416.29
Vietnam	Ho Chi Minh City	1931	26.86
India	Kolkata (Calcutta)	1929	31.99
USA	New York-Newark	1540	320.20
Egypt	Alexandria	1330	28.46
Japan	Tokyo	1110	174.29
China	Tianjin	956	29.62
Thailand	Bangkok	907	38.72

[Source: 'Ranking of the world's cities most exposed to coastal flooding today and in the future. Executive summary' Table 1 © OECD, 2007.]

- (a) Identify **two** patterns in the data.

[2]

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*(Question 6 continued)*

- (b) Suggest **two** reasons why less economically developed countries (LEDCs) are more vulnerable to the effects of coastal inundation than more economically developed countries (MEDCs). [2]

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- (c) State **two** reasons why global warming may lead to rises in sea levels. [1]

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- (d) State **one** reason why it is difficult to measure changes in sea level accurately. [1]

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*(This question continues on the following page)*



*(Question 6 continued)*

(e) Explain **one** effect of coastal inundation on each of the following: [4]

(i) coastal ecosystems

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(ii) human health

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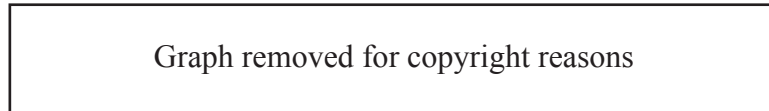


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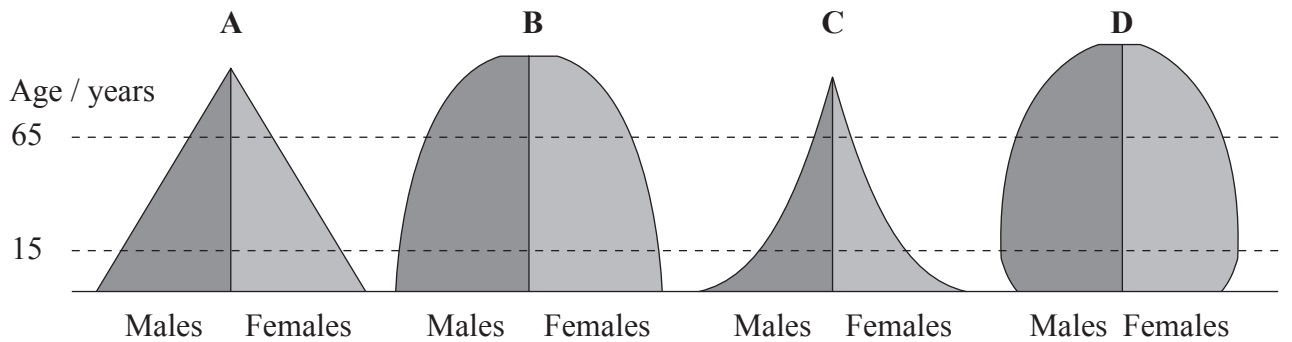
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7. Figure 7 (a) below shows the demographic transition model and Figure 7 (b) shows age/sex pyramids for four countries (A, B, C and D) at different stages of transition.

**Figure 7 (a)**



**Figure 7 (b)**



[Source: [http://upload.wikimedia.org/wikipedia/commons/thumb/0/0a/Dtm\\_pyramids.png/800px-Dtm\\_pyramids.png](http://upload.wikimedia.org/wikipedia/commons/thumb/0/0a/Dtm_pyramids.png/800px-Dtm_pyramids.png)]

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(Question 7 continued)

- (a) Determine the stage of demographic transition represented by each age/sex pyramid. [2]

Pyramid	Stage of demographic transition
A	.....
B	.....
C	.....
D	.....

- (b) State the term used to describe the number of people that can be supported by a given environment. [1]

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- (c) Explain **three** ways in which the number of people supported within an area may be increased. [3]

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