



## Exampro A-level Biology

### 3.4.1 Human Populations

Name:

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Class:

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Author:

Date:

Time: 61

Marks: 48

Comments: These questions focus on data interpretation

**M1.** (a) Birth rate and death rate = 2 marks;;  
*Neutral: any reference to per or times by a number eg per 1000 / x 100*

**OR**

1. Change in population / births and deaths / population at start and end;
2. In a given time;  
*Neutral: ignore any reference to immigration and emigration unless context is incorrect*

2

- (b) 1. High birth rate / high proportion/percentage / number of young / children;  
*1 and 2. Both points must be clearly stated. Do not award other mark by implication*
2. High death rate / low proportion / percentage / number of elderly / older people / low life expectancy  
*1 and 2. Accept appropriate use of percentage / number as alternatives*  
*1. Accept: 'wide base' or any equivalent description of high proportion / number of young children*  
*2. Accept: 'narrow at top' or any equivalent description of low proportion of older people*  
*2. Accept high death rate in context of any age group*

2

[4]

**M2.** (a) Organisms / individuals of one species in a habitat / same place;  
*Accept 'same gene pool' as 'species'*

1

- (b) Any two factors for one mark e.g.  
*Accept two related factors e.g. vaccination and better health care*

Improved medical care, improved nutrition, more food, improved sanitation, less disease, improved living conditions, improved economy, war ends;

1

- (c) Correct answer in range of 269 – 291 (%);;

One mark for incorrect answer but shows change of 6.2 (x 1000) / 6.3 (x 1000) / 6.4 (x 1000);

2

- (d) 1. Increase in (average) life expectancy;  
*Allow **one maximum mark** if candidate provides correct answer using 2007 curve*
2. Low death rate / decrease in death rate / few(er) deaths / more survivors / fewer babies / infants die / more old(er) people;  
*2. Allow any description which suggests more survivors or fewer deaths*

2

[6]

- M3.** (a) All organisms of one species in a habitat/area/place/at one time;  
*Accept group*

1

- (b) (i) From curve **C**;

Find age as a percentage of a maximum/find value when 5000/50% still alive;

(Use to) calculate as a percentage of 95/Answer = 85 years;

***Q** This question tests quality of written communication. Marks may be awarded for calculating the answer but this must be supported by adequate explanation making the points listed.*

*If curve A or B are given, figures for last mark point are*

*A 8*

*B 50*

*All three +/- 2*

3

- (ii) More disease/poor food supplies/poor sanitation/poor medical care;  
*Overcrowding not enough*

High death rate among the young/in childhood/curve drops steeply at first/in first 40;

*Ignore ref to years or percentage*

2

[6]

- M4.** (a) 1. Higher mean / average number of children (per female) in 1700;
2. Higher life expectancy in 2010 / higher proportion / percentage of older people in 2010;
3. Greater range / spread / variation of life expectancies in 2010;  
*Accept: converse answers for all mark points.*  
*Accept: use of figures for all mark points.*  
*Neutral: birth rate / death rate.*

2 max

- (b) Two suitable suggestions e.g.
1. Medical / health care / vaccination / antibiotics / lower infant mortality;
  2. Diet / nutrition / food availability;
  3. Sanitation / water supply / sewage treatment;
  4. Contraception / birth control;
  5. Work related example / occupation / education;
  6. Financial considerations of having children;
  7. Government / state policy;
  8. War;
- Neutral: better living conditions / improved economy.*

2 max

- (c) The following answers = 2 marks;;

60,175,920 / 60.1759 million / 60.176 million / 60.18 million;;

Incorrect answer with following working = 1 mark

60 200 × 0.4 / 24 080 / 583 940 / 559 860;

*Reject: 60,199,600 and reject 60.2 million if rounded up from 60,199,600.*

*Accept: 60.2 million for two marks if rounded up from correct answer shown in working.*

*60.2 million without indication if derived from correct or incorrect answer = 1 mark.*

*Accept: 60.18 / 60.176 for one mark.*

*Accept: 60.175 million for one mark but 60.175 = no marks.*

2

[6]

- M5.** (a) (Number of) organisms of one species in a habitat/same place;

1

- (b) (i)  $B + I = D + E / (B + I) - (D + E) = 0 / (B - D) + (I - E) = 0;$   
*Allow word equations.*

1

- (ii)  $B + I > D + E / (B - D) + (I - E) > 0 / (B + I) - (D + E) > 0;$

1

- (c) (i) Improved medical care/improved nutrition/improved sanitation/water treatment/lower infection rates/less disease;  
*Allow any specific examples of improved health or medical care e.g. vaccinations, health education*

1

- (ii) Correct answer of 108 605 000 = 2 marks;;  
 107 000 × 15/107 million × 0.015/1605 000/  
 (deaths) 535 000 and (births) 2140 000;

2

[6]

- M6.** (a) (i) A – high proportion of young, decreasing proportion  
 in successively older groups / low proportion of older people;  
 B – approximately same proportion of all age groups;  
*(must have pattern i.e. refer to whole age range)*

2

- (ii) a large base to pyramid/high proportion of young /high birth rate;

1

- (b) birth rate and death rate;  
 emigration and immigration;

2

[5]

- M7.** (a) (i) *suitable reason for birth rate increase;*  
*examples,*  
 more people survive to reproductive age;  
 better pre-natal care / health care of mother;  
 better nutrition of mother;

1 max

- (ii) *suitable reason for death rate fall;*  
*examples,*  
 better nutrition;  
 better sanitation;  
 (widespread) introduction of health care;  
 better post-natal care (mother or child);  
 vaccination programmes;

1 max

- (b) (i) birth rate decreasing;  
 as the death rate constant but births minus deaths is falling;

2

- (ii) reduces population growth until 1989/90 (as more (net)  
 emigration); increases population growth from 1989/90  
 (as more (net) immigration);

2

[6]

- M8.** (a) (i) 1931;  
smallest difference between birth and death rate; 2
- (ii) rate of increase =  $34.3 - 22.0 = 12.3$  per thousand,  
so increase =  $18\ 000 \times 12.3/221\ 400$ ;  
size of population =  $18\ 000\ 000 + 221\ 400$  (increase)  
= 18 221 400; 2

- (b) herd immunity/effect;  
any individual has lower chance of meeting infected individual;  
lower chance of disease being passed on/prevents spread of disease; 2 max

- (c) males have XY, females XX/ males have Y chromosome females do not;  
so males have only one allele for some genes;  
these alleles are expressed;  
(harmful alleles) increase chance of early death/valid example;

OR

males have XY, females XX/ males have Y chromosome, females do not;  
males develop testes;  
which are responsible for testosterone production;  
which causes males to take more risks/valid example;

OR

males have XY, females XX/ males have Y chromosomes, females do not;  
females develop ovaries;  
which are responsible for oestrogen production;  
which protects individuals against diseases/valid example, e.g CHD;

3 max

[9]

