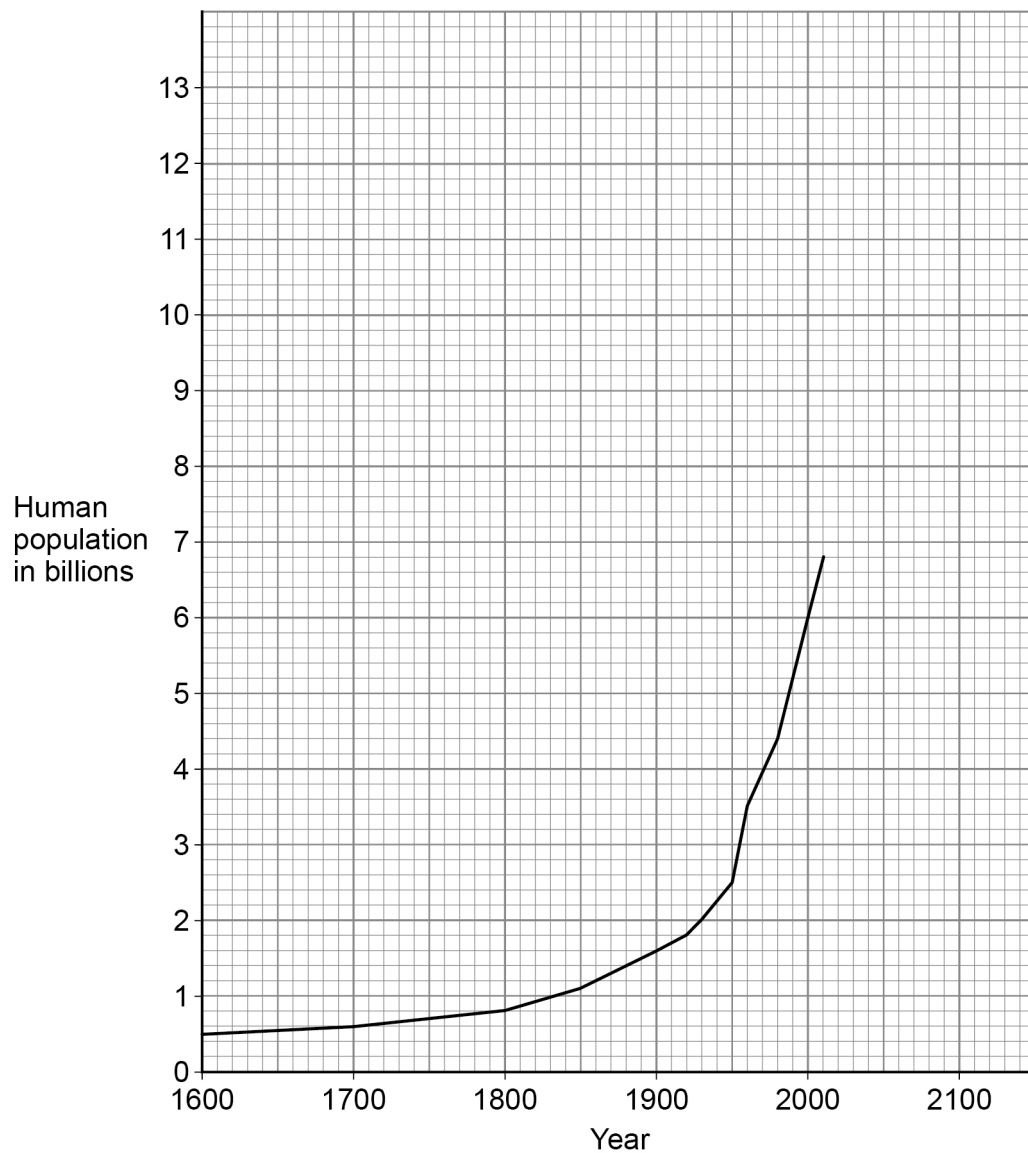


0 9

Figure 12 shows the human population from 1600 to 2010.

Figure 12



In 1900 the human population was 1.6 billion.

0 9 . 1

Calculate how many times greater the human population was in the year 2000 compared with the year 1900.

[2 marks]

Number of times greater = _____



0 9 . 2 In 1950 the human population was 2.5 billion.

Calculate the mean annual increase in the human population between 1900 and 1950.

[2 marks]

Mean annual increase = _____ billion per year

0 9 . 3 Predict the human population in 2050 if the current rate of population increase continues.

You should draw an extrapolation line on **Figure 12**.

[2 marks]

Predicted human population = _____

0 9 . 4 The increasing human population has caused a decline in fish stocks.

Describe how fishing quotas can help to return fish stocks to a sustainable level.

[2 marks]

Question 9 continues on the next page

Turn over ►



0 9 . 6 Genetic modification of crop plants can help meet the demands of the increasing human population.

Golden rice is a genetically modified (GM) crop.

What is the advantage of golden rice compared with non-GM rice?

[1 mark]

Tick (✓) **one** box.

Golden rice contains protein-rich mycoprotein

Golden rice has improved nutritional value

Golden rice produces human insulin

0 9 . 7 Suggest **one** reason why some people are concerned about the use of golden rice.

[1 mark]

16

END OF QUESTIONS



Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	$\frac{6.0}{1.6}$	allow a range of 5.9 to 6.1 for 6.0	1	AO2 4.7.3.2
	3.75	do not accept if a unit is given if no other marks awarded, allow a correct answer using a value of 5.8 or 6.2 for 1 mark	1	
09.2	$\frac{2.5 - 1.6}{50}$	allow $\frac{0.9}{50}$	1	AO2 4.7.3.2
	0.018 (billion per year)		1	
09.3 view with Figure 12	suitable extrapolation line on Figure 2	allow straight extrapolation	1	AO2 4.7.3.2
	reading taken at 2050 from student's line	allow a tolerance of $\pm \frac{1}{2}$ small square allow 1 mark for 10 billion if no extrapolation drawn	1	
09.4	fewer fish caught or limit the number of fish caught	allow a method of doing this, eg increase mesh size or do not catch young fish	1	AO1 4.7.5.1 4.7.5.3
	(remaining fish) can reproduce	allow more fish (survive to) reproduce	1	

Question	Answers	Mark	AO / Spec. Ref.
09.5	Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4-6	AO1 4.7.3.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1-3	4.7.3.2 4.7.3.3 4.7.3.4
	No relevant content	0	4.7.3.6 4.7.3.5
	<p>Indicative content</p> <p>human land use</p> <ul style="list-style-type: none"> • increasing population requires more food • crops / livestock for food • farming crops for biofuels • peat use as compost • peat use as fuel • increased use of pesticide / insecticide / herbicide / fertilisers • use of free-range / organic methods increases land use (for same yield) <p>link to biodiversity</p> <ul style="list-style-type: none"> • deforestation • monocultures • loss of hedgerows to make fields larger • loss of habitat • consequence of loss of habitat eg (change in) migration • fertiliser run off polluting water • use of pesticide / insecticide / herbicide reduces insects / plants which damages food chains • more soil erosion <p>link to atmospheric pollution</p> <ul style="list-style-type: none"> • more carbon dioxide (from farm animals / machinery) • more methane (from cows) • climate change or global warming • example of impact on biodiversity • acid rain • desertification <p>Answers referring to only land use or only biodiversity are level 1</p>		4.7.5.1 4.7.5.2

09.6	golden rice has improved nutritional value		1	AO1 4.7.5.4
09.7	<p>any one from:</p> <ul style="list-style-type: none"> • gene may contaminate / enter other breeds / species • reduction / extinction of population of wild / traditional rice • reduction / extinction of population of flowers / insects • high cost of seeds • may have too much vitamin A (in diet) 	<p>ignore references to religious beliefs</p> <p>} allow decrease in biodiversity</p> <p>allow decrease in gene pool allow may harm (human) health allow may cause side effects (on humans)</p> <p>ignore may harm humans unqualified</p>	1	AO3 4.6.2.4
Total			16	