

GCSE Biology B (Twenty First Century Science)
J257/04 Depth in biology (Higher Tier)

Question Set 11

(a) Red blood cells are made from adult stem cells in the bone marrow.

(i) A stem cell divides by mitosis to make red blood cells.

Mitosis is one stage of the cell cycle. The other stage is interphase.

Complete the table to describe three things that happen during each stage of the cell cycle.

Interphase		Mitosis	
1	The cell grows larger	1
2	2	The nucleus divides
3	3	The cell divides

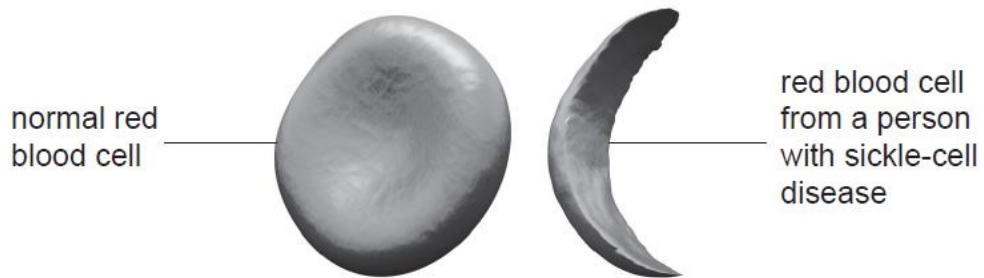
[3]

(ii) Explain how a stem cell is able to become a different type of cell.

[3]

Sickle-cell disease affects the shape of red blood cells.

(b) Look at the picture of red blood cells.



Explain why people with sickle-cell disease often have difficulty in getting enough oxygen to their body tissues.

[3]

- (c) Sickle-cell disease is common in regions of the world in which malaria is also common.

Read the information about sickle-cell disease and malaria.

Sickle-cell disease is caused by a faulty allele. It causes pain from a young age but average life expectancy with the disease is 40 to 60 years.

Only people who are homozygous for the sickle-cell allele have sickle-cell disease.

People who are heterozygous do not have sickle-cell disease, and also have some resistance to malaria.

People who are homozygous for the normal allele do not have sickle-cell disease and have no resistance to malaria.

- (i) Use the information to explain why sickle-cell disease is common in regions in which malaria is widespread. [5]
- (ii) Suggest why sickle-cell disease would be less common in these regions if malaria was wiped out. [2]

Total Marks for Question Set 11: 16

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge