

GCSE Double Award Biology Higher Tier
Unit 4/Biology 2: Topic 4.2

Cell division and stem cells

1. (a) (i) Which part of a living cell contains chromosomes? [1]

.....

(ii) Complete the table below about cell division in human cells by writing on the dotted lines. [4]

Type of division	MITOSIS	MEIOSIS
Number of chromosomes in cells	<p>Original cell</p> <p>46</p> <p>new cells</p>	<p>Original cell</p> <p>46</p> <p>new cells</p>
Function of division	formation of sex cells
Genes in new cells	identical

(iii) What is the scientific term used for sex cells such as sperm and eggs? [1]

.....

2. Barack Obama, the President of the United States of America, supports research into the use of embryonic stem cells. However Newt Gingrich, who was hoping to become President, said in February 2012, that he would 'ban embryonic stem cell research if he became President'.



Barack Obama



Newt Gingrich

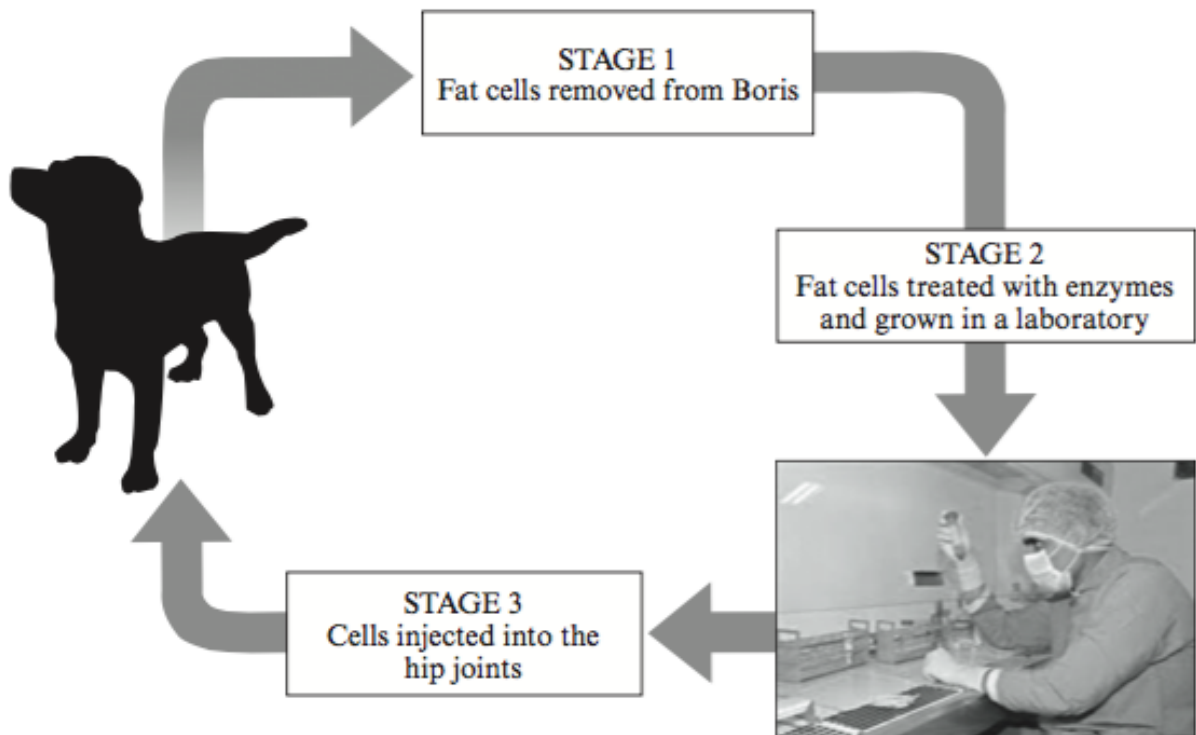
(a) *i.* Some people support stem cell research and others do not. Describe the different types of stem cell and discuss why some people do not support it. [5]

''

''

''

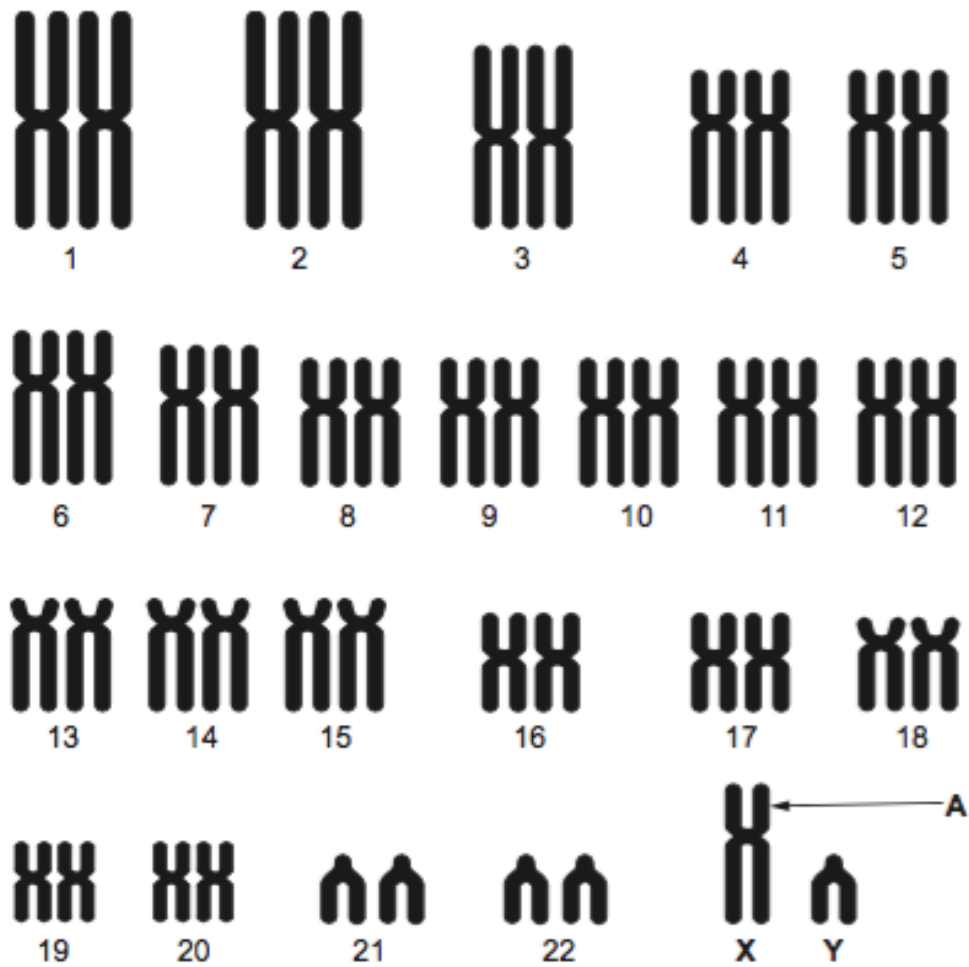
- (b) In December 2010, a dog named Boris was treated for severe arthritis of the hip joints in a veterinary clinic in West Michigan, USA. Some of the stages in the treatment are shown below.



Three months after treatment Boris was examined at the veterinary centre. His hips were found to have greatly improved and X-rays of the hip joints showed evidence of repair of the joint tissues.

- (i) State what type of cells are injected in STAGE 3 in the diagram above. [1]
-
- (ii) State **one** advantage of this method of treatment over the use of embryonic stem cells. [1]
-
-

3. The drawing shows the chromosomes from a human cell.



(a) How does the drawing show that the cell is not a gamete? [1]

(b) Point A on the X chromosome shows the position of an allele. Give the reason why a male cannot be heterozygous for this allele. [1]

(c) Describe how genes are arranged on a chromosome. [1]

4.

Cells in the human body can be haploid or diploid. When an egg cell combines with a sperm cell, a fertilized egg (zygote) is formed.

(a) Which row of the table gives correct information about the egg cell, the sperm cell and the zygote.

	Egg cell	Sperm cell	Zygote
A	Diploid	Diploid	Haploid
B	Diploid	Haploid	Diploid
C	Haploid	Diploid	Haploid
D	Haploid	Haploid	Diploid

Answer(1)

(b) The single cell of the zygote divides into two cells in 15 hours. These cells continue to divide in this way to form an embryo.

The diagram shows an embryo with 32 cells.

Calculate the length of time it takes the single cell of the zygote to form an embryo with 32 cells.

Answer(2)

/3

5. Compare the differences between meiosis and mitosis.

(6)

/6