



BIOLOGY 2020

Unit 2

Key Topic Test 2 – Cell growth and differentiation

Recommended writing time*: 45 minutes

Total number of marks available: 45 marks

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: C

Explanation: An uncontrolled cell cycle can lead to cells being formed in an uncontrolled manner. This is called a tumour, option C. Rapid growth, increased metabolism and disease can be the result of a more rapid cell cycle but not necessarily uncontrolled.

Question 2

Answer: B

Explanation: Option A refers to cell death before the required time and so is incorrect. Option C corresponds to necrosis, not apoptosis. Option D refers to necrosis rather than apoptosis.

Question 3

Answer: A

Explanation: The correct description is differentiation, option A. Option B refers to programmed cell death, option C is not a valid word and option D refers to un-programmed cell death

Question 4

Answer: A

Explanation: Option B refers to the ability to give rise to most cell types but not the associated membranes, option C is even less potent and can only produce cells of a few types and option D is not a valid word in this context.

Question 5

Answer: D

Explanation: Option A describes a zygote, very soon after conception, option B would occur about 3 weeks after conception, too early to be termed a foetus and option C would happen about 4 weeks after conception. The term foetus is used at about 8 weeks after conception, option D.

Question 6

Answer: D

Explanation: Only option D lists the sequence in the correct order.

Question 7

Answer: A

Explanation: The oncogenes will overcome the checkpoints in the cell cycle and forge ahead leading to tumour formation. The tumour suppressor genes will maintain the checkpoints and act as brakes. Options B, C and D are therefore incorrect

Question 8

Answer: B

Explanation: Option A, C and D are not valid words.

Question 9

Answer: B

Explanation: Options A, C and D are not controversial as they do not involve the loss of a potential life. Option B would be most controversial as a blastocyst is considered a life by some.

Question 10

Answer: D

Explanation: A cell taken from the patient has little chance of being rejected by the patient's immune system. Options A, B and C all involve cells taken from another person and could well be rejected by the patient's immune system.

SECTION B: Short-answer questions

Question 1

Letter	Name of layer	Tissue that derives from this layer
X	Ectoderm	Eg. Nervous system, tooth enamel, epidermis of the skin, hair and nails.
Y	Mesoderm	Eg. Muscle, bone, blood, dermis of the skin
Z	Endoderm	Eg. All the tissues and organs such as the colon, the stomach, the intestines, the lungs, the liver, and the pancreas.

Students should provide an example of tissue/s only, they do not need all possible options to gain the mark.

Total 6 marks

Question 2

a.

Potency	Ability
Multipotent	Multipotent cells can develop into more than one cell type, but are more limited than pluripotent cells.
Pluripotent	Pluripotent cells can give rise to all of the cell types that make up the body.
Totipotent	Totipotent cells can form all the cell types in a body, plus the extra-embryonic, or placental, cells.

3 marks

b. Multipotent

2 marks

c. Pluripotent

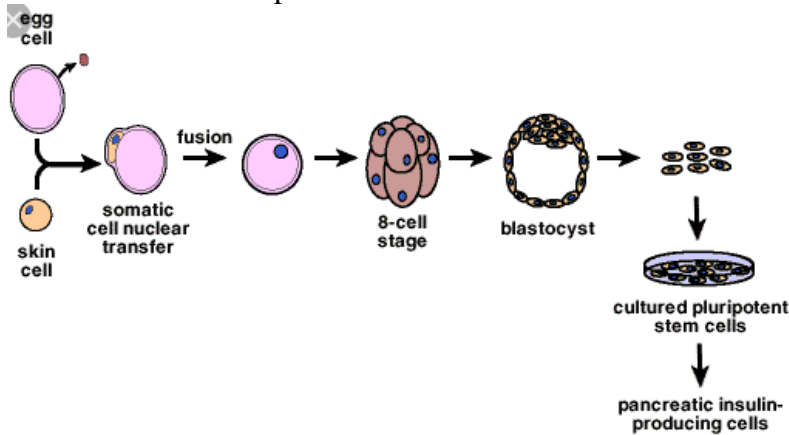
2 marks

Total 7 marks

Question 3

a. Therapeutic cloning

- Donated egg cell has nucleus removed*
- Nucleus is removed from patients somatic cell and placed in the egg cell*
- Egg cell is encouraged to divide and form a blastocyst*
- Embryonic stem cells removed*
- Used to treat patient*



5 marks

- b.** The cells produced for therapeutic cloning are unlikely to be rejected by the patient's immune system* as they have been derived from the patient's own cells*.

2 marks

Total 7 marks

Question 4

a. For:

- Embryonic stem cells have the potential to save and improve human lives
- Embryo is too early in development to be considered human
- IVF produces so many cells. Many are unused, and this avoids them being wasted

Against:

- Religious and pro-life activists have equated this to murder
- Embryos have the same rights as any person as life begins at conception
- Advocate using adult and cord blood stem cells instead

Award marks for two points for, and two against, and one mark for a clear argument

5 marks

- b.** The development of iPSCs has provided an alternative to using embryonic stem cells*. Both types of cells are pluripotent but iPSCs do not require the destruction of an embryo* and thus do not create ethical issues.

2 marks

Total 7 marks

Question 5

In Australia in 1995, AusCord was established. AusCord stores umbilical cord blood and placental blood to provide a source of stem cells. No harm occurs to mother or baby but the stem cells can be used to treat any suitable adult or child who suffers from bone marrow or blood disease.

- a. Multipotent* same as adult stem cells*

2 marks

- b. The potency is different embryonic (pluripotent)* whereas cord stem cells are multipotent*

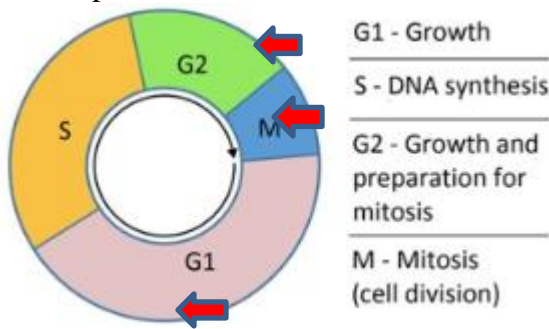
Students may also mention the ethical dilemma. Award marks for any reasonable response.

2 marks

Total 4 marks

Question 6

- a. 3 checkpoints should be marked similar to the diagram below:



3 marks

- b. If repair cannot be carried out then apoptosis is likely to occur.

1 mark

Total 4 marks