

Surname	Initial(s)
Signature	

Paper Reference(s)

5015 5027

Edexcel GCSE

Additional Science (5015)

Biology (5027)

B2 – Topics 1 to 4

Foundation and Higher Tier

Thursday 11 November 2010 – Afternoon

Time: 20 minutes

Materials required for examination

Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers

Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.

Higher tier candidates: answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

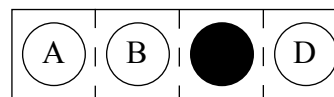
Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

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Turn over

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**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

Conservation for a changing world

The pink banana is an endangered species as the banana trees are being cut down to clear land for cattle grazing.



1. The cutting down of trees to clear land is called
 - A coppicing
 - B replacement planting
 - C deforestation
 - D conservation

2. Banana trees absorb most light energy through their
 - A fruit
 - B leaves
 - C roots
 - D stem

3. Plants use light energy to produce glucose.
This process is
 - A respiration
 - B active transport
 - C photosynthesis
 - D transpiration

4. Which gas is released during the process which produces glucose?
 - A carbon dioxide
 - B carbon monoxide
 - C nitrogen
 - D oxygen

Britain hosts the Olympics in 2012

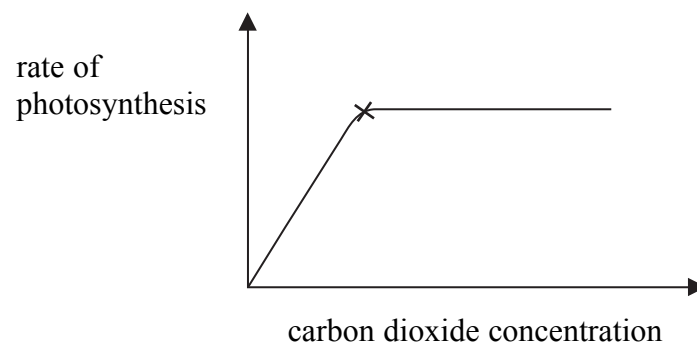
The Olympic games is a sporting competition in which people from around the world compete.



5. Olympic competitors are banned from taking human growth factors.
The main reason why some competitors might take human growth hormone is that
- A they do not need to train
 - B they can make people into athletes
 - C they can cause an increase in muscle growth
 - D they give all competitors a fair advantage
6. Anabolic steroids are also banned for Olympic competitors.
A side-effect of men using anabolic steroids is
- A the development of breasts
 - B the growth of facial hair
 - C the deepening of voice
 - D increased fertility
7. Competitors eat a high protein diet.
The main reason for this is to
- A increase the amount of body fat
 - B grow more muscle tissue
 - C keep energy levels high
 - D lose weight quickly
8. All people are advised to eat a balanced diet and exercise regularly.
The most likely result of following this advice will be
- A a reduction in obesity and heart disease
 - B an increase in obesity and heart disease
 - C a reduction in obesity but an increase in heart disease
 - D an increase in obesity but a reduction in heart disease

Factors affecting photosynthesis

9. Bryan investigated the effect of carbon dioxide concentration on the rate of photosynthesis. The graph shows his results.



As carbon dioxide concentrations increase so does the rate of photosynthesis up to the point X.

Bryan

After point X photosynthesis stops.

Sheila

Whose statements are correct?

- A Bryan only
 - B Sheila only
 - C both Bryan and Sheila
 - D neither Bryan nor Sheila
10. Carbon dioxide concentration is one limiting factor on the rate of photosynthesis. Other limiting factors are
- A light levels and nitrogen concentration
 - B oxygen and nitrogen concentration
 - C light levels and water levels
 - D water levels and glucose concentration
11. Bryan grows tomato plants in a greenhouse. What is the main benefit of growing tomato plants in a greenhouse rather than outside?
- A the plants get more sunlight
 - B carbon dioxide levels are lower
 - C more rainwater is available to the plants
 - D the temperature is higher

12. More carbon dioxide in the atmosphere is likely to cause
- A a hole in the ozone layer
 - B a decrease in acid rain
 - C an increase in global temperatures
 - D eutrophication

A new life

A new life begins when a sperm cell fuses with an ovum.
The new cell starts to divide and eventually forms a fetus.



13. The sperm and the ovum are examples of
- A haploid gametes
 - B diploid gametes
 - C haploid body cells
 - D diploid body cells
14. The latest age at which a fetus can be legally terminated in the UK is
- A before 18 weeks if the life of the mother or fetus is at serious risk
 - B before 24 weeks if the life of the mother or fetus is not at serious risk
 - C after 24 weeks if the life of the mother or fetus is not at serious risk
 - D up to 40 weeks if the life of the mother or fetus is not at serious risk
15. The type of cell division which makes new identical cells is
- A embryonic
 - B meiosis
 - C mitosis
 - D sexual
16. Cells that are able to differentiate into any type of cell are called
- A cancer cells
 - B embryonic stem cells
 - C haploid cells
 - D sex cells

**Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier**

Flying over Mount Everest

During their yearly migration, Bar Headed Geese sometimes fly over Mount Everest. Mount Everest is the highest mountain on Earth.



17. The Bar Headed Goose has a very large wing span. The very large wing span is an example of

- A interdependence
- B adaptation
- C biodiversity
- D competition

18. Which row of the table shows the conditions present at the high altitudes over Mount Everest?

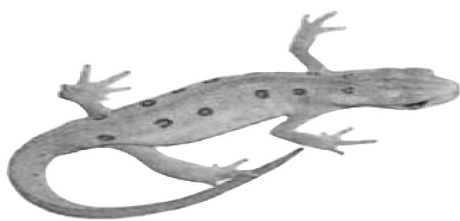
	oxygen level	temperature
A	low	high
B	low	low
C	high	high
D	high	low

19. Aerobic respiration provides Bar Headed Geese with energy during flight. What are the products of aerobic respiration?

- A oxygen and carbon dioxide
- B water and glucose
- C glucose and carbon dioxide
- D carbon dioxide and water

20. During very strenuous flight, anaerobic respiration may take place. Anaerobic respiration requires
- A oxygen
 - B lactic acid
 - C glucose
 - D carbon dioxide

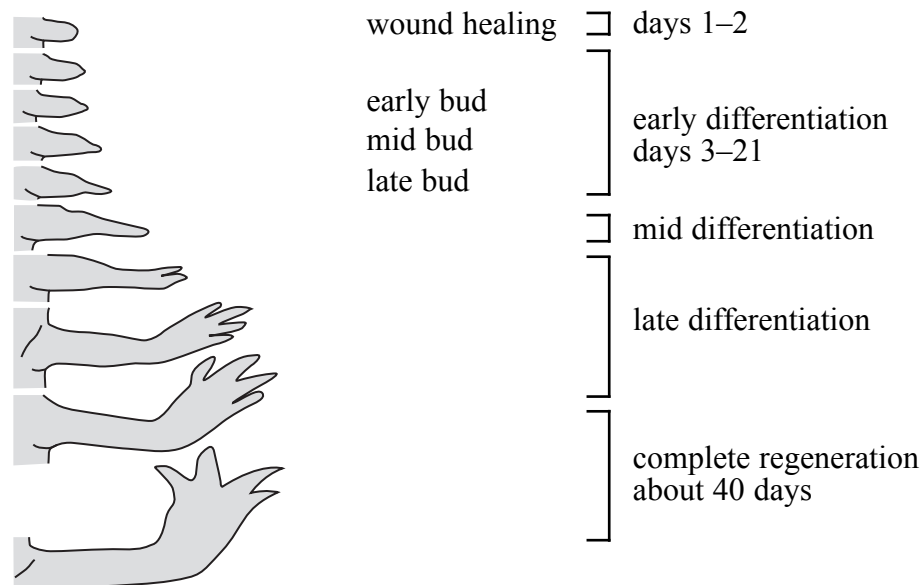
The Salamander



21. Which row of the table shows the factors that influence the growth of salamanders?

	genes	hormones	nutrition
A	yes	yes	yes
B	yes	yes	no
C	yes	no	yes
D	no	yes	yes

22. Salamanders can regenerate a limb if a limb is accidentally lost.



What is happening in the early stages of differentiation from day 3 to 21?

- A** new muscle, bone and skin cells are forming from stem cells
B wound healing is occurring and stem cells are forming
C the salamander completely regenerates its new limb
D stem cells are shortening to form bone cells
23. Stem cells are produced in embryos.
 What is an ethical concern about the use of stem cells from embryos?
- A** the embryos may die when stem cells are taken
B embryos are not living until they are born
C stem cells are always genetically modified
D stem cells from embryos cannot be used by adults
24. Cells other than stem cells have a limited number of times they can divide.
 What is the name given to the number of divisions that a normal cell can perform?
- A** Hayflick limit
B mitosis limit
C meiosis limit
D Crick limit

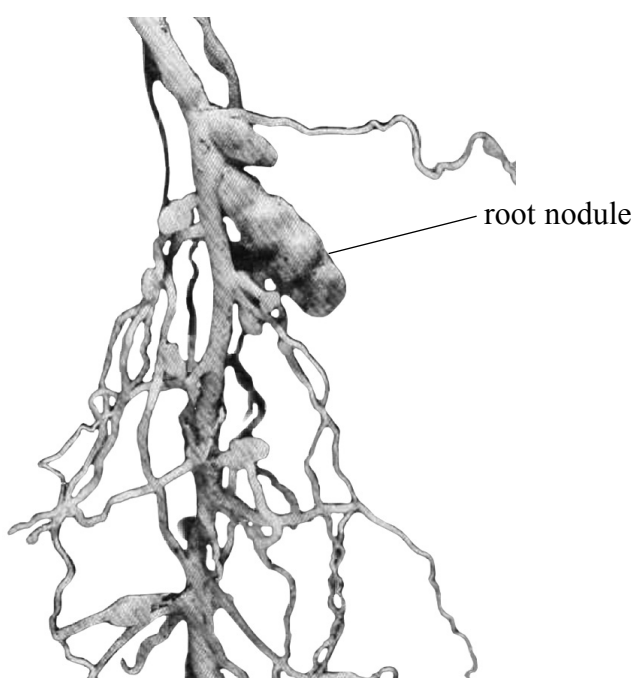
TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Foundation tier candidates do not answer any more questions after question 24.

**Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.**

The clover plant

Clover is a leguminous plant.
Colonies of *Rhizobium* bacteria form nodules on the roots of the plant.

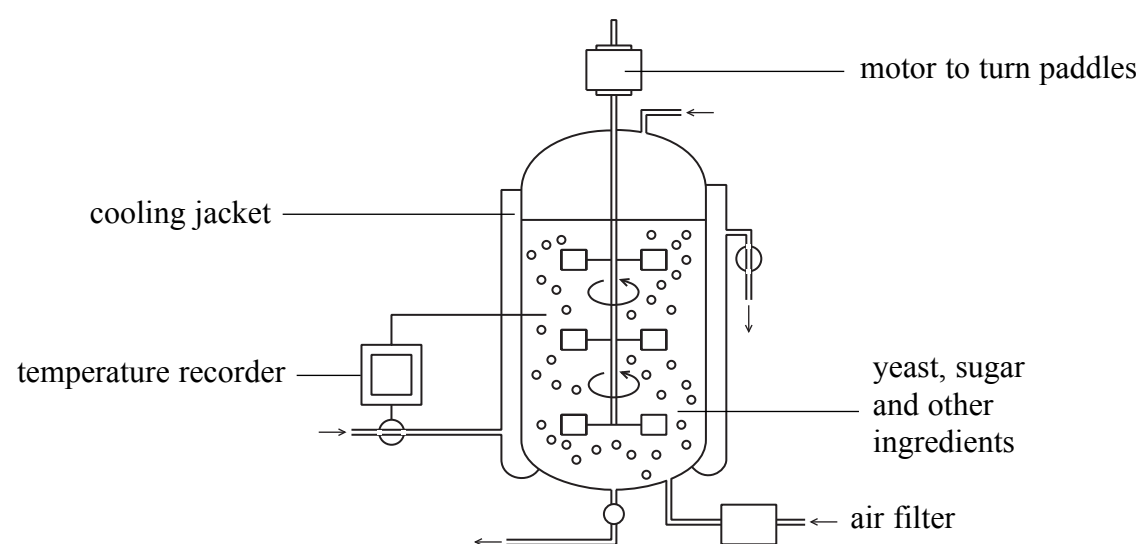


25. *Rhizobium* bacteria and the clover plant rely on each other for healthy growth. This relationship is an example of
- A competition for resources
 - B predation
 - C interdependence
 - D a living indicator
26. *Rhizobium* bacteria provide nitrates for the clover. In the nitrogen cycle, *Rhizobium* bacteria are
- A pathogens
 - B nitrogen fixing bacteria
 - C vectors
 - D denitrifying bacteria
27. Nitrates are essential for plant growth because they help make
- A carbohydrates
 - B glucose
 - C proteins
 - D fats

- 28.** The nodules contain a pink substance called leghaemoglobin. Leghaemoglobin has a similar role to haemoglobin in the red blood cells. What is the function of leghaemoglobin in the root nodules?
- A** to hold oxygen
 - B** to convert nitrogen into nitrates
 - C** to decompose dead plant matter
 - D** to convert nitrates into nitrogen
- 29.** Many farmers add nitrogenous fertilisers to the soil. Heavy rain can wash excess fertiliser in to rivers. The build up of nitrates in the environment is
- A** transpiration
 - B** active transport
 - C** biodiversity
 - D** eutrophication
- 30.** These statements are about the build up and effects of nitrates in an environment. They are in the wrong order.
- 1 fish die
 - 2 excess nitrates run off into rivers
 - 3 plants in the water die and decompose
 - 4 oxygen levels in the water fall
 - 5 algal blooms form
- What is the correct order of these statements?
- A** 2 – 4 – 3 – 5 – 1
 - B** 2 – 5 – 4 – 3 – 1
 - C** 2 – 5 – 3 – 4 – 1
 - D** 2 – 4 – 5 – 3 – 1

Making insulin

The diagram shows a fermenter used for the production of insulin by genetically modified bacteria.



31. Which part of the fermenter helps to maintain aseptic conditions?

- A temperature recorder
- B cooling jacket
- C air filter
- D motor to turn paddles

32. The bacteria in the fermenter have been genetically modified using

- A hormones and glucose
- B glucose and enzymes
- C enzymes and plasmids
- D plasmids and hormones

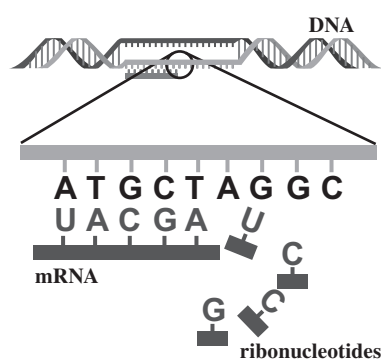
33. Which row of the table shows the optimum conditions needed inside the fermenter for the growth of bacteria?

	temperature range (°C)	pH
A	15 – 30	1.0
B	15 – 30	6.5
C	55 – 70	1.0
D	55 – 70	6.5

34. These three statements are about food production in fermenters.
Which of these are advantages of using microorganisms for food production?
- 1 food production is independent of weather conditions
 - 2 waste products from other industrial processes can be used as a food source for microorganisms
 - 3 food production is fast due to the rapid growth of microorganisms
- A 1 and 2 only
 B 2 and 3 only
 C 1 and 3 only
 D 1, 2 and 3

Protein structure and synthesis

The diagram shows the first stage in protein synthesis.



35. In which part of a cell does this stage of protein synthesis mainly take place?
- A cytoplasm
 B ribosome
 C nucleus
 D chloroplast
36. At this stage of protein synthesis mRNA is being
- A translated into amino acids
 B translated from DNA
 C transcribed from DNA
 D transcribed into amino acids

37. A codon for a single amino acid consists of

- A a single base
- B four bases
- C two base pairs
- D a triplet of bases

38. This mRNA sequence codes for some amino acids.

U A C G A U C C G

What will be the corresponding tRNA code to produce the amino acids?

- A U A C G A U C C G
- B A T G C T A G G C
- C A U G C U A G G C
- D T A C G T A G G C

39. These two statements are about the growth of an animal.

- 1 an animal grows by mitosis
- 2 an animal will grow faster if meiosis occurs

Which are true?

- A 1 only
- B 2 only
- C both 1 and 2
- D neither 1 or 2

40. Which row of the table is correct for the number of new cells formed from mitosis and meiosis following one complete cycle of cell division?

	number of cells formed by mitosis	number of cells formed by meiosis
A	2	2
B	2	4
C	4	2
D	4	4

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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