

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

Wednesday 9 June 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.

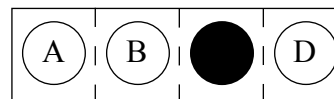
**Before the test begins:**

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.

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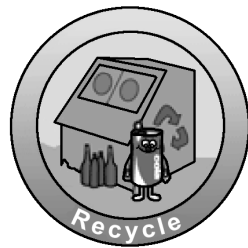
*Turn over*

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

### Recycling

A new scheme in London could see householders earning up to £150 a year for recycling their waste.



1. Recycling will

- A stop deforestation
- B conserve natural resources
- C decrease biodiversity
- D prevent global warming

2. Which of these **cannot** be recycled?

- A aluminium
- B water
- C petrol
- D paper

3. Carbon dioxide is recycled in the environment.

Which row of the table shows how carbon dioxide is added to and removed from the environment?

	adds carbon dioxide	removes carbon dioxide
A	respiration	photosynthesis
B	combustion	respiration
C	photosynthesis	respiration
D	respiration	combustion

4. Photosynthesis is an important process in the recycling of carbon dioxide.  
Which part of a plant cell absorbs light energy during photosynthesis?

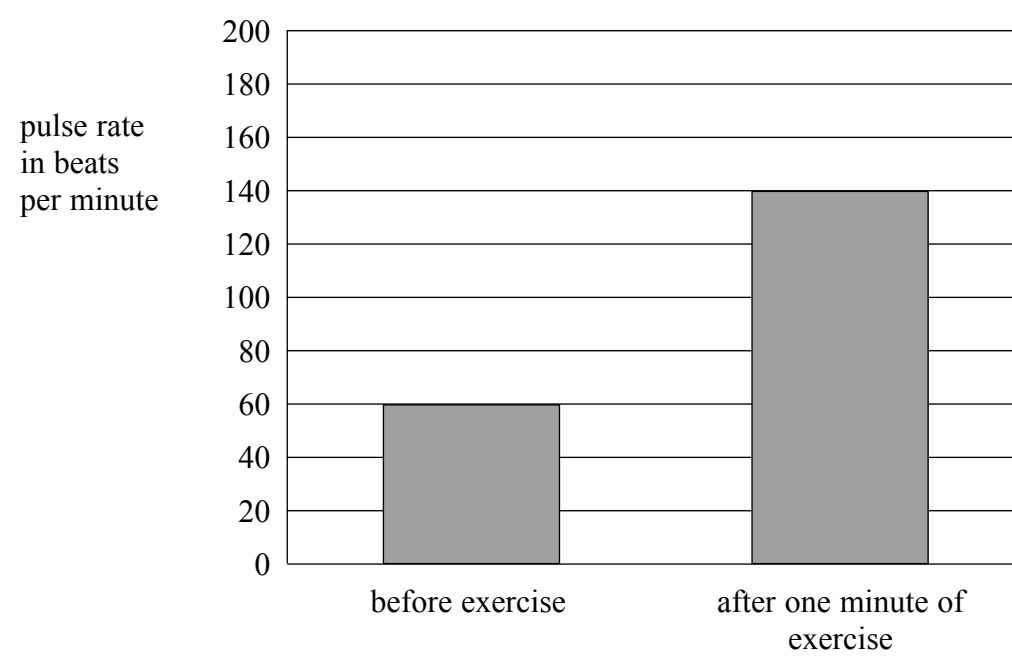
- A nucleus
- B cytoplasm
- C vacuole
- D chloroplast

### Richie's training

Richie was chosen to be part of the British ski team for the 2010 winter Olympic games. Richie had to exercise regularly to keep fit.



The graph shows Richie's pulse rate before and after one minute of exercise.



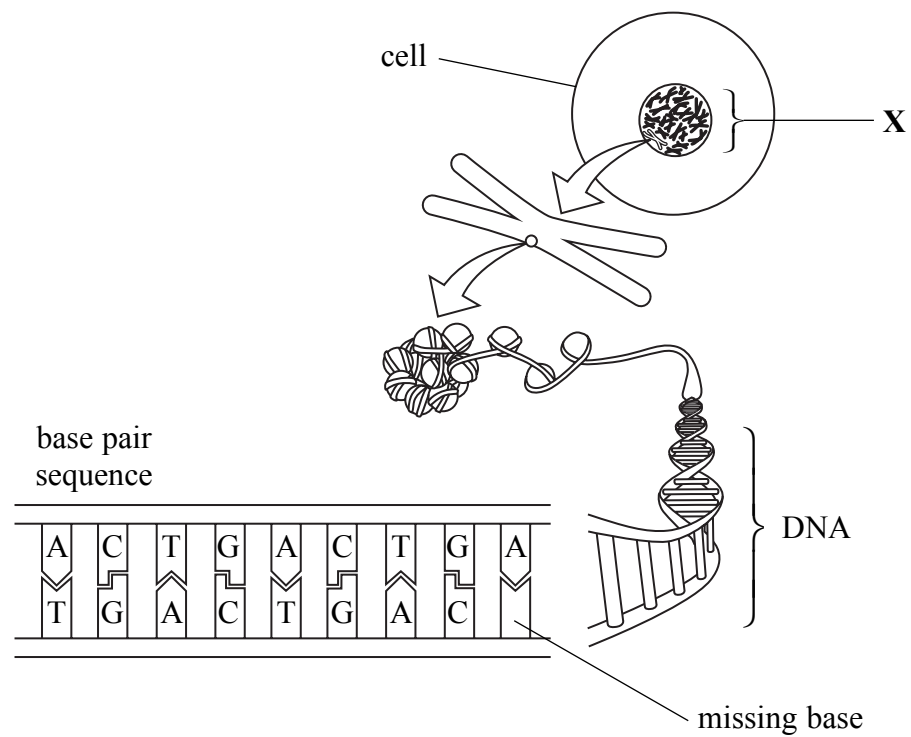
5. By how much did Richie's pulse rate increase after one minute of exercise?

- A 60 beats per minute
- B 80 beats per minute
- C 140 beats per minute
- D 200 beats per minute

6. Richie's pulse rate increased during exercise because his muscles needed more
- A oxygen
  - B carbon dioxide
  - C lactic acid
  - D carbon monoxide
7. Richie's breathing rate also increases as he exercises.  
Which structures move to cause air to enter his lungs?
- A heart and windpipe
  - B windpipe and ribs
  - C ribs and diaphragm
  - D diaphragm and heart
8. Some athletes have been tempted to take steroids.  
The main reason some athletes take steroids is to
- A grow more facial hair
  - B become impotent
  - C grow breasts
  - D enhance their performance

**A code for life**

*Use the diagram to help you answer questions 9 and 10.*



9. The part labelled X is
- A a chromosome
  - B a nucleus
  - C cytoplasm
  - D the cell membrane
10. The diagram shows that one base pair in the sequence has a missing base. Which letter represents the missing base?
- A G
  - B A
  - C T
  - D C
11. The DNA inside the cell contains codes to make
- A lactic acid
  - B bases
  - C glucose
  - D protein

12. The skin cell of a mouse contains 40 chromosomes.  
This skin cell can produce two new cells by mitosis.  
Which row of the table gives the characteristics of the new cells?

	genetically identical to mouse skin cell	number of chromosomes in each new cell
<b>A</b>	yes	40
<b>B</b>	no	40
<b>C</b>	yes	20
<b>D</b>	no	20

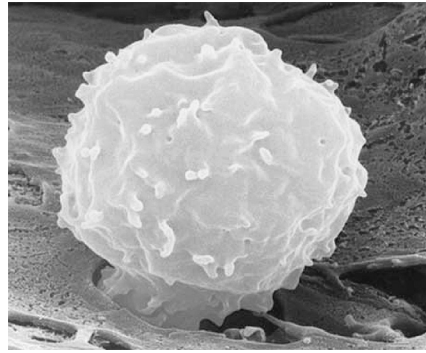
### Pollution

13. Which of the following gases is **not** a pollutant?
- A** carbon dioxide
  - B** methane
  - C** nitrogen
  - D** sulphur dioxide
14. What is the main cause of global warming?
- A** a decrease in deforestation
  - B** an increase in the ozone layer
  - C** an increase in acid rain
  - D** an increase in the greenhouse effect
15. One effect of global warming is likely to be
- A** an increase in eutrophication
  - B** an increase in the acidity of lakes
  - C** increased flooding of low lying areas
  - D** an increase in the size of the holes in the ozone layer
16. Eutrophication can cause environmental damage.  
The main cause of eutrophication is
- A** burning of coal to produce carbon dioxide
  - B** overuse of nitrogenous fertilisers
  - C** growth of rice plants which produce methane
  - D** release of CFCs from refrigerators

**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.**

**Making use of stem cells**

‘Scientists claim a breakthrough in growing human sperm from stem cells’.

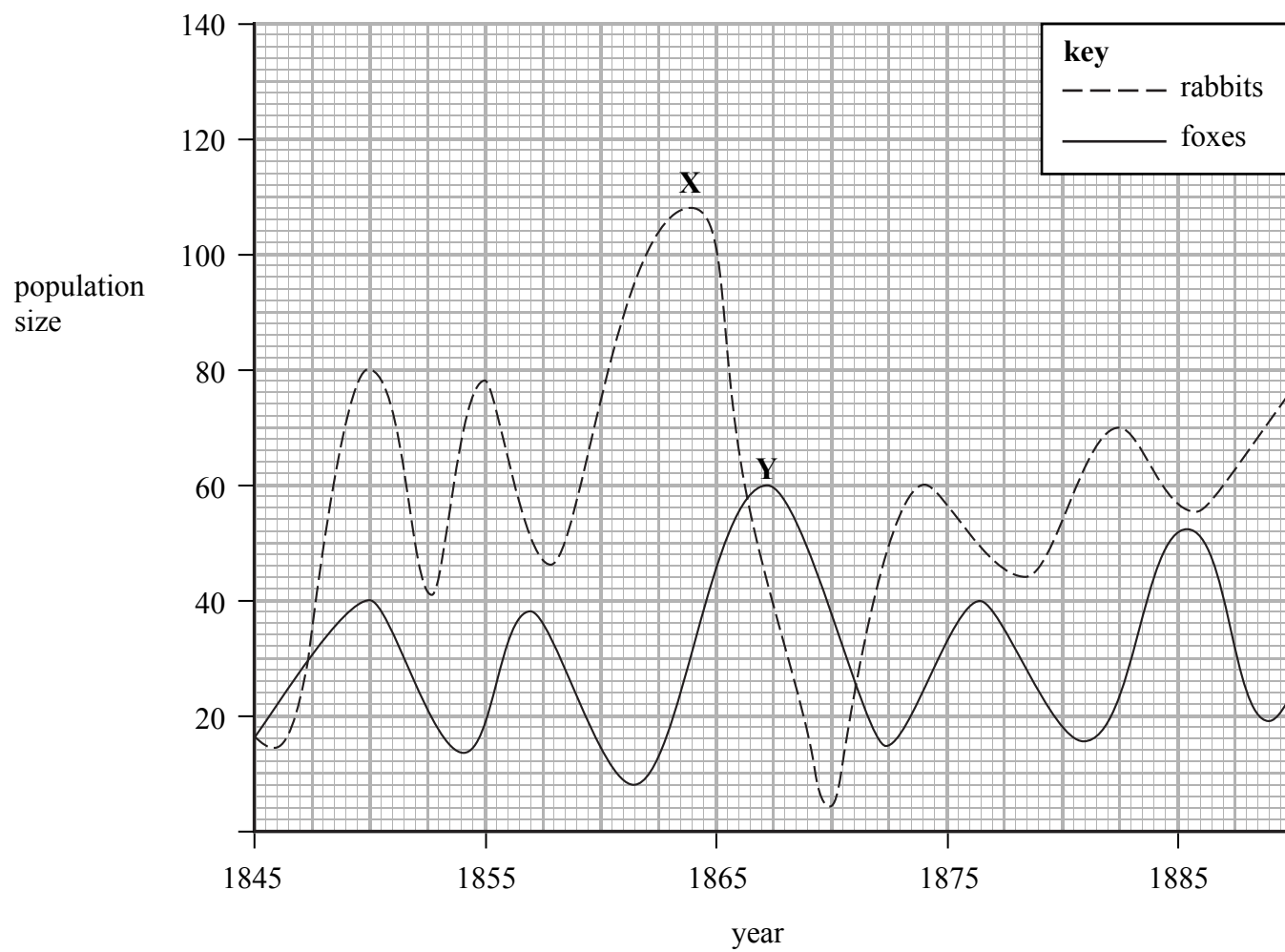


- 17.** Stem cells from embryos can be used to produce sperm cells.  
This is because stem cells from embryos
- A** have a limit on the number of times they can divide
  - B** differentiate only into sperm cells
  - C** contain different genes than body cells
  - D** can differentiate into any type of cell
- 18.** Which of these statements about the use of stem cells from embryos are true?
- 1 stem cells can be used to produce new body organs
  - 2 embryos left over from fertility treatments can be used to produce stem cells
- A** none
  - B** 1 only
  - C** 2 only
  - D** 1 and 2
- 19.** Some people are concerned about the use of embryos in stem cell research.  
This is most likely to be because they feel that embryos
- A** should be used for fertility treatment
  - B** have a right to life
  - C** are expensive to produce
  - D** could survive outside the womb

### Changing populations

Use the information in the graph to help you answer questions 20 and 21.

The graph shows a relationship between rabbit and fox populations.



20. The graph shows that
- A the number of foxes is controlled only by the number of rabbits
  - B the rabbits are the only food source of the fox
  - C the number of rabbits is always greater than the number of foxes
  - D in 1850, the number of rabbits was double the number of foxes
21. What is the reason for peak Y occurring after peak X?
- A the prey have more food and reproduce more
  - B the predators have more food and reproduce more
  - C the prey are being eaten by another predator
  - D the predators moved away from the area

22. Some animals depend on each other for their survival.  
This is an example of
- A interdependence
  - B adaptation
  - C competition
  - D conservation
23. Which of these statements will affect the size of natural populations in an aquatic environment?
- 1 a sewage spill into a river
  - 2 sulphur dioxide from burning fossil fuels reacting in rain clouds to form acid rain
- A 1 only
  - B 2 only
  - C both 1 and 2
  - D neither 1 nor 2
24. Conservation techniques can be used to protect natural populations.  
Which of these is **not** a conservation technique?
- A reforestation
  - B deforestation
  - C coppicing
  - D replacement planting

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**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.**

**Thanet Earth**



Thanet Earth is Britain's biggest greenhouse development.  
When completed it will cover an area equivalent to 80 football pitches.  
The aim of Thanet Earth is to meet Britain's demand for home grown salad vegetables all year round.

25. Which of the following methods would help to maximise energy transfer in food production at Thanet Earth?

	<b>increased predator control</b>	<b>intensive farming methods</b>	<b>organic farming methods</b>
<b>A</b>	no	no	yes
<b>B</b>	yes	yes	no
<b>C</b>	no	yes	no
<b>D</b>	yes	no	yes

26. The plants at Thanet Earth are grown using a system called hydroponics.  
The plants are suspended from the ceilings and their roots are in water instead of soil.  
The water in the system must contain enough

- A** light
- B** carbon dioxide
- C** nutrients
- D** glucose

27. Each greenhouse has its own mini 'power station' which burns gas to keep the temperature constant all year round.  
What effect will burning gas have on the plants if the 'power stations' were situated inside the greenhouses?

- A** the carbon monoxide produced will increase the rate at which the plants respire
- B** the sulphur dioxide produced will form acid rain which will kill them
- C** the oxygen produced will enable the plants to respire at a faster rate
- D** the carbon dioxide produced will enable the plants to photosynthesise at a faster rate

28. The plants in the greenhouse can be destroyed by insects such as caterpillars and thrips. Predators such as mites and wasps are used to control these insects. Predator control reduces the need for

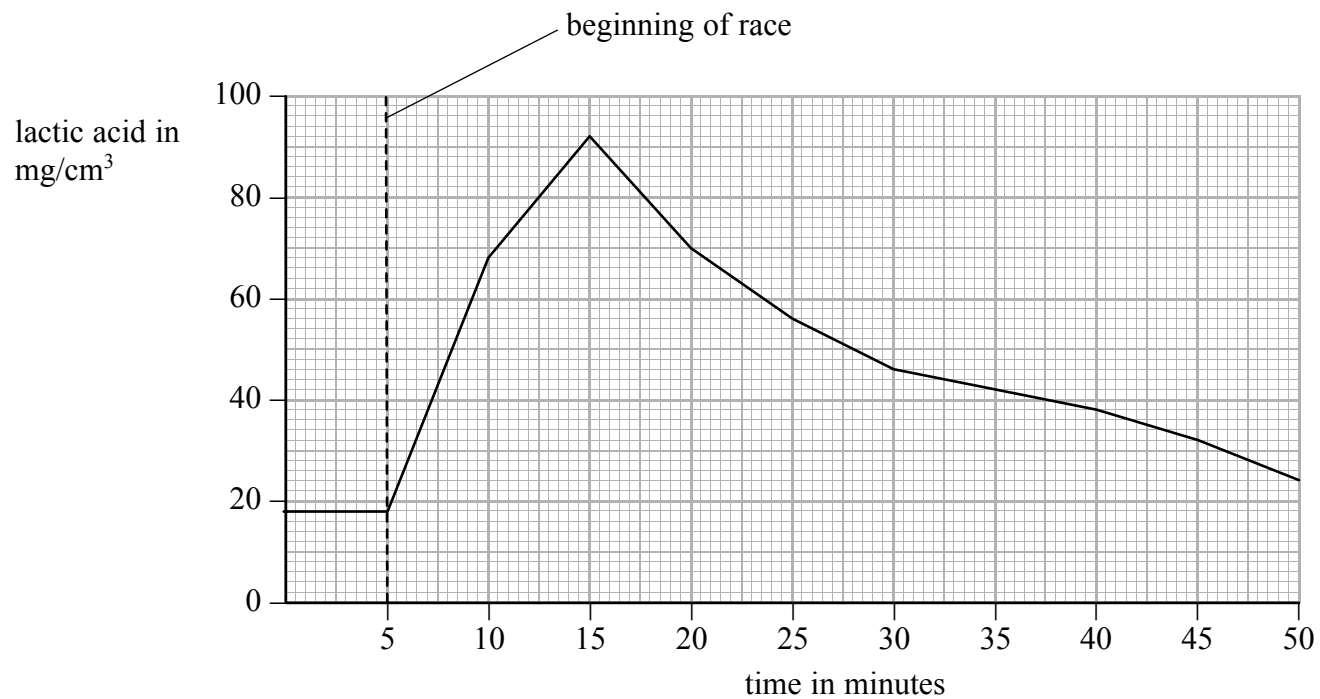
- A fertilisers
- B pesticides
- C weedkillers
- D nutrients

29. Producing more home grown salad vegetables could help to reduce global warming. One reason for this is because

- A intensive farming releases large amounts of energy
- B the plants photosynthesise faster which produces more carbon dioxide
- C greenhouses prevent carbon dioxide being released into the atmosphere
- D fewer vegetables will need to be transported from other countries

#### Improving athletic performance

30. The graph shows the concentration of lactic acid in the blood vessel leaving the leg muscle of a runner before, during and after a race.



What is the concentration of lactic acid 15 minutes after the race has finished?

- A 32 mg/cm<sup>3</sup>
- B 46 mg/cm<sup>3</sup>
- C 70 mg/cm<sup>3</sup>
- D 92 mg/cm<sup>3</sup>

31. Lactic acid is produced from the incomplete breakdown of
- A glucose
  - B oxygen
  - C carbon dioxide
  - D energy
32. Which of these statements about oxygen debt are true?
- 1 the oxygen debt decreases as gas exchange between the blood and muscles increases
  - 2 the energy released from glucose increases as an oxygen debt increases
- A 1 only
  - B 2 only
  - C both 1 and 2
  - D neither 1 nor 2
33. During exercise the rate of aerobic respiration in muscles increases. This is because
- A less energy is needed to breakdown glucose for muscle contraction
  - B diffusion of lactic acid into the muscle tissue is increased
  - C more energy is needed from the breakdown of glucose in the presence of oxygen
  - D diffusion of gases at the lung surface is decreased

#### All about bacteria

Genetically modified (GM) bacteria can be used to produce useful products such as human proteins and antibiotics.

34. How many of these statements about genetically modified bacteria are true?
- GM bacteria reproduce by meiosis
  - enzymes are used to put human genes into bacteria
  - GM bacteria produce human proteins by transcription and translation
- A none
  - B one
  - C two
  - D three
35. Microorganisms can be cultivated to produce food for humans. Which is **not** an advantage of using microorganisms for food production?
- A industrial waste products can be used
  - B microorganisms reproduce rapidly
  - C microorganisms can be manipulated easily
  - D the production is dependent on climate

### Cloning Jenny's hamster

*Use this information to answer questions 36 and 37.*

Jenny would like her hamster cloned.  
The stages in this procedure are listed below.

- 1 a nucleus is taken from one of the hamster's body cells
- 2 a donor egg cell is enucleated
- 3 the hamster's nucleus is inserted into the enucleated egg cell
- 4 an embryo develops
- 5 the embryo is inserted into a surrogate hamster

**36.** Electric shock treatment is used between two of these stages.  
The two stages are

- A** 1 and 2
- B** 2 and 3
- C** 3 and 4
- D** 4 and 5

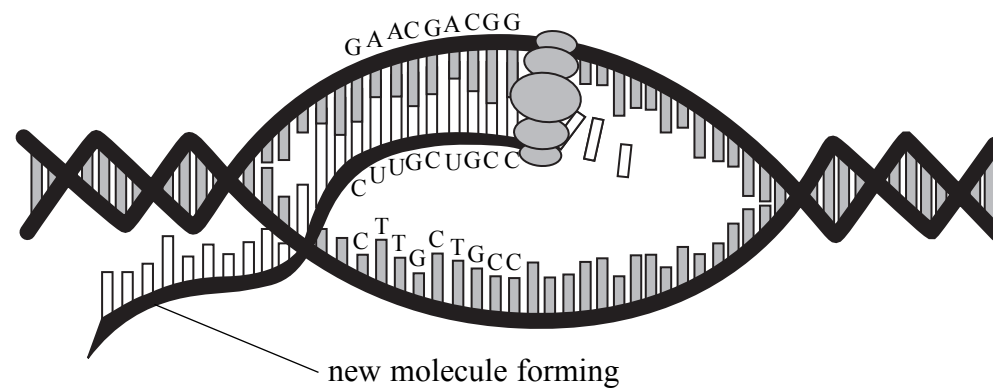
**37.** The nucleus in stage 1 is

- A** diploid and genetically identical to the nuclei in the cells of Jenny's hamster
- B** diploid and genetically identical to the nuclei in the cells of the surrogate hamster
- C** haploid and genetically identical to the nuclei in the cells of Jenny's hamster
- D** haploid and genetically identical to the nuclei in the cells of the surrogate hamster

### Making proteins

Use the diagram to help you answer questions 38 and 39.

The diagram shows one stage involved in protein synthesis.



38. Which row of the table shows the name given to this stage of protein synthesis and states where it takes place in the cell?

	name of this stage	where this stage takes place in the cell
<b>A</b>	transcription	on ribosomes in cytoplasm
<b>B</b>	translation	on ribosomes in cytoplasm
<b>C</b>	transcription	nucleus
<b>D</b>	translation	nucleus

39. What is the name of the new molecule made at the stage of protein synthesis shown in the diagram?

- A** mRNA
- B** DNA
- C** amino acid
- D** polypeptide

40. Haemoglobin is a protein found in red blood cells. It contains 2 alpha polypeptide chains. The DNA sequence for each alpha chain contains 330 base pairs. What is the total number of amino acids found in **both** alpha chains of haemoglobin?

- A** 110
- B** 220
- C** 330
- D** 660

**TOTAL FOR HIGHER TIER PAPER: 24 MARKS**

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