

Cells and control practice questions

29 questions • 79 marks • mark scheme at the back

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 79

Mitosis and cancer Spec 2.1-2.4

1 In which stage of the cell cycle is the DNA copied? [1 mark]

- A . ☐ Prophase
- B . ☐ Interphase
- C . ☐ Metaphase
- D . ☐ Telophase

2 Describe what happens during metaphase, during anaphase and during cytokinesis. [3 marks]

3 Mitosis is important to living organisms. State three ways in which mitosis is used. [3 marks]

4 A human skin cell has 46 chromosomes. The cell divides by mitosis. Describe the cells that are produced. [3 marks]

[2 marks]

.....

.....

.....

.....

[6 marks]

[illegible]

Spec 2.5-2.9

[3 marks]

[illegible]

[2 marks]

.....

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- 9** The table shows the mass of girls aged 12 months on some percentile lines. A girl's mass was on the 50th percentile at 6 months old. At 12 months old her mass is 7.0 kg. Use the table to suggest why a doctor would want to check her growth. **[2 marks]**

Mass of girls aged 12 months (practice data)					
Percentile	2nd	25th	50th	75th	98th
Mass in kg	7.0	8.2	8.9	9.7	11.3

- 10** A baby has a mass of 3.5 kg at birth. At 6 weeks old the baby's mass is 4.2 kg. Calculate the percentage gain in mass. **[2 marks]**

Answer =

- 11** Many newborn babies lose some mass in the first few days. A baby had a mass of 3.5 kg at birth and 3.22 kg at 5 days old. Calculate the percentage loss in mass. **[2 marks]**

Answer =

- 12** Describe the function of embryonic stem cells, stem cells in adult animals and meristems in plants. **[3 marks]**

The brain

Spec 2.10B-2.12B

Triple only

21 Triple only [1 mark]

Which part of the brain controls heart rate and breathing rate?

- A. ☐ Cerebellum
- B. ☐ Cerebral hemispheres
- C. ☐ Medulla oblongata
- D. ☐ Retina

22 Triple only [3 marks]

State one function of each of the cerebral hemispheres, the cerebellum and the medulla oblongata.

23 Triple only Higher tier [3 marks]

Explain how CT scans and PET scans help doctors to investigate the brain.

24 Triple only Higher tier [3 marks]

Explain why it is difficult to treat a spinal injury and a brain tumour.

The eye

Spec 2.15B-2.17B

Triple only

25 Triple only [1 mark]

Which cells in the retina detect colour?

- A. ☐ Rod cells
- B. ☐ Cone cells
- C. ☐ Iris cells
- D. ☐ Lens cells

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (interphase) (1)

2. [3]

- metaphase: chromosomes line up along the middle / equator of the cell (1)
- anaphase: the two copies of each chromosome are pulled apart to opposite ends / poles of the cell (1)
- cytokinesis: the cytoplasm and cell membrane divide to form two cells (1)

3. [3]

- growth (1)
- repair / replacing damaged or worn-out cells (1)
- asexual reproduction (1)

4. [3]

- two (daughter) cells (1)
- each has 46 chromosomes / the same number of chromosomes as the parent cell (1)
- genetically identical to the parent cell / to each other (1)
- diploid cells / two sets of chromosomes (1)
- Max 3

5. [2]

- changes in cells (1) allow mutations / changes in DNA
- that lead to uncontrolled cell division (1) do not accept 'cells divide' without 'uncontrolled' or equivalent; ignore 'forms a tumour'

6. [6]

Level 3 5-6	Gives a clear, correctly ordered description of the cell cycle stages including cytokinesis. Explains that the daughter cells are genetically identical and gives all the uses of mitosis, linking them to the organism. Scientific terms are used accurately.
Level 2 3-4	Describes some of the stages with some correct detail, and gives at least two uses of mitosis. There may be minor errors or a missing link.
Level 1 1-2	Gives isolated points about the stages or the uses of mitosis, with little detail or order.

Indicative content

- interphase: the cell grows and the DNA is copied
- prophase: the chromosomes become visible and the nuclear membrane breaks down
- metaphase: the chromosomes line up along the equator of the cell
- anaphase: the chromosome copies are pulled to opposite ends of the cell
- telophase: nuclear membranes form around each set of chromosomes
- cytokinesis: the cytoplasm and cell membrane divide to give two daughter cells
- the two daughter cells are genetically identical to the parent
- growth: more cells are produced as the organism grows
- repair: damaged cells are replaced
- asexual reproduction: identical offspring are produced

7. [3]

- cell division (1)
- elongation (1)
- differentiation (1)

8. [2]

- cells become specialised / gain structures for a particular job (1)
- so different cells can carry out different functions / the organism can have different tissues and organs (1)

9. [2]

- she has moved from the 50th percentile to the 2nd percentile (1) allow she has dropped down across the percentile lines
- a large change in percentile may show she is not growing properly / has a health problem (1)

10. [2]

- change in mass = $4.2 - 3.5 = 0.7$ kg and $0.7 \div 3.5 \times 100$ (1)
- 20% (1) correct answer with no working scores 2

11. [2]

- change in mass = $3.5 - 3.22 = 0.28$ kg and $0.28 \div 3.5 \times 100$ (1)
- 8% (1) correct answer with no working scores 2; do not accept 8.7% (divided by final mass)

12. [3]

- embryonic stem cells can differentiate into any type of cell / produce all the specialised cells of the developing embryo (1)
- stem cells in adult animals can differentiate into a limited range of cell types to replace damaged or worn-out cells, such as blood cells from bone marrow (1)
- meristems produce cells that can differentiate into any type of plant cell, allowing the plant to keep growing (1) allow found at tips of roots and shoots for growth

13. [6]

Level 3 5-6	Gives a balanced discussion with several benefits and several risks, which are explained, and may include a reasoned conclusion. Scientific terms are used accurately.
Level 2 3-4	Gives at least one benefit and one risk, with some explanation. The discussion may be one-sided or lack detail.
Level 1 1-2	States one or two simple points about benefits or risks, with little or no explanation.

Indicative content

- benefits: could treat conditions such as diabetes or paralysis
- benefits: could replace damaged or diseased cells with healthy cells
- benefits: new tissues could be grown for transplants
- risks: stem cells may divide out of control and form a tumour
- risks: viruses in donated stem cells could be passed to the patient
- risks: the immune system may reject cells from another person
- ethical or religious objections to using embryos
- a conclusion that weighs the benefits against the risks

14. [1]**B B (1)****15. [3]**

- neurotransmitter is released (from the first neurone) into the synapse / gap (1)
- the neurotransmitter diffuses across the gap (1)
- it binds to receptors on the next neurone, which triggers a new electrical impulse (1)

16. [3]

- X: sensory neurone (1)
- Y: relay neurone (1)
- Z: motor neurone (1)

17. [2]

- $18 + 16 + 15 + 13 + 11 = 73$ and $73 \div 5$ (1)
- 14.6 cm (1) correct answer with no working scores 2

18. [2]

- negative correlation / distance decreases as the number of attempts increases (1)
- practice makes the reaction time shorter / the response quicker (1)

19. [2]

- it is fast / rapid / automatic / does not involve conscious thought (1)
- so the body responds before (more) damage is done / reduces injury (1)

20. [6]

Level 3 5-6	Describes the whole pathway in order, naming receptor, sensory, relay and motor neurones and effector. Explains how synapses transmit the impulse with neurotransmitters and links structure (such as myelin sheath or axon) to function. Scientific terms are used accurately.
Level 2 3-4	Describes most of the pathway in order with the types of neurone named, and mentions synapses or neurotransmitters. Links between structure and function may be missing.
Level 1 1-2	Gives isolated points about neurones or the response, with little order or explanation.

Indicative content

- receptors in the skin detect the stimulus (heat or pain) and produce electrical impulses
- sensory neurone carries the impulses to the CNS
- synapse between the sensory neurone and the relay neurone: neurotransmitter is released, diffuses across the gap and triggers an impulse
- relay neurone in the spinal cord passes the impulses to the motor neurone
- motor neurone carries the impulses to the effector (a muscle in the arm)
- the muscle contracts and the hand is pulled away
- the myelin sheath insulates the neurones and speeds up the transmission of impulses
- the long axon carries impulses over long distances
- the reflex is fast and automatic because it does not involve conscious thought

21. [1] Triple only

C C (1)

22. [3] Triple only

- cerebral hemispheres: any one of consciousness, intelligence, memory, language (1)
- cerebellum: coordinates movement / helps to control balance (1)
- medulla oblongata: controls unconscious activities such as heart rate and breathing rate (1)

23. [3] Triple only Higher tier

- brain tissue is difficult to access / is inside the skull (1)
- CT scans show the structure of the brain / damage or tumours (1)
- PET scans show function / which areas of the brain are active (1)
- without surgery (1)
- Max 3

24. [3] Triple only Higher tier

- neurones in the spinal cord / CNS do not easily repair themselves (1)
- impulses cannot pass the damaged region, so paralysis or loss of feeling can be permanent (1)
- surgery to remove a tumour can damage healthy brain tissue / the tumour may be in a place that cannot be reached safely (1)

25. [1] Triple only

B B (1)

26. [3] Triple only

- cornea: refracts / bends light entering the eye (1)
- lens: refracts light to focus it on the retina (1)
- iris: controls how much light enters the eye (1)

27. [4] Triple only

- light from distant objects is focused in front of the retina (1)
- because the eyeball is too long / the lens refracts the light too much (1)
- corrected with a concave lens (in glasses or contact lenses) (1) allow laser surgery to change the shape of the cornea
- which spreads the light out so that it focuses on the retina (1)

28. [2] Triple only

- the lens becomes cloudy, so less light reaches the retina (1)
- the lens is replaced with an artificial lens by surgery (1)

29. [2] Triple only

- one or more types of cone cell are missing / not working properly (1)
- so the person has difficulty telling some colours apart, such as red and green (1)