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TEACHERS WITHOUT BORDERS PROGRAMME

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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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In Bill Gates words, at the Mandela Day 'Living Together' address: "Maintaining the quality of this country's higher education system while expanding access to more students will not be easy. But it's critical to South Africa's future" – working together, we can help achieve this."

Contributing schools to date:

Clifton School	Milnerton High	Rustenburg Girls' High	St Peter's
Durban Girls'	Northwood High	St Anne's DC	St Stithians
Fairmont High	Roedean	St John's DSG	Wynberg Boys' High
Herzlia High	Rondebosch Boys'	St Mary's DSG Kloof	Wynberg Secondary

QUESTION 1

1.1

1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8	1.1.9	1.1.10
C	B	D	C	B	A	B	A	C	D

[10]

1.2

1	D
2	H
3	E
4	G
5	M
6	I
7	F
8	B
9	L
10	A

[10]

1.3.1 Interphase ✓ (1)

1.3.2 Mitosis ✓ (1)

1.3.3 A ✓ (1)

1.3.4 DNA must replicate so that each daughter cell receives the same DNA ✓ as the parent cell and as each other ✓ (2)

1.3.5 D ✓ - metaphase ✓ (2)

1.3.6 Cytokinesis ✓ (2)
[8]

1.4.1 A – Cell wall ✓
B – Channel protein ✓ (2)

1.4.2 Cellulose ✓ (1)

1.4.3 Active transport ✓ movement of ions from a low concentration to a high concentration ✓ against the diffusion gradient (✓) which requires energy ✓ through a channel protein due to them being too large ✓ (4)
[7]

1.5.1 Fatty acids ✓

1.5.2 Sclereids ✓

1.5.3 phospholipids ✓

1.5.4 Endoplasmic reticulum ✓

1.5.5 Ribosomes ✓

[5]

QUESTION 2

- 2.1.1 Compound light microscope ✓ (1)
- 2.1.2 Only use the fine adjustment knob when focussing / do not use the course adjustment knob when focussing. ✓ (1)
- 2.1.3 B✓ - Rotating/revolving nose piece ✓ (2)
- 2.1.4 - Easier to handle
- not as expensive
- view living specimens
- view in colour ✓ (1)
- 2.1.5 Guard cell ✓ (1)
- 2.1.6 Chloroplasts ✓ (1)
- 2.1.7 - Allows for gaseous exchange✓, taking in of CO₂ ✓ which is a requirement for photosynthesis
- Allows for transpiration✓ which draws water✓ up from the roots which is a requirement for photosynthesis (4)
- 2.1.8 XY = 4 cm
5 μm = 1 cm
- $$Actualsize = \frac{4}{1} \times 5 = 20 \mu m \quad \checkmark \quad (3)$$
- 2.1.9 Drop cover slip at a 45° angle to avoid air bubbles ✓ (1)
[15]
- 2.2.1 Cancerous cells are shed into the bloodstream and lymphatic vessels✓ which helps the spread ✓ of cancer to other parts of the body. (1)
- 2.2.2 Activin B and ALK7 ✓ (1 mark for both) (1)
- 2.2.3 Carbon, Hydrogen, Oxygen, Nitrogen✓ (all or nothing) (1)
- 2.2.4 Advantage
- share enough biological and chemical similarities to be able to see how the cancer would react in our bodies
- do not have to do tests on humans ✓
- Disadvantage
- Animal cruelty
- Not human and so may react differently in a human's body ✓
(Any sensible answer) (2)
[5]

parent ✓ organism.

(2)

2.3.2 No, ✓ the clones will not be exposed to exactly the same environmental conditions / amount of food, exercise ✓ as Missy was growing up so they may look slightly differently.

(2)

2.3.3 Any body cell is acceptable (no egg/sperm) ✓

(1)

2.3.4 - novelty

- cover the cost of the labs, scientists and equipment required for cloning
(any sensible answer) ✓

(1)

[6]

2.4.1 Cell membrane ✓

(1)

2.4.2 Y to X ✓

(1)

2.4.3 It is semi / selectively / differentially permeable. ✓

(1)

[3]

[30]

QUESTION 3

3.1.1 The relative effectiveness in photosynthesis will be the lowest in the green/yellow wavelength (500 – 600 nm) OR
The relative effectiveness in photosynthesis will be the highest in violet/blue light (420 – 450 nm)

Statement ✓

Both variables ✓ (2)

3.1.2 Optimum conditions would be a temperature of 30° C ✓ and 440 nm ✓ wavelength (2)

3.1.3 Heading ✓

Size and accuracy ✓

Drawing rules ✓

4 correct labels ✓ ✓ ✓ ✓

(7)

[11]

3.2.1 To investigate whether carbon dioxide ✓ is needed for photosynthesis. ✓

(2)

3.2.2 To remove CO₂ in the part of the experiment that acts as the control. ✓

(1)

3.2.3 To destarch ✓ the plant, to ensure that starch is absent from the leaf at the beginning of an experiment, so that if any starch is formed, then photosynthesis must have taken place ✓.

(2)

[5]

3.3.1 A – Mitochondria ✓

B – Rough endoplasmic reticulum ✓

(2)

3.3.2 As water moves into the vacuole it swells causing the cytoplasm to push against the cell wall ✓ making the cell turgid. ✓

(2)

[11]

- 4.1.1 D ✓ (1)
- 4.1.2 - Many chloroplasts in each cell for maximum photosynthesis
 - Closely packed to fit more photosynthetic cells in the tissue
 - Upright so each cell has direct exposure to sunlight
 (Must give structure✓ and reason✓) (2)
- 4.1.3 - Large, empty lumen for uninterrupted water transportation ✓
 - walls thickened with lignin for support. ✓ (1)
- 4.1.4 Phloem✓ – sieve tube✓
 - companion cell✓ (3)
- 4.1.5 W✓ – many stomata / location of the spongy mesophyll✓ (2)
- 4.1.6 Cuticle✓ - waxy, waterproof layer on the epidermis (1)
[10]
- 4.2.1 a) W✓ – the walls are evenly thickened with lignin all around the cell✓ (2)
 b) Z ✓ - thin cellulose walls of even thickness✓ (2)
 c) X✓ – thickened in the corners (unevenly thickened) with cellulose✓ (2)
[6]
- 4.3.1 4 and 6✓ (1)
- 4.3.2 Apical meristem✓ (1)
- 4.3.3 - large, prominent nucleus
 - thin cell walls
 - no large vacuoles
 - no intercellular spaces
 - dense cytoplasm ✓ (1)
- 4.3.4 Tips of shoots OR tips of lateral branches ✓ (1)
[4]
- [20]**