

- M1.**
- (a) 1. Gives rise to new plants / plantlets;
2. So must be able to develop into different tissues / other specialised cell types / differentiate;  
*1. Ignore references to leaves / callus* 2
- (b) Two marks for 5 : 1/50 : 10/1 : 0.2;;  
*One mark for ratio correctly identified but expressed incorrectly as 1 : 5 / 10 : 50 / 0.2 : 1;* 2
- (c) (i) 1. Meiosis / independent assortment / crossing over;
2. (Fusion of) genetically different gametes / random fertilisation; 2
- (ii) Will be clones / produced by mitosis / will be genetically identical / less variation / all plants will have desired characteristics;  
*If the reference is to identical must be genetically identical, but allow less variation without the reference to genetical.* 1
- [7]

**M2. Essay Using DNA in science and technology**

**DNA and classification**

2.2 Structure of DNA

2.3 Differences in DNA lead to genetic diversity

2.9 Comparison of DNA base sequences

**Genetic engineering and making useful substances**

2.5 Plasmids

5.8 The use of recombinant DNA to produce transformed organisms that benefit humans

**Other uses of DNA**

2.5 Cell cycle and treatment of cancer

5.8 Gene therapy;

Medical diagnosis and the treatment of human disease;

The use of DNA probes to screen patients for clinically important genes.

- M3.** (a) Will replace themselves / keep dividing / replicate;  
Undifferentiated / can differentiate / develop into other cells / totipotent / multipotent / pluripotent;  
*Accept tissues* 2
- (b) Reverse transcriptase;  
*Allow phonetic spelling* 1
- (c) (i) Alters base / nucleotide sequence / causes frame shift;  
Different sequence of amino acids in polypeptide / protein / primary structure alters the tertiary structure;  
*Accept any reference, such as adding bases, to changing the base sequence of the gene. Reject deletion / substitution.*  
*Idea of sequence essential so not makes different amino acids.*  
*Accept answers involving stop / start codons and effect on protein.* 2
- (ii) Affects tumour suppressor gene;

Inactivates (tumour suppressor) gene;

Rate of cell division increased / tumour cells continue to divide;

*Ignore answers relating to oncogenes. May gain third point.*

2 max

(d) Yes

SCID patients unlikely to survive / quality of life poor unless treated;

Cancer that develops is treatable / only affects 25% / five children;

No

Risk of developing cancer is high / 25%;

Cancer may recur / may not be treated successfully in future / only short time scale so more may develop cancer;

*No mark for yes or no. Marks are for supporting argument based on biological reasoning.*

*Accept any points*

2 max

[9]