Mark schemes

1

(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] (a) Will replace themselves / keep dividing / replicate;

2

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]

Essay Using DNA in science and technology

3

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.