

**M1.** (a) to kill virus  
**or**  
to prevent virus spreading 1

(b) take (stem) cells from meristem  
**or**  
tissue culture  
*allow take cuttings* 1

(c) use Benedict's solution 1

glucoses turns solution blue to orange 1

(d) **Level 2 (3–4 marks):**  
A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points that explain why plants with TMV have stunted growth.

**Level 1 (1–2 marks):**  
Simple statements are made, but not precisely. The logic is unclear.

**0 marks:**  
No relevant content.

**Indicative content**

- less photosynthesis because of lack of chlorophyll
- therefore less glucose made  
so
- less energy released for growth
- because glucose is needed for respiration  
and / or
- therefore less amino acids / proteins / cellulose for growth
- because glucose is needed for making amino acids / proteins / cellulose

4

[8]

M2.

(a)

	Mitosis only	Meiosis only	Both mitosis and meiosis
How cells are replaced	✓		
How gametes are made		✓	
How a fertilised egg undergoes cell division	✓		
How copies of the genetic information are made			✓
How genetically identical cells are produced	✓		

*if more than one tick per row then no mark  
ignore first row*

1  
1  
1  
1

(b) (i) (adult) bone marrow

*accept (umbilical) cord blood, skin, amniotic fluid / membrane*

1

(ii) cells will not be rejected by the patient's body (if they have been produced by therapeutic cloning)

*allow easier to obtain linked to embryo stem cells*

**or**

(embryo stem cells) can develop into many different types of cells

*allow doesn't need an operation linked to bone marrow*

**or**

(embryo stem cells) not yet differentiated / specialised or undifferentiated

*accept embryo cells are pluripotent*

- M3.** (a) (i) mitosis  
*correct spelling only* 1
- (ii) replicates / doubles / is copied / duplicates  
*accept cloned*  
*ignore multiplied / reproduced* 1
- (b) fertilisation occurs / fusion (of gametes)  
*accept converse for asexual, eg none in asexual / just*  
*division in asexual* 1
- so leading to mixing of genetic information / genes / DNA / chromosomes  
*genes / DNA / chromosomes / genetic information comes*  
*from 1 parent in asexual*  
*ignore characteristics* 1
- one copy (of each allele / gene / chromosome) from each parent  
**or**  
gametes produced by meiosis  
**or**  
meiosis causes variation  
*meiosis must be spelt correctly* 1

- M4.** (a) circles round right hand **X** and **Y** gametes  
*put two ticks or crosses by the circles* 2
- (b) 50:50 **or** 1:1 **or** 50% **or** 0.5 **or**  $\frac{1}{2}$  equal **or** evens  
*credit even*  
*do not accept 2:1 or 50 / 50* 1
- (c) (i) 23 1
- (ii) 23  
*credit the same as the one above to be marked consequential* 1
- (d) DNA  
*do not accept nucleic acid* 1
- (e) same 1

[7]