

(b) Scientists used similar plant tissue culture techniques to investigate the effect of the age of the seedlings on totipotency. Seedlings were divided into four groups, each consisting of 25 seedlings. One group was grown for 7 days before the plant tissue culture technique was carried out. The number of seedlings that showed totipotency was recorded as a percentage.

This procedure was repeated for the other three groups of seedlings, which were grown for 14, 21 and 28 days respectively before the plant tissue culture technique was carried out.

The results are shown in the table below.

Age of seedlings before plant tissue culture technique carried out / days	Percentage of seedlings showing totipotency (%)
7	76
14	56
21	40
28	60

(i) Describe the effect of age on the percentage of seedlings showing totipotency.

(2)

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(ii) The scientists were concerned about the reliability of the data.

Suggest how the data could have been made more reliable.

(2)

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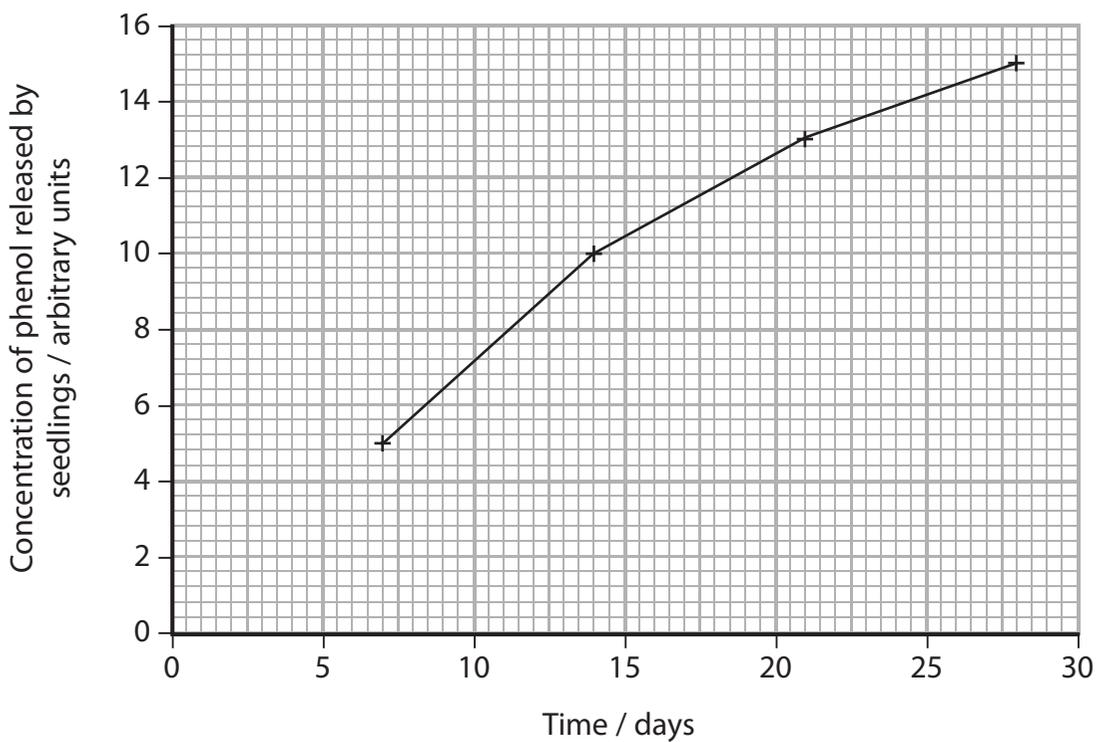
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(c) As cotton plants grow, they release a substance called phenol.

In another investigation, the scientists measured the concentration of phenol released by seedlings.

The results are shown in the graph below.



(i) Using the information in the table in part (b) and the graph, give evidence to support the hypothesis that phenol reduces totipotency.

(1)

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(ii) Using the information in the table in part (b) and the graph, give evidence that does **not** support the hypothesis that phenol reduces totipotency.

(1)

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(d) Human stem cell research involves the use of both totipotent and pluripotent stem cells.

Describe the differences between a totipotent stem cell and a pluripotent stem cell.

(2)

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(Total for Question 4 = 12 marks)

