

2 Several processes lead up to fertilisation in animals and plants.

*(a) Describe and explain how, in mammals, events following the acrosome reaction prevent more than one sperm fertilising an egg.

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(b) Animals produce haploid gametes by meiosis.

Explain how meiosis gives rise to genetic variation in gametes.

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- (c) In flowering plants, the growth of pollen tubes is affected by many factors. An investigation was carried out to study the effect of the concentration of a chemical called methylpurine on pollen tube growth.

Pollen grains from lily flowers were exposed to 0.01 mol dm^{-3} methylpurine at pollination.



Lily flowers
Magnification $\times 0.2$

After 48 hours, the lengths of the pollen tubes formed were measured and the mean length calculated.

This was repeated with two other concentrations of methylpurine and a control with no methylpurine.

The results are shown in the table below.

Concentration of methylpurine / mol dm^{-3}	Mean length of pollen tube after 48 hours / mm
0.0000	94
0.0001	95
0.0010	90
0.0100	28

- (i) The investigation was carried out at a constant temperature of 22.5°C .

Suggest why the temperature was kept constant.

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(ii) Using the information in the table, describe the effect of methylpurine concentration on the mean length of pollen tubes from lily flowers.

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(iii) Methylpurine can inhibit messenger RNA (mRNA) synthesis.

Suggest how this can cause the change in mean pollen tube length.

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(Total for Question 2 = 13 marks)

