D3.1 Reproduction in plants: data-based questions

What the Cell · DP Biology · data-based questions

Name _____ **Date** _____ **Total** _____ / 17

Read the data carefully before you answer. The number of marks shows how many separate points to make. Show your working in calculations.

1 Seed dispersal

10 marks

Sycamore seeds have a wing. Seeds were dropped one at a time in a steady wind of 3 m s^{-1}, with their wings intact or with the wings cut off. The time to fall and the distance travelled sideways were measured for 50 seeds of each kind.

Seeds	Drop height / m	Mean fall time / s	Mean distance travelled / m ± SD
Winged	2	1.9	3.4 ± 0.8
Wings removed	2	0.7	0.6 ± 0.2
Winged	10	8.8	16 ± 4

a **Calculate** how many times further winged seeds travelled than seeds without wings, from 2 m. **[1]**

b **Explain** how the wing increases the distance a seed travels. **[2]**

c **Suggest** one advantage to a tree of dispersing seeds far from itself. **[1]**

Many seeds are dispersed by animals that eat fruit. The table shows the mean composition of fruits from temperate and tropical forests.

Fruits	Lipid / % dry mass	Carbohydrate / % dry mass	Protein / % dry mass
Temperate (12 species)	4	82	5
Tropical (15 species)	21	60	7

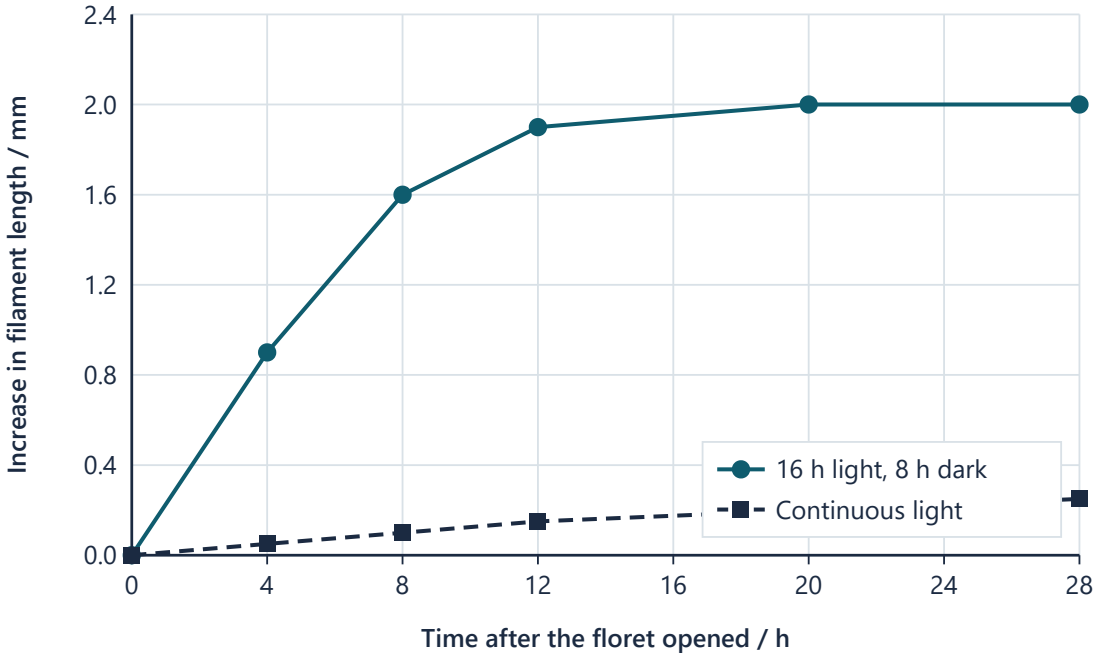
d **Compare** the composition of tropical and temperate fruits. **[2]**

e Lipid releases about 39 kJ g^{-1} and carbohydrate about 17 kJ g^{-1}. **Explain** which type of fruit gives more energy per gram. **[2]**

f **State** one advantage and one disadvantage of seed dispersal by animals. **[2]**

2 Timing that prevents self-pollination 7 marks

In sunflowers, the anthers of a floret release pollen before the stigma of the same floret is ready to receive it. The filaments that hold the anthers grow longer early in the morning, raising the anthers. Sunflower plants were grown in continuous white light or in 16 hours of light and 8 hours of dark. The increase in filament length was measured from the time the floret opened.



a **State** the increase in filament length after 28 hours in light and dark. **[1]**

b **Calculate** how many times greater this is than in continuous light. **[1]**

c **Explain** how releasing pollen before the stigma is ready reduces self-pollination. **[2]**

The percentage of ovules that developed into seeds was measured on 30 plants in each condition (mean ± SD).

Condition	Ovules developed into seeds / %
Continuous light	62 ± 14
16 h light, 8 h dark	88 ± 5

d **Explain** how the standard deviations help in comparing the two conditions. **[3]**