

M1. (a) (i) Z 1

(ii) X 1

(b) (i) moving randomly 1

(ii) stronger than 1

(c) (i) evaporation 1

(ii) any **one** from:  
• becomes windy  
• temperature increases  
*accept (becomes) sunny "the sun" alone is insufficient*  
• less humid 1

[6]

- M2.** (a) (i) random distribution of circles in the box with at least 50 % of circles touching 1
- random distribution of circles occupies more than 50 % of the space  
*judged by eye* 1
- (ii) (large) gaps between particles  
*accept particles do not touch*  
*accept particles are spread out* 1
- (so) easy to push particles closer (together)  
**or**  
forces between particles are negligible / none  
*an answer in terms of number of particles is insufficient* 1
- (b) (i) (both are) random  
*accept a correct description of random eg unpredictable or*  
*move around freely or in all directions*  
*they take up all the space is insufficient*  
*they are spread out is insufficient*  
*they move in straight lines is insufficient* 1
- (ii) (speed also) increases 1

[6]

**M3.(a)** Student A's measurements had a higher resolution 1

Student B was more likely to misread the temperature 1

(b) a random error 1

(c) 8.4 °C 1

(d) 740 (seconds)  
*allow answers in the range 730 – 780* 1

(e)  $0.40 \times 199\,000$  1

79 600 (J) 1

*accept 79 600 (J) with no working shown for 2 marks*

(f) stearic acid has a higher temperature than the surroundings  
*accept stearic acid is hotter than the surroundings* 1

temperature will decrease until stearic acid is the same as the room temperature / surroundings 1

**[9]**