

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]