Respirometer questions answers:

1. (a)
Pea seeds (where fluid moved away from them i.e. more carbon dioxide made than oxygen consumed): 9.3cm^3 (volume of oxygen consumed, and thus carbon dioxide made) + 0.9cm^3 (extra movement of fluid after the 9.3 showing oxygen consumed) = 10.2 total carbon dioxide produced.
Oil seeds (where fluid moved towards them i.e. more oxygen consumed than carbon dioxide made): 8.8 – 2.5 = 6.3 total carbon dioxide produced.
(b) (RQ = volume of carbon dioxide produced divided by the volume of oxygen consumed).
Pea seeds: 10.2/9.3 = 1.097
Oil seeds: 6.3/8.8 = 0.72
(c)
Pea seeds using carbohydrates as a respiratory substrate (RQ around 1)
Oil seeds using lipids as a respiratory substrate (RQ value around 0.7)

2. The heat would cause the gases to expand and this pressure change would move the manometer fluid, rendering the results less accurate.

3. The volume of carbon dioxide produced divided by the volume of oxygen consumed = the RQ.

4. The simple respirometer can be used to compare what?
The rates of respiration between simple organisms (i.e. their oxygen consumption and carbon dioxide production) and between the same organism in different conditions.

5. What does the boiling tube that doesn't contain organisms act as?
A thermo barometer to oppose and compensate for changes in temperature and air pressure in the container with the organism in.

6. The changes in air pressure and temperature are shown by what?
Changes in the level of the manometer fluid against the scale. (The fluid shows the difference in pressure between the tube and the atmosphere).

7. When measuring oxygen consumption, what is added to the organisms 'tube and what will this show?
Potassium hydroxide to absorb carbon dioxide so that any changes in manometer levels are due to oxygen consumption..

8. When investigating carbon dioxide output now also, what does any change in the manometer fluid due to?
This is due to a net difference between oxygen taken up and carbon dioxide given out. If more towards the organisms then more oxygen is used than produced; if more away from the organisms then the opposite is true.

9. If for a time there is no change in manometer fluid then what does this show?
That the rate of oxygen consumption and carbon dioxide production is equal.

10. If over time e.g. 2cm^3 of gas is produced then that means that 2cm^3 more CO_2 has been made than O_2 consumed. If repeated over the same time and Potassium hydroxide is added (removes carbon dioxide) and the manometer fluid decrease in volume by 5cm^3, what does this tell us?
That the amount of oxygen consumed is 5cm3

11. How would you calculate the amount of carbon dioxide produced?
There was a net increase of 2cm^3 gas produced compared to oxygen consumption, which was 5cm^3 so 5 + 2 = 7cm^3 carbon dioxide produced.

12. If more carbon dioxide is produced than oxygen absorbed, what direction does the manometer fluid move, in relation to the tube with the organisms in it?
Away from them.

13. If caster oil seeds gave out 6.3cm^3 of carbon dioxide and absorbed 8.8cm^3 of oxygen, what is there respiratory quotient and what respiratory substrate does this indicate that they use for respiration?
6.3. divided by 8.8 = 0.72, which indicates that lipids are the respiratory substrate.

14. The equation for calculating the volume of lumen of the capillary tube travelled by the oil droplet is $\pi r^2 l$ but what does each symbol refer to?
π = Pi r = radius of capillary tube l = distance fluid has travelled