Vegetable oils and emulsions

1. This question is about extracting oil from a fruit. Olives are fruits of the olive tree. Olive oil can be extracted from olives.

The stages in the extraction are shown in the flow chart below.
Match sentences, A, B, C and D, with the numbers 1–4 in the flow chart.

A  Olive oil separates from the water.
B  The mixture is pressed.
C  Water is added and the mixture is stirred.
D  The olives are crushed.

Olives are collected from the olive trees.

1

The mixture is allowed to stand.

2

Olive oil and water are obtained.

3

The olive oil is put into bottles.

4
2. Plant oils have many uses.

Match words, A, B, C and D, with the numbers 1–4 in the sentences.

A  a fuel
B  an emulsion
C  energy
D  temperature

Vegetable oil can be burned as . . . 1 . . . 

Vegetable oils are useful foods because they contain a lot of . . . 2 . . . 

Vegetable oils cook food at a higher . . . 3 . . . than water.

In some foods, vegetable oil is mixed with another liquid to form . . . 4 . . . 

3. Ice-cream is a foam because it has small air bubbles trapped inside it.

Ice-cream is sold by volume. Ice-cream manufacturers increase the volume of air in a product so that they make more money.

A student investigated the volume of air in four different ice-creams, K, L, M and N. The four ice-creams were kept in the same freezer.

For each ice-cream, the following procedure was carried out:

• the student measured the volume of some ice-cream straight from the freezer
• the ice-cream was then melted down, allowing the air to escape
• the volume of the ice-cream was re-measured to give the final volume.

The results are shown in the table.

<table>
<thead>
<tr>
<th>Ice-cream</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial volume in cm³</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Final volume in cm³</td>
<td>96</td>
<td>91</td>
<td>87</td>
<td>95</td>
</tr>
</tbody>
</table>

(a) Which ice-cream originally contained the most air?

1  K
2  L
3  M
4  N

(b) The investigation was fair because . . .

1  the same volume of ice-cream was used each time.
2  four samples of ice-cream were used.
3  the investigation was repeated.
4  the temperature of the ice-creams was kept constant during the investigation.
Progress check
Unit C1, C1.6.1 and C1.6.2

(c) The student could have improved the reliability of the investigation by . . .

1. allowing the ice-cream to melt over a longer period of time.
2. checking that the temperature was constant throughout the investigation.
3. using more than four ice-cream samples.
4. repeating the investigation.

4. A student was comparing two vegetable oils, X and Y, to find out how much heat they release when they burn.
She used the apparatus shown in the diagram. The oil was allowed to burn for 6 minutes in each test.

Her results are shown in the table.

<table>
<thead>
<tr>
<th></th>
<th>Oil X</th>
<th>Oil Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of empty oil burner</td>
<td>60 g</td>
<td>60 g</td>
</tr>
<tr>
<td>Mass of oil burner + vegetable oil</td>
<td>67 g</td>
<td>66 g</td>
</tr>
<tr>
<td>Mass of oil burner + vegetable oil after burning</td>
<td>62 g</td>
<td>63 g</td>
</tr>
<tr>
<td>Initial temperature of water in the beaker</td>
<td>24 °C</td>
<td>24 °C</td>
</tr>
<tr>
<td>Final temperature of water in the beaker after heating</td>
<td>49 °C</td>
<td>42 °C</td>
</tr>
</tbody>
</table>

(a) How many grams of oil X were burned during the experiment?

1. 2 g
2. 4 g
3. 5 g
4. 7 g

(b) Oil X produced a temperature rise of 5 °C per gram of oil burned.

What rise in temperature was produced by burning 1 g of oil Y?

1. 3 °C
2. 6 °C
3. 18 °C
4. 42 °C
(c) How could the student improve the reliability of the results for each oil?
1. Repeat the experiment several times and take the mean (average) value.
2. Burn the same mass of oil X and oil Y in the tests.
3. Burn the same mass of oil X and oil Y but for a shorter length of time.
4. Use several other oils and compare the results with those for oil X and oil Y.

(d) The student could get more accurate results if she improved the design of her apparatus.

One improvement would be to . . .
1. use a larger beaker.
2. use a thermometer with a larger range of temperatures.
3. burn a smaller quantity of oil each time.
4. protect the flame from draughts.