Tooth decay

Does your mother tell you that sugar is bad for your teeth? Does she tell you to brush your teeth after dinner and after eating sweets, because the sugar would make your teeth rot?

You are going to investigate whether or not sugar is responsible for rotting teeth. Is sugar the culprit? Or is there some other reason why teeth decay if not brushed regularly after eating sweet things? Prepare the following investigation:

You will need:
3 glass bowls/dishes
Masking tape and marker
Water
Half a cup of vinegar
1 tablespoon sugar
Eggshells from one or two eggs (we are using eggshells instead of teeth - they both contain calcium carbonate - the substance that lies under the enamel of teeth and decays)

What to do:
1. Label the three bowls SUGAR, VINEGAR and WATER.
2. Break the eggshells into smallish pieces and distribute into the three bowls.
3. Make up a sugar solution by adding the sugar to half a cup of water and stirring till the sugar is dissolved.
4. Into the bowl marked SUGAR, pour the sugar solution. Into the bowl marked VINEGAR, pour the half cup of vinegar.
5. Into the bowl marked WATER, pour half a cup of water.
6. The shells should be covered by the liquid.
7. Leave the shells for 12 hours. Touch the shells and examine their texture. Note your observations.
Grade 8 Natural Science Worksheet

8. Leave the shells for another 12 hours. Touch the shells and examine their texture. 
   Note your observations.

Answer these questions:

1. Describe the shells in each bowl after 24 hours. [8]
2. Is sugar as bad for your teeth as vinegar? [2]
3. Why do you think vinegar had this effect on the egg shells? [8]

4. Now we know that we don’t drink vinegar straight from the bottle - we eat sweet substances! In this investigation, vinegar was representative of any acid in our mouth. So what is the relationship between sugar and acid and tooth decay? You may have to research the answer to this question if you cannot answer it yourself. [12]

Your teacher will award a maximum of 10 marks for the manner in which you conducted your practical work. Did you follow the instructions? Did you perform the experiment following correct protocol? Did you clean up after your practical? Did you behave appropriately during the practical? If you worked in groups, did you contribute positively to the group’s success? [10]

[40 marks]
Grade 8 Natural Science Worksheet

Suggested Solutions

<table>
<thead>
<tr>
<th>Possible marks</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 + 10 = 40</td>
<td>1. After 24 hours, the shells in the water bowl ✓ ✓ and in the sugar solution bowl are very much the same ✓ ✓ as they were originally. However, the shells in the vinegar have changes. ✓ ✓ They are softer and smaller – they appear to be eaten away. You may have noticed bubbles in this bowl. ✓ ✓ [8]</td>
</tr>
<tr>
<td></td>
<td>2. It seems that sugar is not as bad for your teeth as vinegar is. ✓ ✓ [2]</td>
</tr>
<tr>
<td></td>
<td>3. The vinegar had this effect on the egg shells because the egg shells have calcium CARBONATE ✓ ✓ in them, which reacts with the acidic vinegar, ✓ ✓ causing CO₂ to be formed. ✓ ✓ The egg shell material is broken down as a result of the reaction. ✓ ✓ [8]</td>
</tr>
<tr>
<td></td>
<td>4. Bacteria ✓ ✓ growing in our mouths and on our teeth and gums consume sugars in our mouth and around our teeth. ✓ ✓ Specifically, these bacteria live in the substance called plaque which grows where the teeth join the gums and between teeth. ✓ ✓ The bacteria consume the sugars and use the sugar for their growth and metabolism. ✓ ✓ They produce acids as a waste product. ✓ ✓ The acids cause the tooth decay, by breaking down the calcium carbonate in the teeth. ✓ ✓ So the acid produced by the bacteria in our mouths is directly responsible for tooth decay - not the sugar! ✓ ✓ But, of course, Mom was still right! Cleaning your teeth gets rid of most of the sugar, leaving the bacteria with less substrate to consume – therefore fewer acids are produced – less tooth decay! ✓ ✓ [12]</td>
</tr>
</tbody>
</table>

Award a maximum of 10 marks for the manner in which learners conducted practical work. Did they follow the instructions? Did they perform the experiment following correct protocol? Did they clean up after the practical? Did they behave appropriately during the practical? If they worked in groups, did they contribute positively to the group’s success?