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**Particles**

**True or false?**

**Place a tick next to the true statements and a cross next to the false ones.**

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| --- | --- | --- |
|  |  | Air has no weight. |
|  |  |  |
|  |  | When particles are heated they stay the same size. |
|  |  |  |
|  |  | When ice is heated its particles melt. |
|  |  |  |
|  |  | Steam is hot air. |
|  |  |  |
|  |  | All particles are the same size. |
|  |  |  |
|  |  | The bubbles in boiling water are made of water vapour. |
|  |  |  |
|  |  | All substances are made of particles. |
|  |  |  |
|  |  | Particles in a liquid are larger than in a solid. |

**Answer these questions:**

1. Draw a particle picture to represent a solid, liquid and gas.
2. What can be found in the space between particles in a solid?

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1. Explain what happens to sugar when it is added to water. Use ideas about particles in your answer.

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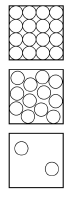
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| [Image result for wrong cross](https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiwypKkttXbAhUDRhQKHdQuA3gQjRx6BAgBEAU&url=https://pixabay.com/en/incorrect-delete-remove-cancel-red-294245/&psig=AOvVaw1djbkItdcEtCFzeX2mNTdt&ust=1529143654145485) |  | Air has no weight. |
|  |  | Students often think gases have no weight, or even have a negative weight, and that is why things filled with gas float. |
| C:\Users\User\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\IPKOG1VN\MC900434665[2].wmf |  | When particles are heated they stay the same size. |
|  |  | Students often think particles of the same substance have different properties in solid, liquid and gas e.g. they can think solid ice particles are hard and cold, liquid water particles have expanded and are squishy, water vapour particles expand more and are very large. |
| [Image result for wrong cross](https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiwypKkttXbAhUDRhQKHdQuA3gQjRx6BAgBEAU&url=https://pixabay.com/en/incorrect-delete-remove-cancel-red-294245/&psig=AOvVaw1djbkItdcEtCFzeX2mNTdt&ust=1529143654145485) |  | When ice is heated its particles melt. |
|  |  | Students often think the particles of a solid melt when it is turned into a liquid. |
| [Image result for wrong cross](https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiwypKkttXbAhUDRhQKHdQuA3gQjRx6BAgBEAU&url=https://pixabay.com/en/incorrect-delete-remove-cancel-red-294245/&psig=AOvVaw1djbkItdcEtCFzeX2mNTdt&ust=1529143654145485) |  | Steam is hot air. |
|  |  | Students often think steam is hot air rather than water vapour. |
| [Image result for wrong cross](https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiwypKkttXbAhUDRhQKHdQuA3gQjRx6BAgBEAU&url=https://pixabay.com/en/incorrect-delete-remove-cancel-red-294245/&psig=AOvVaw1djbkItdcEtCFzeX2mNTdt&ust=1529143654145485) |  | All particles are the same size. |
|  |  | Students need to understand that although particles of the **same substance** are the **same size**, **different types of particles** are different sizes e.g. an atom of hydrogen is smaller than a molecule of water. |
| C:\Users\User\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\IPKOG1VN\MC900434665[2].wmf |  | The bubbles in boiling water are made of water vapour. |
|  |  | Students often think the bubbles in boiling water are bubbles of air. |
| C:\Users\User\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\IPKOG1VN\MC900434665[2].wmf |  | All substances are made of particles. |
|  |  | Students often think substances **contain** particles rather than **consist** of particles e.g. they think water has particles in it with water or air between the particles or that oxygen has air between the particles. |
| [Image result for wrong cross](https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiwypKkttXbAhUDRhQKHdQuA3gQjRx6BAgBEAU&url=https://pixabay.com/en/incorrect-delete-remove-cancel-red-294245/&psig=AOvVaw1djbkItdcEtCFzeX2mNTdt&ust=1529143654145485) |  | Particles in a liquid are larger than in a solid. |
|  |  | Students often think particles of the same substance have different properties in solid, liquid and gas e.g. they can think solid ice particles are hard and cold, liquid water particles have expanded and are squishy, water vapour particles expand more and are very large. |

**Particles - answers**

1. Draw a particle picture to represent a solid, liquid and gas. Answer:



Misconceptions: Students often think that particles in a solid do not move, draw diagrams of liquids without any particles touching and think that when a liquid becomes a gas there are fewer total particles.

1. What can be found in the space between particles in a solid? Answer: nothing.

Misconceptions: Students often think the space between particles in a solid contains air.

1. Explain what happens to sugar when it is added to water. Use ideas about particles in your answer. Answer: The sugar dissolves; particles of water collide with sugar particles; water surrounds the particles of sugar moving them away until the sugar particles are spread evenly in the water.

Misconceptions: Students often think that melting and dissolving are the same; they can also think the solute particles disappear.

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