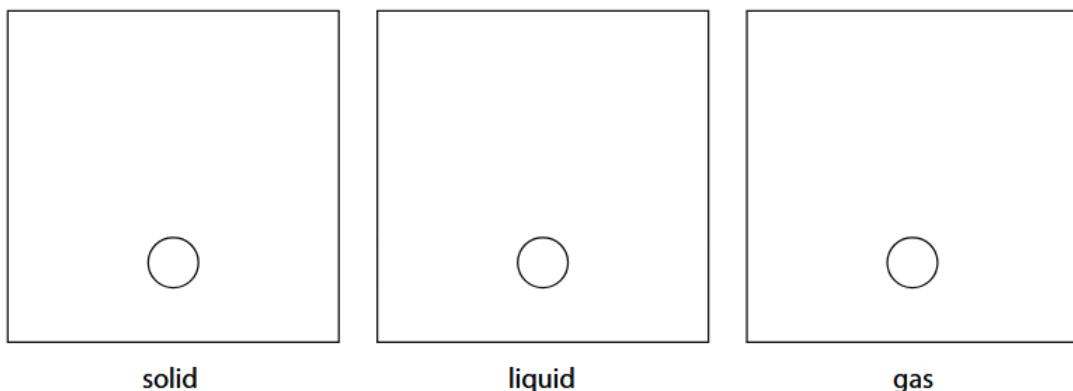


- 1 (a) (i) Complete each box in Figure 1 to show how particles are arranged in a solid, liquid and gas.

One particle in each box has been drawn for you.

(3)



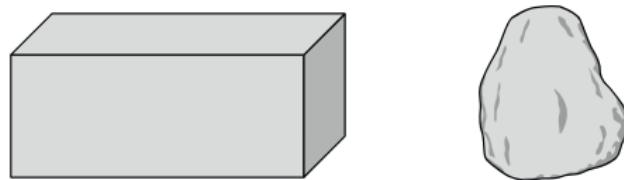
**Figure 1**

- (ii) Which row of the table is correct for water compared to steam?

(1)

|                                       | <b>the density of water is</b> | <b>the water molecules are</b> |
|---------------------------------------|--------------------------------|--------------------------------|
| <input type="checkbox"/> A            | bigger                         | smaller                        |
| <input checked="" type="checkbox"/> B | smaller                        | bigger                         |
| <input type="checkbox"/> C            | bigger                         | closer together                |
| <input type="checkbox"/> D            | smaller                        | further apart                  |

- (b) A student investigates the density of a copper block and the density of a small stone, as shown in Figure 2.



**Figure 2**

- (i) The student calculates the volume of the block as  $13\text{ cm}^3$ .

She finds that the mass of the block is 100 g.

Calculate the density of the block.

Use the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

(2)

$$\text{density} = \dots \text{ g/cm}^3$$

- (ii) The student found the volume of the copper block by multiplying the area of its base by its height.

The small stone does not have straight sides.

Describe how the student could measure the volume of the small stone.  
You may use a diagram if it helps your answer.

(3)

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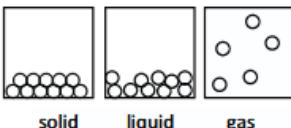
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**(Total for Question 1 = 9 marks)**

| <b>Question number</b> | <b>Answer</b>   | <b>Additional guidance</b>   | <b>Mark</b> |
|------------------------|---|--|-------------|
| <b>1(a)(i)</b>         | <p>In the solid box:<br/>regular arrangement and particles touching (1)</p> <p>In the liquid box:<br/>irregular arrangement and most particles touching (1)</p> <p>In the gas box:<br/>random and spaced (compared to liquid) (1)</p> | <p>ignore variation in particle size<br/>ignore arrows/lines indicating movement<br/>allow solid and liquid arrangements that do not fill the box</p>  <p style="text-align: center;">solid      liquid      gas</p> | <b>(3)</b>  |

| <b>Question number</b> | <b>Answer</b> | <b>Mark</b> |
|------------------------|---------------|-------------|
| <b>1(a)(ii)</b>        | C             | <b>(1)</b>  |

| <b>Question number</b> | <b>Answer</b>   | <b>Additional guidance</b>  | <b>Mark</b> |
|------------------------|---|---|-------------|
| <b>1(b)(i)</b>         | <p>substitution (1)<br/> <math>100 \div 13</math></p> <p>answer (1)<br/> <math>7.7 \text{ (g/cm}^3\text{)}</math></p> | <p>award full marks for correct numerical answer without working</p> <p>allow<br/> <math>7.692 \text{ (g/cm}^3\text{)}</math></p> | <b>(2)</b>  |

| <b>Question number</b> | <b>Answer</b>  | <b>Additional guidance</b>  | <b>Mark</b> |
|------------------------|--|---|-------------|
| <b>1(b)(ii)</b>        | <p>An answer that provides a description by making reference to:</p> <ul style="list-style-type: none"> <li>• part fill a measuring cylinder with water and record the starting volume (1)</li> <li>• completely immerse the stone in the water and record the final volume of water and stone (1)</li> <li>• volume of stone = final volume – initial volume (1)</li> </ul> | <p>accept valid alternative methods, e.g.</p> <p>fill a displacement can until some water overflows/flows out of spout</p> <p>completely immerse the stone in the displacement can and collect the displaced water in a measuring cylinder</p> <p>volume of water displaced = volume of stone</p> | <b>(3)</b>  |