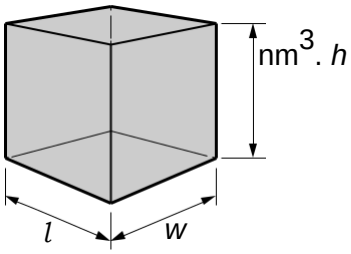
(c) The nanoparticle shown is a cube. This nanoparticle has a volume of 1000



NOT TO SCALE

Calculate the surface area of the nanoparticle.

Use the formula: surface area = 6 × (h × w)

Surface area = ... nm^2

[3]

PLEASE DO NOT WRITE ON THIS PAGE

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

5. Work crossed out:

   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks

   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.

7. There is no NR (No Response) option. Award NR (No Response)

   -if there is nothing written at all in the answer space

   -OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')

   -OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question.

   Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

   If you have any questions or comments for your Team Leader, use the phone, the RM Assessor messaging system, or email.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

Question			Answer	Marks	AO element	Guidance
			= 6104.7(J) ✓			**ALLOW** correct evaluation from mp2 **IGNORE** incorrect rounding on answer line if correct evaluation given in working.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td></td><td>Any two from:
Assume (inelastic) spheres/not actual shape ✓
Don’t show true scale/actual size (of particles)/actual space between particles ✓
Don’t show interactions/attractions/bonds between particles/atoms/molecules ✓
Don’t show movement/collisions of particles ✓
Don’t show electron etc</td><td>2</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><th></th><th>Movement of particles</th><th>Arrangement of particles</th></tr><tr><td>Solid</td><td>Vibration (about a fixed point) ✓</td><td></td></tr><tr><td>Liquid</td><td>Moving/sliding past each other ✓</td><td>Close together ✓</td></tr><tr><td>Gas</td><td></td><td>Random ✓
Far apart ✓</td></tr></table></td><td>4</td><td>1.1</td><td>5 correct = 4 marks
4 correct = 3 marks
2 or 3 correct = 2 marks
1 correct = 1 mark

DO NOT ALLOW Fairly/quite close together

ALLOW irregular</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Particles gain (kinetic) energy ✓
(and) move faster/move apart/move more ✓
OR
Energy breaks/weakens force between particles ✓
Particles move further apart/move more ✓</td><td>2</td><td>1.1</td><td>ALLOW atoms/molecules/ions for particles
DO NOT ALLOW idea of moving apart if clearly referring to solid to liquid change

1 mark if both points made but no reference to particles etc

ALLOW heat for energy.

IGNORE temperature/heating/heated</td></tr>
<tr><td></td><td>(d)</td><td></td><td>Gas ✓</td><td>1</td><td>3.2a</td><td></td></tr>
</table>