

SUBJECT TEST

Mathematics

GRADE

9

Tests which are re-used are protected by paragraph 3 of Chapter 4 of the Official Secrets Act.
The intention is for this test to be re-used until 2009-06-30.
This should be considered when determining the applicability of the Official Secrets Act.

Spring 2009

Part A – Oral Part

The Oral Parts for the Students

Name

This booklet contains mainly *the oral tasks, version A–C, for the students*. It also contains *the discussion questions* that the teacher will go through together with the students and *the information for the students* that they will receive a few days before the test is carried out.

Discussion questions

Version A

- I Compare pair-wise the volumes for the bodies in pictures J–M. Which body has the greater volume? Explain. How can you determine the ratio between the two volumes?
- II Which of the bodies in pictures J–M make the water rise more than one decimetre?

Version B

- I Choose two vessels that have the same volume and explain why this is so. If the pupils cannot find such volumes the teacher may help by saying e.g. that B and G have the same volume. Explain why. (The following pairs of volumes are equal: A and D, B and G, D and H, L and M, B and F and also N and P.)
- II There are three cylinders (J, K and L). What are the ratios between their volumes?
- III There are three cone shaped glasses (O, P and Q). What are the ratios between their volumes?

Version C

Questions I–IV relate to figures A–D, question V relates to figures E–H.

- I Which of the bodies A, B, C and D has the greatest volume?
- II The pyramid can fit inside the cube. How large part of the cube is occupied by the pyramid?
- III Does the cube have twice the volume of the sphere?
- IV The sphere can fit inside the cylinder. How large part of the cylinder is occupied by the sphere?
- V Compare the pair of bodies in picture E and the pair of bodies in picture H. Find similarities and differences between E and H.

Information for students

This is a description of the oral part of the national test. This part is to be carried out in groups of 3–4 students sitting together with the teacher around a table.

- Each student receives a paper with figures and a paper with a number of statements and questions. You may study these for a few minutes. The teacher tells you in what order you are to report your arguments.
- Each student explains some of the questions and statements for the others in the group. You should explain how you decided whether the statement was true or false and defend your answer and explain your reasoning. After each explanation your fellow-students may ask questions, make additional comment or support or argue against you.
- After everyone in the group has presented their explanations, the group will discuss some questions that the teacher presents.
- The evaluation of your efforts and contributions for this oral test will be based on three factors:

Understanding

To what extent you show that you have understood the question, the concepts and relationships between them.

Language

How clear your explanation is, and how well you use mathematical language.

Degree of participation

To what extent you participate in the discussion, can argue for your ideas and respond to the explanations of other students.

Remember that this is an opportunity to demonstrate your knowledge when presenting your explanations, when discussing other students' explanations and in the closing discussion. Your achievement on this oral part of the examination gives a number of g- and vg-points and you may also show MVG-quality on this part. The result of this oral part is then combined with your results on the other parts of the national test.

Version A

The unit of length is decimetre (dm).

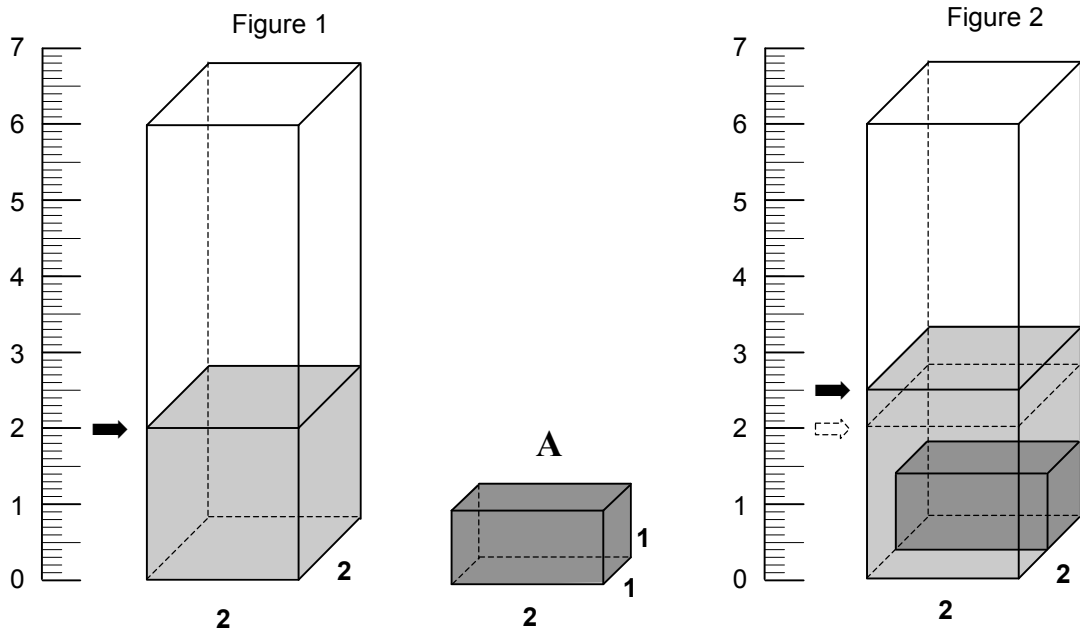
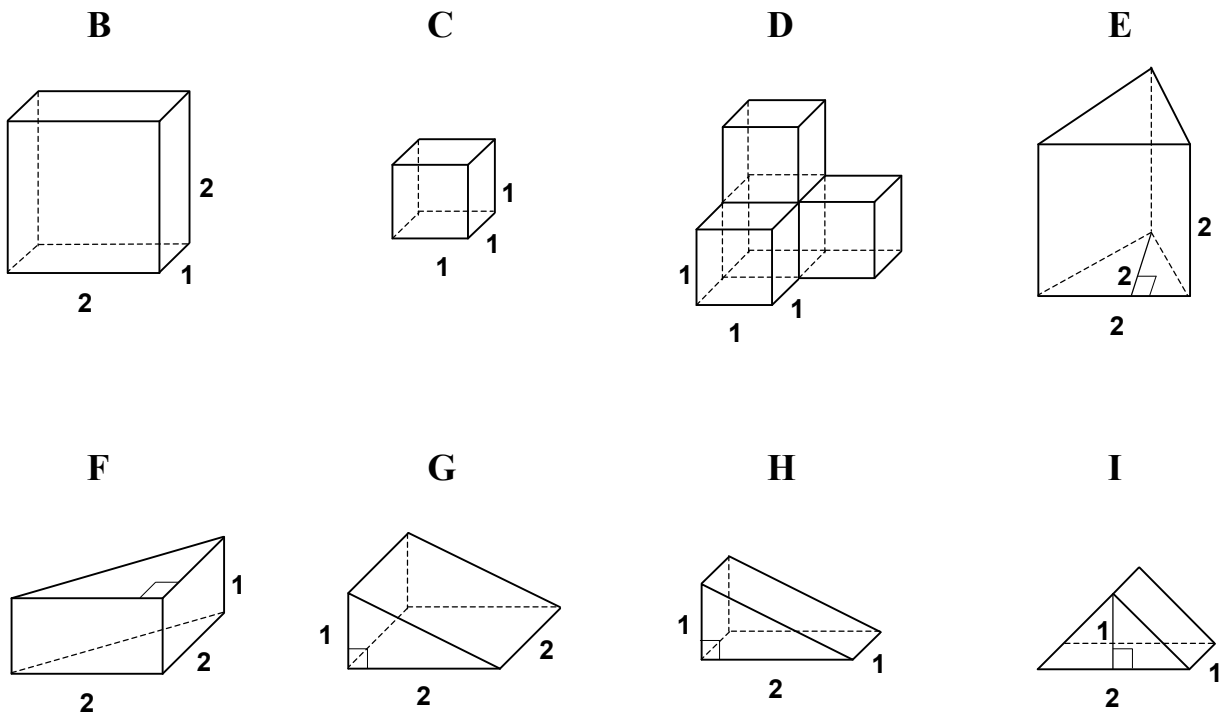
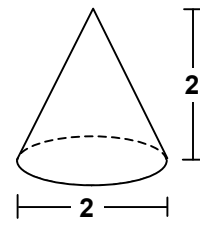
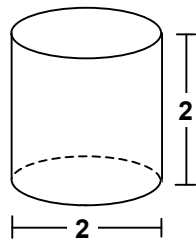


Figure 1 shows a vessel containing water to a depth of 2 dm. If you submerge the rectangular block A into the vessel the water level rises to 2.5 dm, see figure 2.



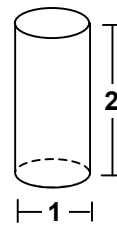
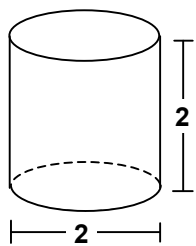
J

(dm)



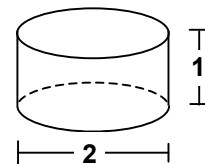
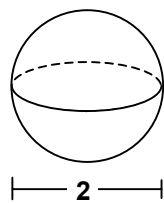
K

(dm)



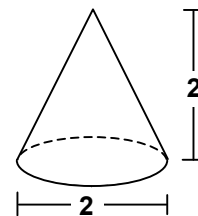
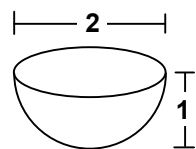
L

(dm)



M

(dm)



The pictures show various three-dimensional geometric bodies. There are a number of statements and questions related to these pictures. You are to answer the questions and determine whether the statements are true or false. It is important that you defend your answer and explain your reasoning.

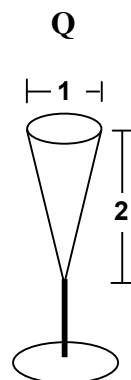
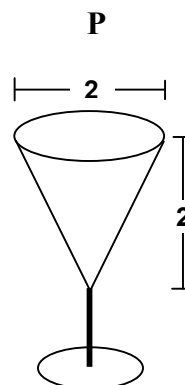
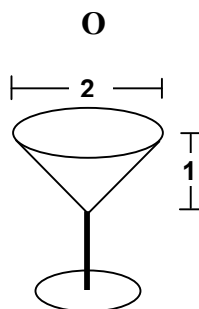
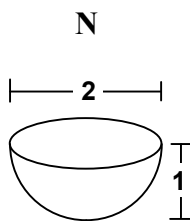
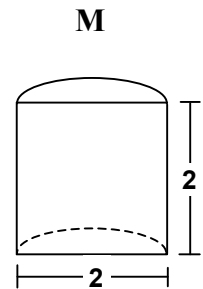
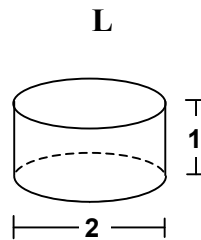
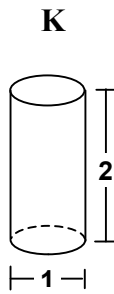
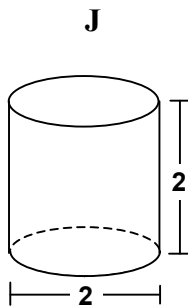
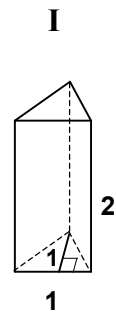
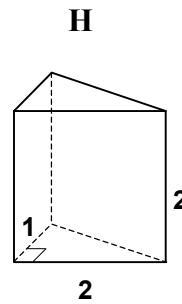
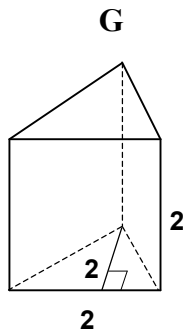
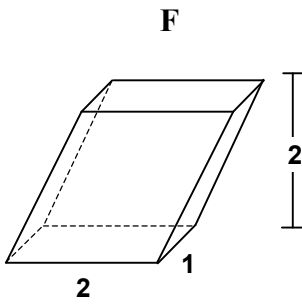
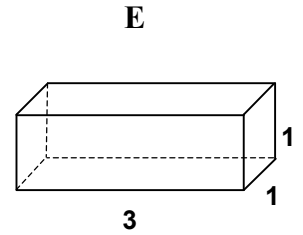
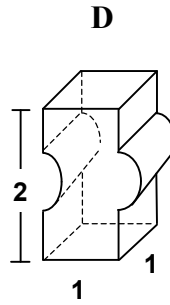
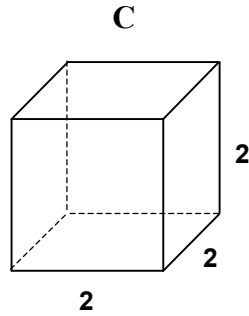
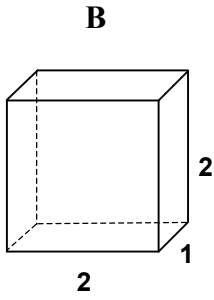
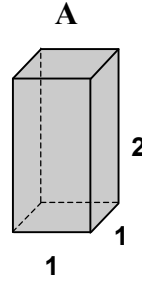
1. The volume of D is half that of the water.
2. The volume of C is one quarter of that of the water.
3. The volume of B is half that of the water.
4. H has a greater volume than C.

Suppose that you submerge the various bodies into the vessel with water so that the water entirely covers the body.

5. To what level does the water rise when you submerge B?
6. To what level does the water rise when you submerge C?
7. To what level does the water rise when you submerge D?
8. To what level does the water rise when you submerge H?
9. To what level does the water rise when you submerge E?
10. To what level does the water rise when you submerge F?
11. To what level does the water rise when you submerge G?
12. To what level does the water rise when you submerge I?

Version B

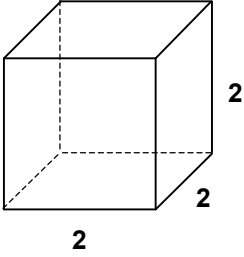
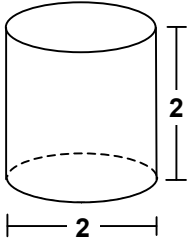
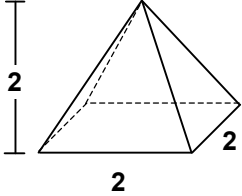
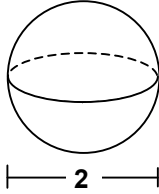
A vessel in the shape of a rectangular block (vessel A) is filled with water. The water is poured into one of the vessels B-Q. The unit of length is decimetre (dm).



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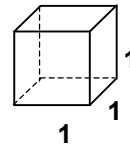
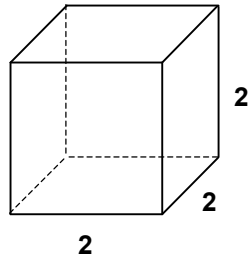
1. Vessel B will be half full.
2. The water will come up to half the height of vessel C.
3. Vessel D will be almost full.
4. The water will come up to 50 % of the height of vessel E.
5. Vessel F will be half full.
6. The water will come up to 25 % of the height of vessel G.
7. Vessel H will be completely full.
8. When vessel I is full there is half of the water left in A.
9. The water comes up to half the height of vessel J.
10. The water comes up to 75 % of the height of vessel M.
11. The water comes up to about $\frac{2}{3}$ of the height of vessel L.
12. Vessel P will be almost full.
13. In vessel N the water runs over.

Version C

| | |
|---|---|
| <p style="text-align: center;">A (dm)</p>  | <p style="text-align: center;">B (dm)</p>  |
| <p style="text-align: center;">C (dm)</p>  | <p style="text-align: center;">D (dm)</p>  |

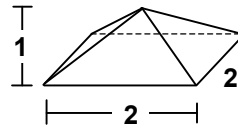
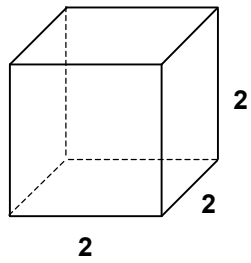
E

(dm)



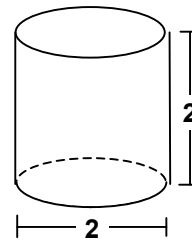
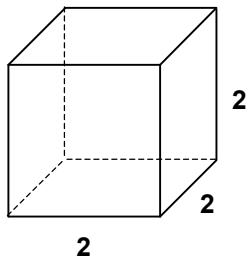
F

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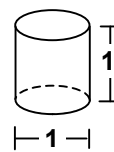
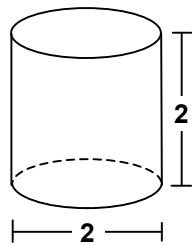
G

(dm)



H

(dm)



1. Describe the three-dimensional geometric body in picture A, e.g. sides, edges, angles etc. What is such a body called?
2. Describe body B in the same way as in Question 1
3. Describe body C in the same way as in Question 1.
4. Describe body D in the same way as in Question 1.
5. Compare the two geometric bodies in picture E. Which one has the greatest volume? Explain. How can you determine the ratio between the volumes?
6. Compare the two bodies in picture F in the same way as in Question 5.
7. Compare the two bodies in picture G in the same way as in Question 5.
8. Compare the two bodies in picture H in the same way as in Question 5.

