Skolverket
(National Agency for Education)

MATHEMATICS TEST

Year 9

Spring 2005

Part A – Oral Part

The contents of this test material must remain *secret* until the end of June 2015.

Teacher Material – For Copying
Discussion Questions for Different Versions

Student Material – For Copying
Information for Students
Version I–III

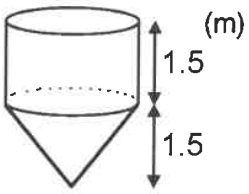
PRIM gruppen

Stockholm Institute of Education
PRIM-gruppen

Discussion questions for different versions

Version I

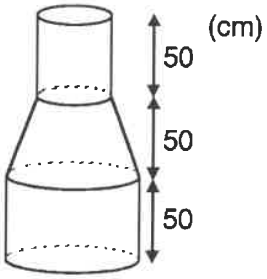
Questions for discussion



- How might the tank look?
  (Note! If the students do not discover that the tank consists of a cylinder [rectangular block] and a cone [pyramid], the teacher may reveal this to enable the discussion to continue.)
- How can you use the graph to determine the ratio between the heights of the two parts of the tank?
- How would the graph look if the vertical axis showed the volume (m^3) instead?

Version II

Questions for discussion

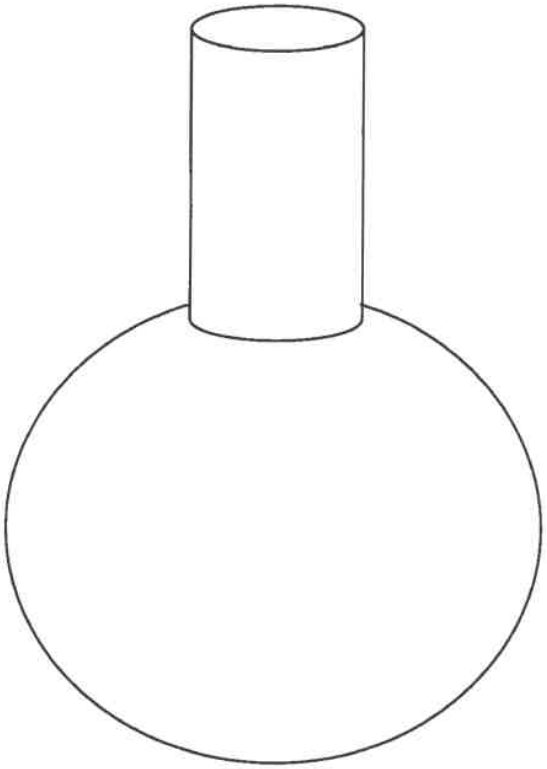


- How might the tank look?
  (Note! If the students do not discover that the tank consists of a cylinder [rectangular block], a cone frustrum [pyramid], and a cylinder [rectangular block], the teacher may reveal this to enable the discussion to continue.)
- How can you use the graph to determine the ratio between the heights of the three parts of the tank?
- How can you use the graph to determine the ratio between the diameters (of the bases) of the two "straight" parts of the tank (i e right circular cylinders)?
- How would the graph look if the vertical axis showed the volume (m^3) instead?

Version III

Questions for discussion

- How would the graph corresponding to the vase below look?
  (Copy the picture below and show it to the students.)
- How might the vases corresponding to graphs A and B look?
- How can you use the graphs to determine the ratio between the heights of the different parts of the vases?
- Can you make any other conclusions, based on the graphs, about the proportions of the vases?



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 one or two graphs and a paper with a number of statements about the graph/s. 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 statements for the others in the group. You should explain how you decided whether the statement about the graph was true or false. After each explanation your fellow-students may ask questions, make additional comments 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, namely *understanding, language* and *degree of participation.*

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

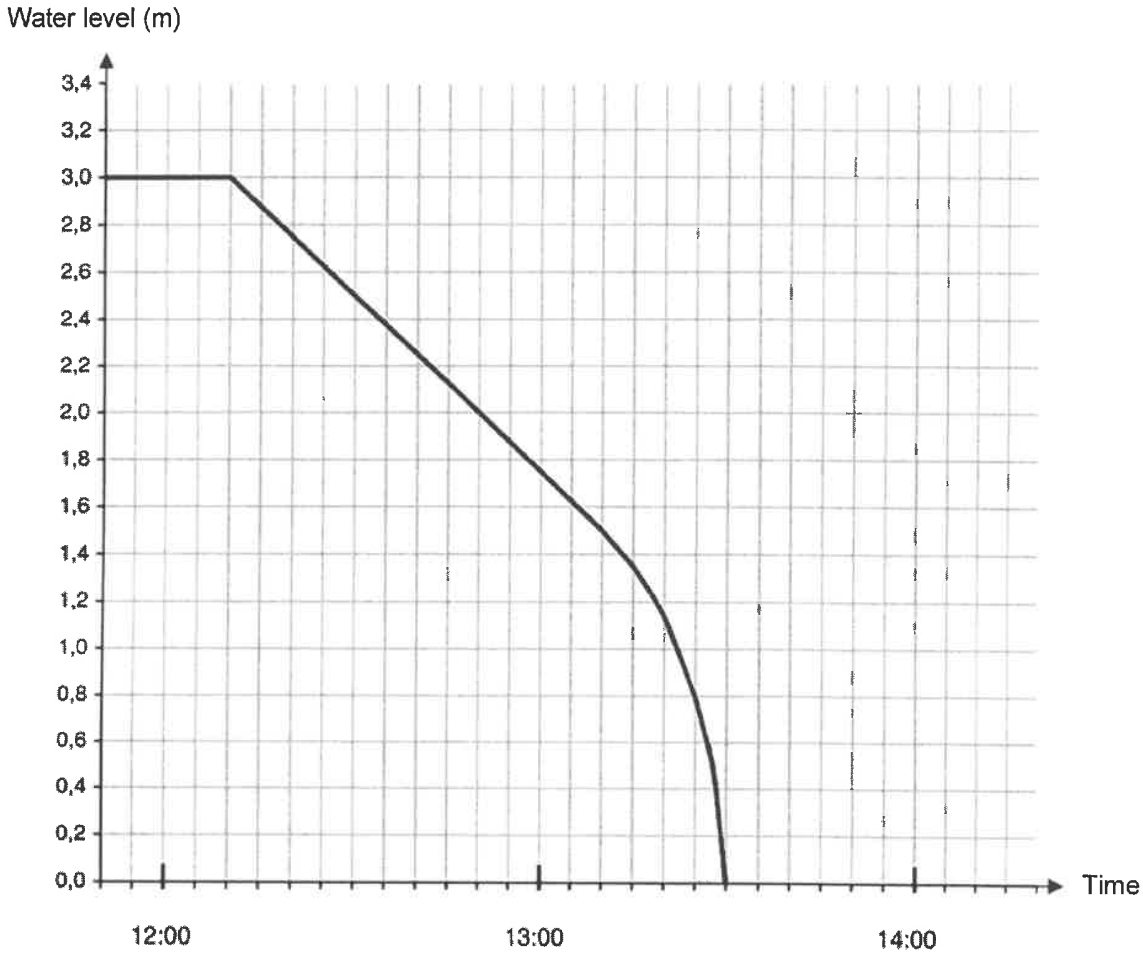
  How clear your explanation is, and how well you use mathematical language.

  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 both 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.

Part A – Version I

A tank of water is emptied at *a constant rate*. The graph shows the level of the water in the tank at various times.



Part A – Version I

The graph shows that

1. the process of removing water from the tank began at 12.10.

2. the tank was empty at 13.40.

3. at 13.00 the water level was 2.0 m.

4. the water level had fallen to half of the original level at 13.10.

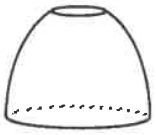
5. the water level fell by the same amount all the time.

6. during the first half-hour the water level fell 1 m.

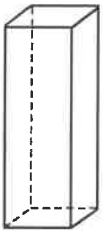
7. if the emptying had begun at 12.00, the water level would have been 1.5 m at 13.00.

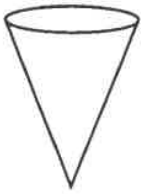
8. if the water level had continued to fall in the same way as during the first hour, the tank would have been empty at 14.00.

9. during the first hour the water level fell 1.5 cm/min.

10. the tank may have this shape:  ¤

11. the tank may have this shape:  ¤

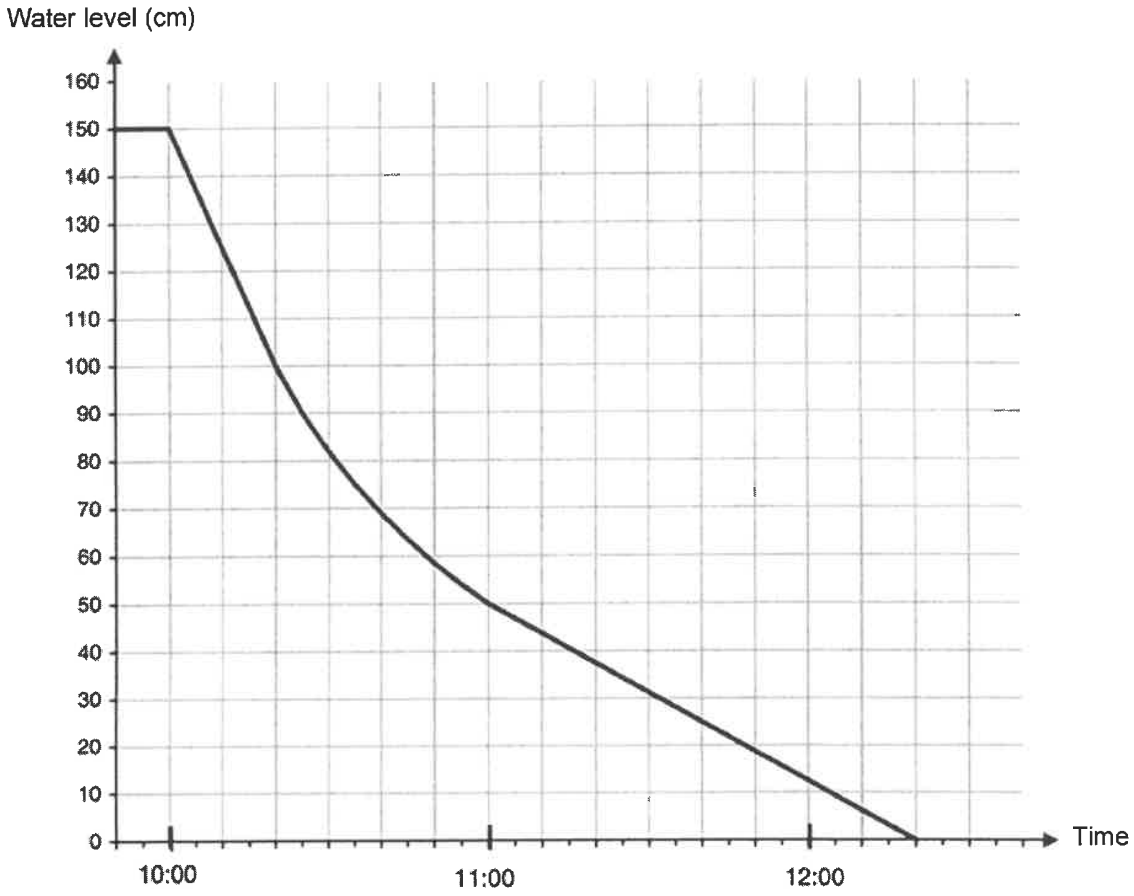
12. the tank may have this shape:  ¤

13. the tank may have this shape:  ¤

14. at 12.50 half of the water had been removed from the tank. ¤

Part A – Version II

A tank is emptied at *a constant rate.* The graph shows the level of the water in the tank at various times.

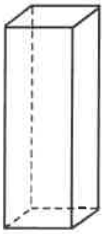


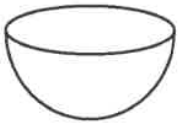
Part A – Version II

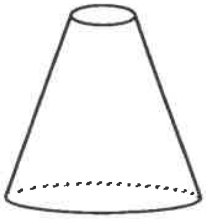
The graph shows that

1. the process of removing water from the tank began at 9.50.
2. at 10.20 the water level in the tank was 1 m.
3. the tank was completely emptied in two hours.
4. the water level had fallen to one third of the original level at 11.00.
5. the water level fell by the same amount all the time.
6. during the first 15 min, the water level fell by 0.5 m.
7. if the emptying had begun at 10.20, the tank would have been empty at 12.40.
8. if the water level had continued to fall the whole time at the same rate as at the start, the tank would have been empty at 11.00.
9. during the last hour the water level fell 1 cm/min.

10. the tank may have this shape:  ¤

11. the tank may have this shape:  ¤

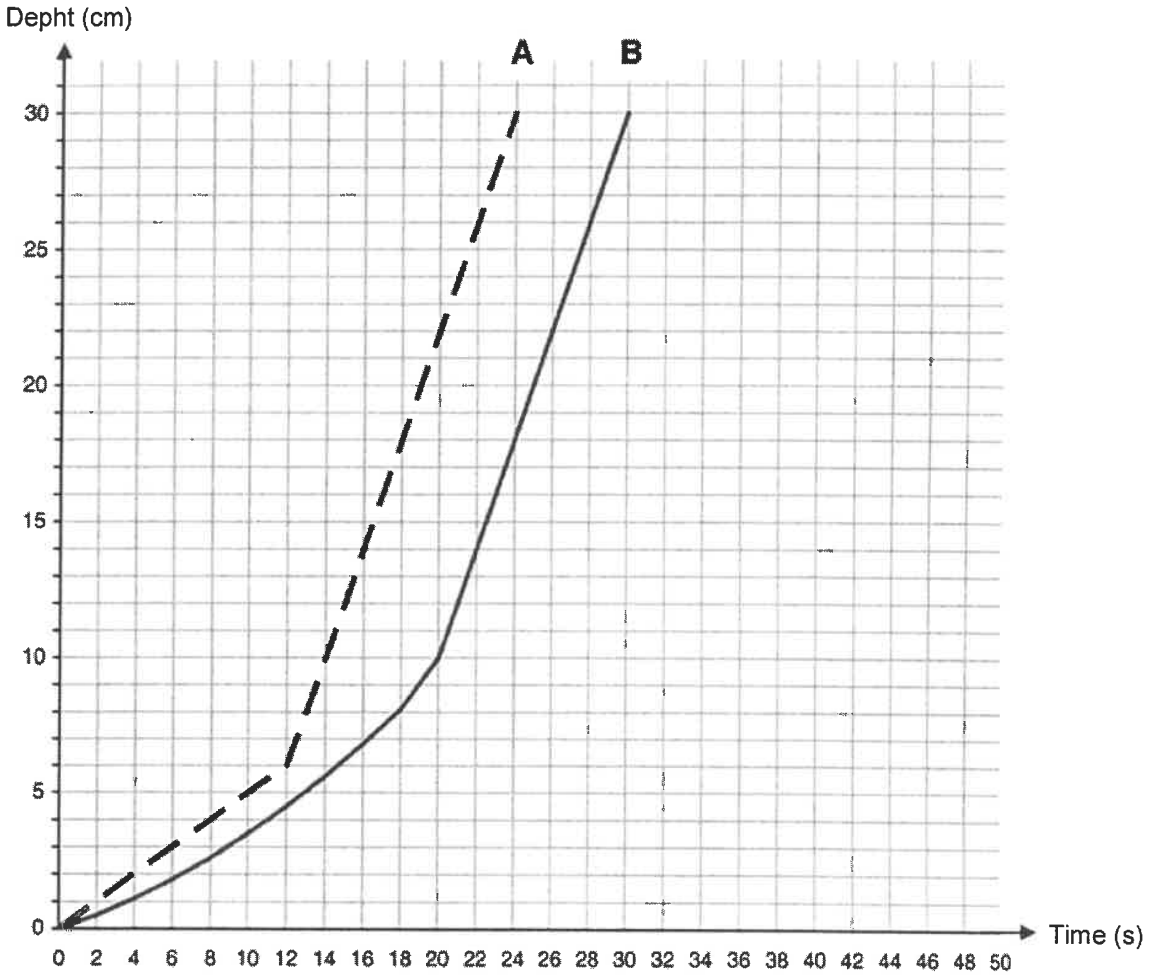
12. the tank may have this shape:  ¤

13. the tank may have this shape:  ¤

14. at 10.35 half of the water had been removed. ¤

Part A – Version III

The graph shows the water depth in two vases being filled with water.
Water is poured into the vases at *a constant rate*.



Part A – Version III

The graph shows that

1. it takes 26 seconds to fill vase A.

2. it takes longer to fill vase B than vase A.

3. vase A is 25 cm high.

4. after 10 seconds the water level in vase B is 10 cm.

5. after 20 seconds the water level is higher in vase A than in vase B.

6. the water levels in the vases have risen to half the height of the vases after 20 seconds.

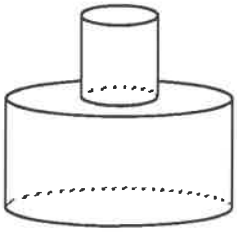
7. the water level in the vases rises faster at the start than towards the end.

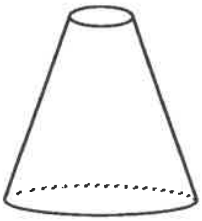
8. at the beginning of the filling of vase A, the water level rises by 2 cm/s.

9. if the water level in vase A had continued to rise all the time in the same way as at the start, the vase would have been full after 50 seconds.

10. vase A and vase B have the same volume. ¤

11. the upper parts of the vases have the same shape. ¤

12. vase A can have this shape:  ¤

13. vase B can have this shape:  ¤