

Skolverket

Vårterminen 2000

Engelsk version av sidorna 17–36 i ”Information till lärare
Delprov M med bedömningsanvisningar”.

Skolår 9

Lärarhögskolan i Stockholm
PRIM-gruppen

Model 1 – Equalities and differences

This exercise verifies if the student knows how to describe and compare geometrical figures and to find equalities and differences between the figures. The exercise also tests to what extent the student can use mathematical language, see relations, argue and accept arguments from others. The exercise tests the knowledge of the student on all mark levels. Figures can be chosen with regard to the capacity of the student.

Instructions to the teacher

The teacher makes a grouping. A group should be composed of 3–4 students who function well together.

The exercise is composed of two sub-moments. First every student gives an account of “her/his problem” to the other students in the group. Then the whole group discusses all the figures.

- Choose those *pairs of figures*, that should be used in the group and copy them on white paper.
- Every student gets a sheet of paper with *one pair* of figures and is then permitted about five minutes for preparation.
- The students report in turn to the other students in the group. The students should report in the same order as the exercises are positioned on the copy originals. During the reporting procedure it could be suitable that the students in the group sit around a table to make it natural to converse. The sheet with the figures that are described might then lie on the table, to make it possible for all to see it. To help the student to advance the teacher might put in short questions.
- After each report the other students in the group are invited to ask, comment and make additions.
- Finally all figures are put on the table and the students are invited together to discuss equalities and differences between as many figures as possible.

Information to the student (is found as a copy original on page 17)

- This exercise is an oral sub-test included in the national test.
- Each one of you will get a sheet of paper with two geometrical figures. You will be allowed a few minutes for preparation.

Moment 1

- Every one of you reports to the others in the group. The matter is to describe equalities and differences between the figures e.g. concerning perimeter and area.
- After every report the fellow-students around the table should ask about anything that might have been unclear. They may also make additions from their own thinking about the two figures.

Moment 2

- When all have reported about their pair of figures you put all figures on the table. Look on the figures together and discuss equalities and differences between as many figures as possible. Present your own thinking, listen to the fellow-students and argue for your own ideas.
- It is important that you all participate as actively as possible.

Consider that this is an opportunity to show what you know, both in your own report, in the discussion after the reports of your fellow-students, and in the concluding discussion. You are assessed not only for being right or wrong but also for how well you adopt your fellow-students' ideas and how well you explain your thinking. Use the mathematical language as well as you can.

Assessment directions

The different pairs of figures are differently difficult to compare. At the assessment of the student's performance one should therefore take into account what pair of figures the student has compared.

Description of characteristics of student performances on different mark levels

Pass

The student finds some geometrical qualities in the figures and shows an understanding for the concepts of perimeter and area e.g. by being able to decide what figure that has the largest perimeter respectively area. The student expresses him/herself comprehensibly and can answer relevant questions. The student takes part in the final discussion but does not carry it forward.

Pass with Distinction

The student finds several geometrical qualities and differences between the figures. The student describes how to calculate the perimeter and the area of the rectangle and finds methods to decide the perimeter and the area of the other figure. In the final discussion the student realises that there is no direct relation between the perimeter of a figure and its area but does not express her/himself in a general way on how the area of a figure with given perimeter is maximised or minimised.

Example of how two students, on different qualitative levels, have solved an exercise

The task is to compare the rectangle and the leaf.

Student A

Among other things the student says: "The rectangle has the larger area because if you put the leaf on top of it, there is place enough. You can see that. The perimeter is probably larger for the leaf because it turns in and out which makes it longer.

After a hint: "You can measure the rectangle and take that times that (indicates the length and the width) to get the area, and the perimeter can be measured.

In the final discussion: "Yes of course, if the perimeter of the leaf is the larger then the area must not also be the larger.

Student B

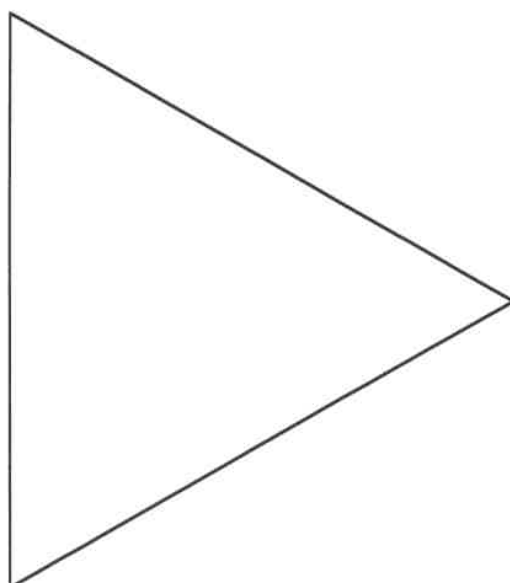
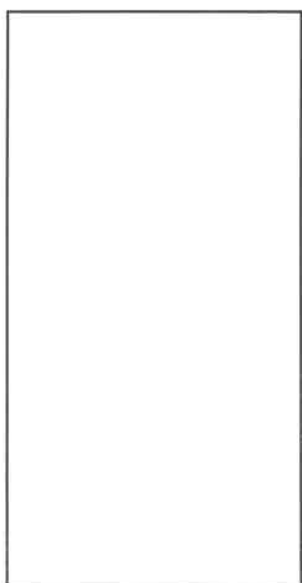
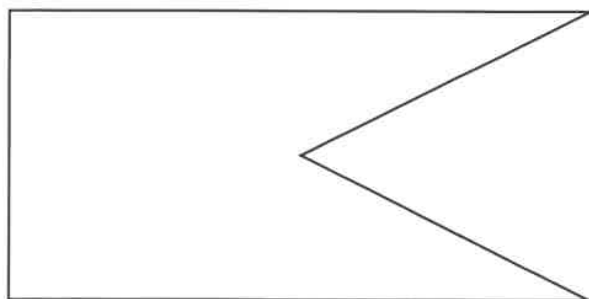
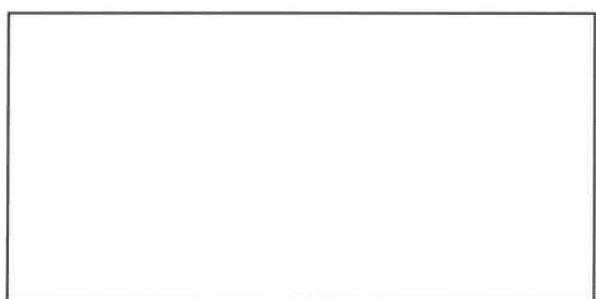
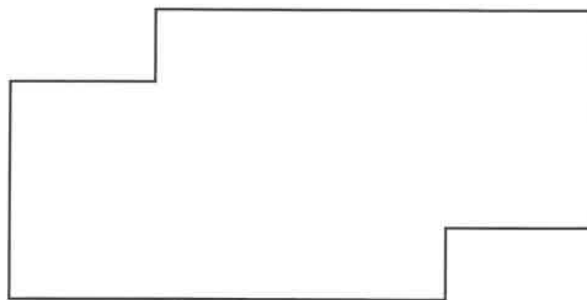
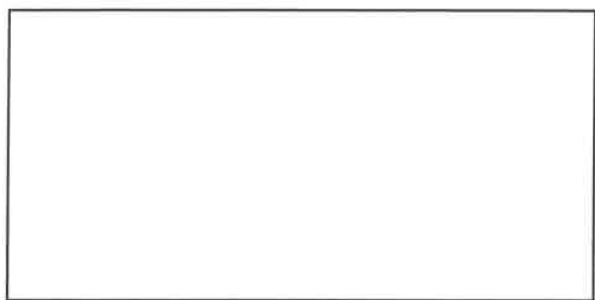
Among other things the student says: "The leaf has the smaller area because there is room for it completely within the rectangle. The leaf has the larger perimeter because there are a lot of bulges in and out. The perimeter and the area of the rectangle can be found by measuring length and width. If you want to find the perimeter of the leaf I suppose you could put a string along the edge and measure it. The area is a little difficult but you might put a grid on top of it and count squares.

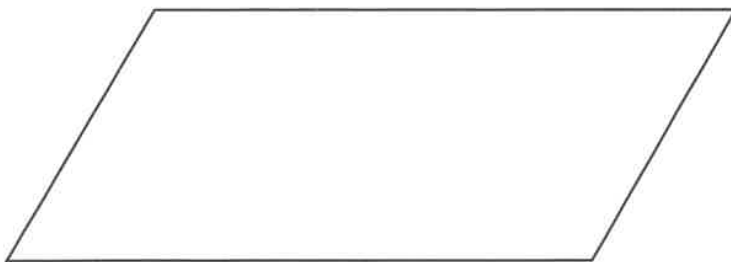
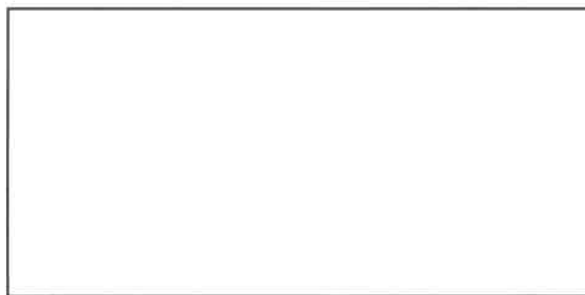
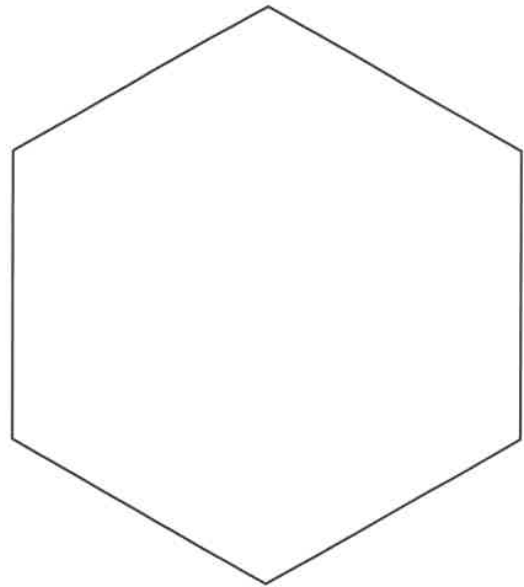
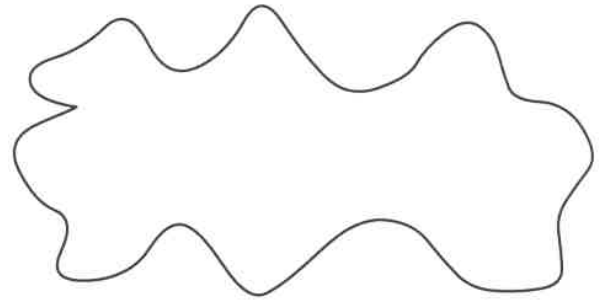
In the final discussion: “The hexagon is the only figure that has a larger area than the rectangle with the same perimeter, so you cannot say that the area gets larger the larger the perimeter is.

Qualitative levels		
	G	VG
U	A	B
L	A	B
P	A	B

The student A is assessed with the sub-test mark Pass and the student B with the sub-test mark Pass with Distinction.

Figures to model 1





Model 2 – To connect concepts with three-dimensional figures

This exercise tests if the student is able to relate words and concepts to a given three-dimensional figure and to what extent he/she understands and can make use of a correct mathematical language. The exercise tests the knowledge of the student on all mark levels. The figure can be chosen with regard to the capacity of the student.

Instructions to the teacher

The teacher makes a grouping. A group should be composed of 2 + 2 students who function well together. The exercise is composed of three sub-moments. First two students choose the smallest number of concepts they think they need unambiguously to describe a certain solid. Two other students are then given the concepts and shall by reasoning find what solid they refer to. Finally the whole group discuss the results together with the teacher.

- Copy the list with concepts and cut it into 32 cards.
- Choose a suitable exercise for the group from the list and copy it on white paper.
- Two of the students get a piece of paper with a picture of the solid. They also get all the cards with concepts. By discussing and arguing they should then together find what concepts they want to choose, unambiguously to describe their very solid. If necessary the teacher might add concepts to give the two students, who are to take over, an acceptable start.
- When the two first students have chosen concepts the illustrations are put away and the two other students are called to enter. They get the concepts that the two first students have chosen and are then together in a discussion to find what figure is intended.
- When they have come to a decision the whole group discuss the result.

Information to the student (is found as a copy-original on page 18)

- This exercise is an oral sub-test included in the national test.

Moment 1: Two students

- Two of you will get a piece of paper with a picture of a three-dimensional solid. You will also get a number of cards with geometrical concepts as e.g. rectangle, circle and vertex.
- You are together to choose the smallest number of concepts you think you need to describe your figure. You shall give reasons to each other for choosing those very concepts.
- It is important that you both participate as actively as possible and help each other to explain what meaning the concepts have for the solid you shall describe.
- When you are finished two fellow-students get the concepts you have chosen.

Moment 2: Two other students

- Supported by the concepts you get from your fellow-students you should *reason* to find what three-dimensional solid the concepts together describe.
- It is important that you both participate as actively as possible and help each other to explain what meaning the concepts have for the solid that is requested.

Moment 3: The whole group

- Finally the whole group discuss the result together with the teacher.

Consider that this is an opportunity to show what you know, both in your own report, and in the concluding discussion. You are assessed not only for being right or wrong but also for how well you adopt your fellow-students' ideas and how well you explain your thinking. Use the mathematical language as well as you can.

Assessment directions

The different pairs of figures are differently difficult to compare. At the assessment of the students' performances one should therefore consider what pair of figures they have worked with.

Description of characteristics of student performances on different mark levels

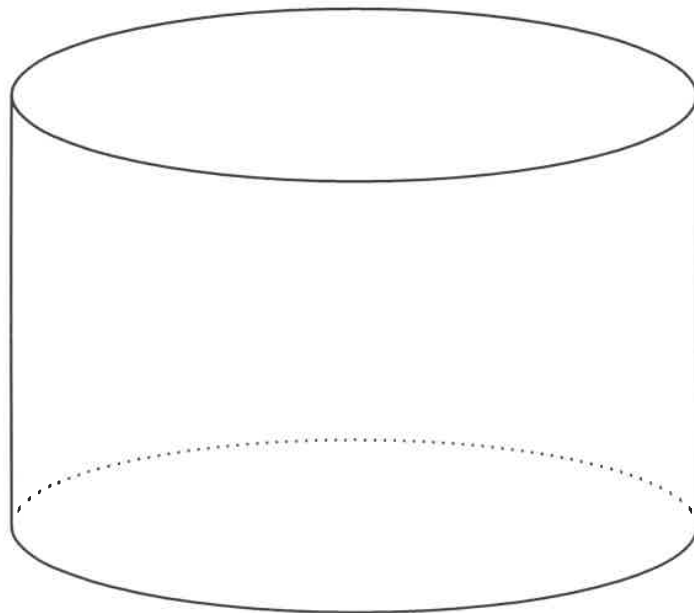
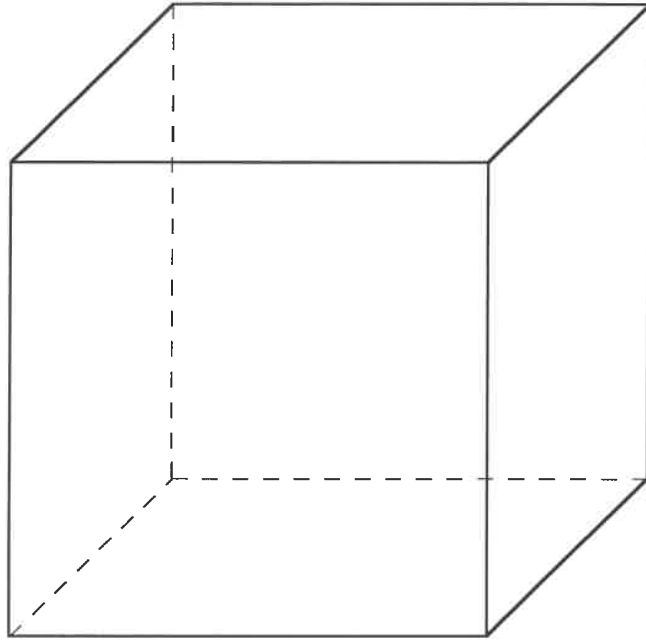
Pass

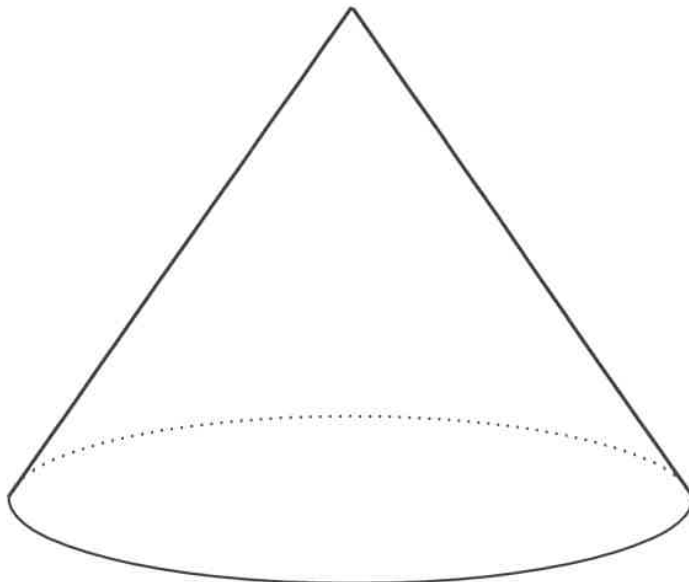
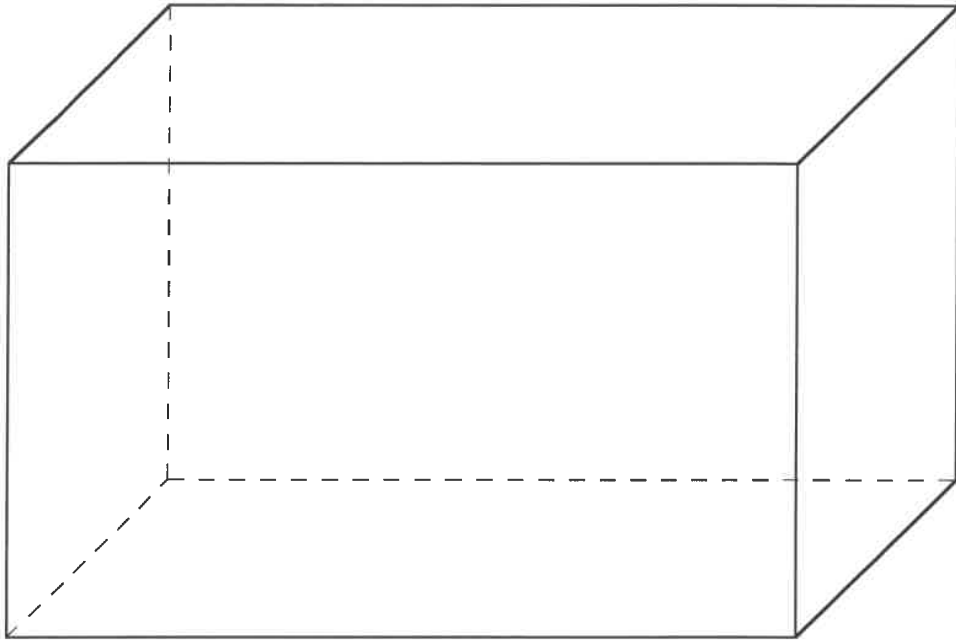
The student works actively to choose relevant words and concepts. The student is prepared to test their relevance, but leaves totally or to some extent the mathematical terminology.

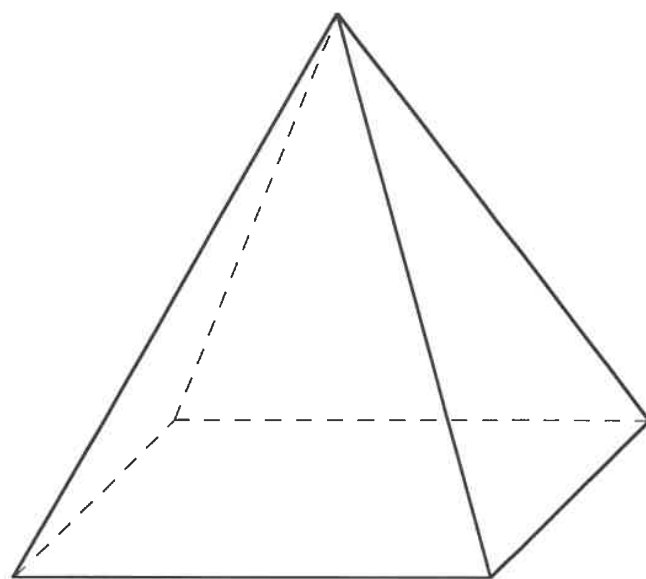
Pass with Distinction

The student works actively to choose relevant words and concepts. The student gives a clear response to arguments from other students and meets others' questions and ideas. The student uses to a large extent the terminology of mathematics in her/his reasoning. If necessary the student makes connections between every day language and the language of mathematics.

Figures and concepts to model 2







Line	Parallel
Triangle	Width
Vertex	Circle
Surface	Straight
Volume	Space
Plane	Radius
Angle	Symmetry
Boundary-surface	Two-dimensional

Three-dimensional	Isosceles
Degree	Area
Perimeter	Diameter
Square	Height
Base	Diagonal
Equilateral	Edge
Polygon	Length
Segment	Rectangle

Model 3 – To describe geometrical figures

This exercise verifies if the student knows how to describe a geometrical figure and to what extent she/he knows how to use a correct mathematical language. The exercise tests the knowledge of the student up to and including the level of Pass with Distinction. The figure can be chosen with regard to the capacity of the student.

Instructions to the teacher

The teacher makes a grouping. The group should be composed of 3–4 students who function well together.

The exercise is composed of two sub-moments. First one student describes a figure as correctly as possible to her/his fellow-students in the group. These draw (sketch without a ruler) the figure. Then the whole group has a discussion about the result. Encourage the students to use mathematical language as much as possible.

- Copy a figure of suitable level of difficulty to every student. The students in the group should have different figures.
- Student “one” gets her/his figure. It must not to be shown to the others in the group. The others get a blank piece of paper.
- The student describes the figure for his fellow-students, who draw the figure, as they comprehend it. During this moment the fellow-students must not make questions.
- When the description is finished the members of group in common compare the original and the drawings and discuss together the result, and how one could have given a clearer description. Here you, as a teacher, may act as a “catalyst” to enhance the discussion and move it forwards.
- Then one changes to student “two” who repeats the same procedure with her/his figure. Continue in the same manner until all the students in the group have described their figures.

Information to the student (is found as a copy-original on page 19)

- This exercise is an oral sub-test included in the national test.
- Each one of you will get a picture with a geometrical figure. You will be allowed a few minutes for preparation.

Moment 1

- Every one reports to the others in the group. The task is to describe a geometrical figure as clearly as possible to the others in the group. They will draw the figure with the help of your description.

Moment 2

- After every description you are together to compare the originals and the drawings and discuss if the descriptions possibly could have been done more clear with a more correct mathematical language.
- It is important that you participate as actively as possible and try to use the mathematical language as e.g. square, circle, and area when it is suitable.

Consider that this is an opportunity to show what you know both in your own report and in the discussions after your fellow-students’ presentations. You are

assessed not only for being right or wrong but also for how well you adopt your fellow-students' ideas and how well you explain your thinking. Use the mathematical language as well as you can.

Assessment directions

The different figures are differently difficult to describe. At the assessment of the students' performances one should therefore take into account what figure the student has described.

Description of characteristics of student performances on different mark levels

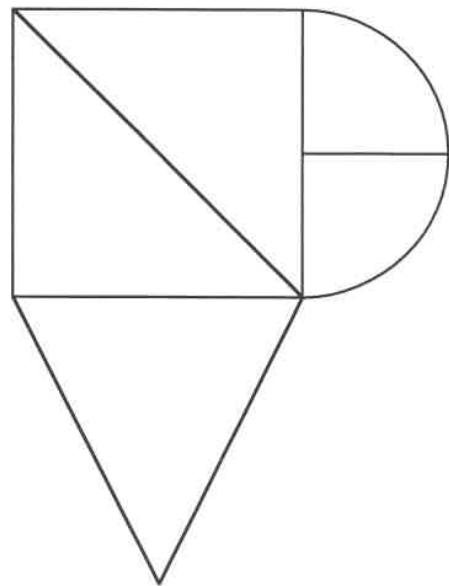
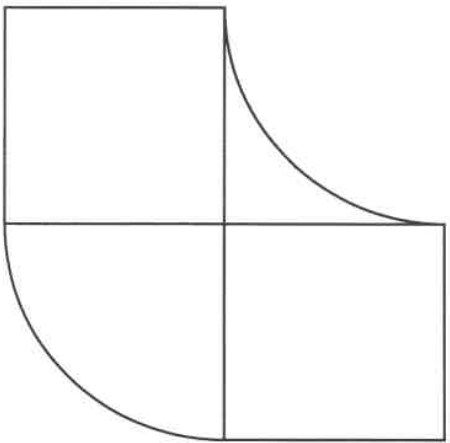
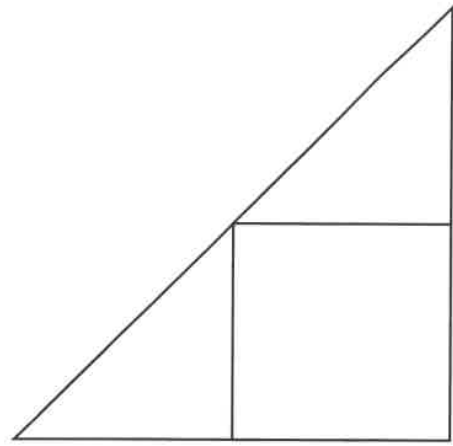
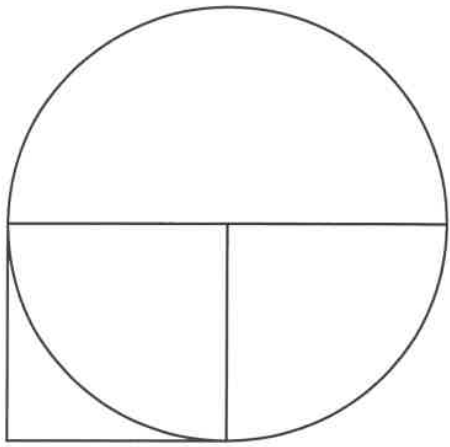
Pass

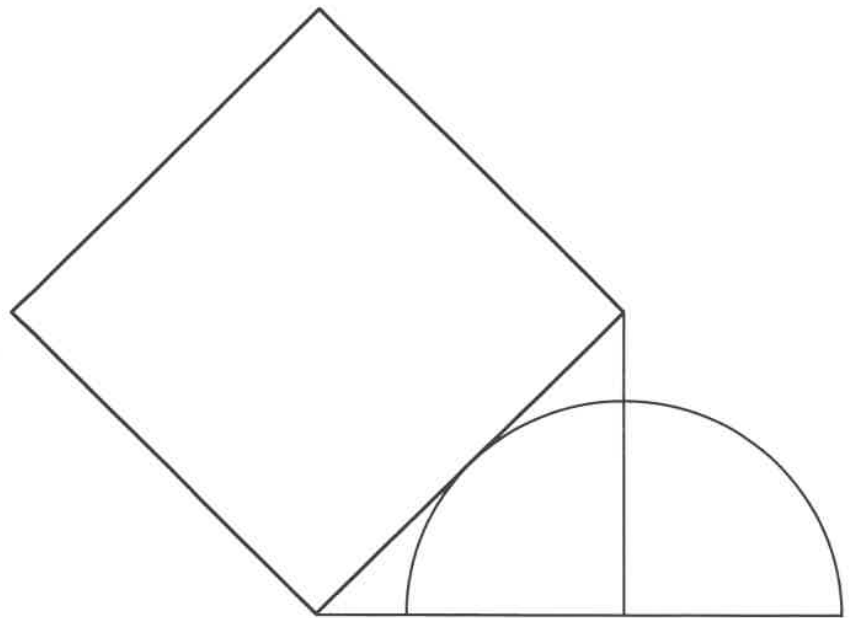
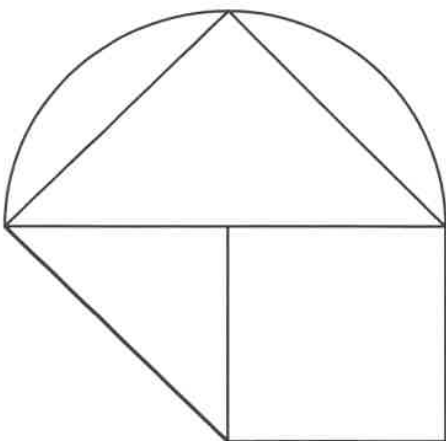
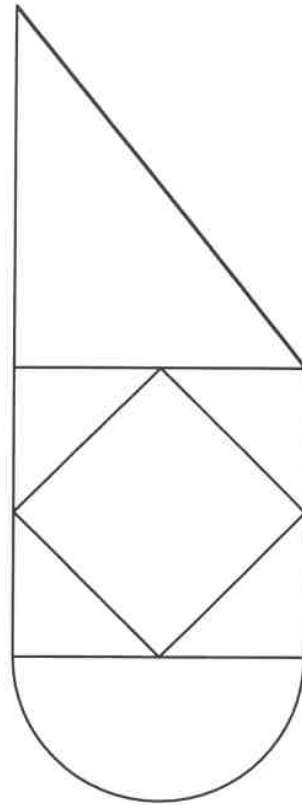
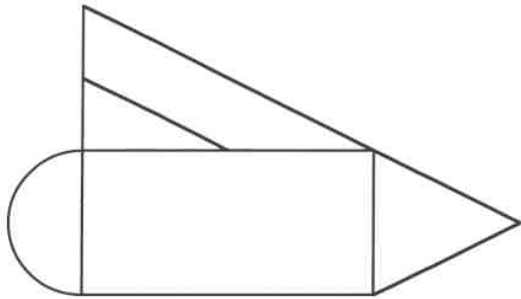
The student describes the figure fairly correctly but not unambiguously. From this follows that the fellow-students' figures might look different, although they have followed the instructions. The student uses an every day language, which makes the description longer than necessary. The student participates to a certain extent in the following discussions.

Pass with Distinction

The student describes the figure correctly and on the whole unambiguously. The student gives a planned description, which makes it possible for the fellow-students to draw the figure in an acceptable way. To a large extent the student uses mathematical terminology in the description. In the discussions after the fellow-students' descriptions the student brings forward ideas about how the description could have been made more unambiguous. The student can also adopt and meet the fellow-students' ideas about how the description could have been made more lucid.

Figures to model 3





Information to the student (model 1)

- This exercise is an oral sub-test included in the national test.
- Each one of you will get a sheet of paper with two geometrical figures. You will be allowed a few minutes for preparation.

Moment 1

- Every one of you reports to the others in the group. The matter is to describe equalities and differences between the figures e.g. concerning perimeter and area.
- After every report the fellow-students around the table should ask about anything that might have been unclear. They may also make additions from their own thinking about the two figures.

Moment 2

- When all have reported about their pair of figures you put all figures on the table. Look on the figures together and discuss equalities and differences between as many figures as possible. Present your own thinking, listen to the fellow-students and argue for your own ideas.
- It is important that you all participate as actively as possible.

Consider that this is an opportunity to show what you know, both in your own report, in the discussion after the reports of your fellow-students, and in the concluding discussion. You are assessed not only for being right or wrong but also for how well you adopt your fellow-students' ideas and how well you explain your thinking. Use the mathematical language as well as you can.

Information to the student (model 2)

- This exercise is an oral sub-test included in the national test.

Moment 1: Two students

- Two of you will get a piece of paper with a picture of a three-dimensional solid. You will also get a number of cards with geometrical concepts as e.g. rectangle, circle and vertex.
- You are together to choose the smallest number of concepts you think you need to describe your figure. You shall give reasons to each other for choosing those very concepts.
- It is important that you both participate as actively as possible and help each other to explain what meaning the concepts have for the solid you shall describe.
- When you are finished two fellow-students get the concepts you have chosen.

Moment 2: Two other students

- Supported by the concepts you get from your fellow-students you should *reason* to find what three-dimensional solid the concepts together describe.
- It is important that you both participate as actively as possible and help each other to explain what meaning the concepts have for the solid that is requested.

Moment 3: The whole group

- Finally the whole group discuss the result together with the teacher.

Consider that this is an opportunity to show what you know, both in your own report, and in the concluding discussion. You are assessed not only for being right or wrong but also for how well you adopt your fellow-students' ideas and how well you explain your thinking. Use the mathematical language as well as you can.

Information to the student (model 3)

- This exercise is an oral sub-test included in the national test.
- Each one of you will get a picture with a geometrical figure. You will be allowed a few minutes for preparation.

Moment 1

- Every one reports to the others in the group. The exercise is to describe a geometrical figure as clearly as possible to the others in the group. They will draw the figure with the help of your description.

Moment 2

- After every description you are together to compare the originals and the drawings and discuss if the descriptions possibly could have been done more clear with a more correct mathematical language.
- It is important that you participate as actively as possible and try to use the mathematical language as e.g. square, circle, and area when it is suitable.

Consider that this is an opportunity to show what you know both in your own report and in the discussions after your fellow-students' presentations. You are assessed not only for being right or wrong but also for how well you adopt your fellow-students' ideas and how well you explain your thinking. Use the mathematical language as well as you can.

Assessment matrix for oral test

Understanding

The assessment concerns to what extent

- the student shows an understanding for the task and for the mathematical concepts
- the student reflects upon and motivates her/his conclusions
- the student uses relations and generalisations.

Language

The assessment concerns to what extent

- the student's account is clear and distinct
- the student uses a correct mathematical terminology.

Participation

The assessment concerns to what extent

- the student contributes her/his own mathematically based ideas and explanations
- the student follows and tests explanations and arguments of others
- the student argues and carries the discussion forward.

	Qualitative levels		
Understanding	Shows some understanding for the task and for some mathematical concepts	Shows an understanding for and uses mathematical concepts. Knows how to motivate her/his conclusions	Shows a good understanding for mathematical concepts and relations between them. Motivates her/his conclusions
Language	Comprehensible and possible to follow but mainly colloquial language	Easy to follow. Includes an acceptable mathematical terminology	Well structured and clear with a relevant mathematical terminology
Participation	Takes some part in the discussion	Follows and tests others' explanations	Takes part of others' arguments. Carries the discussion forward