Directions

The test   The test is made up of 17 problems.

                     The problems that are short-answer type (the problems worth 1
                     point) requires, for the most part, only an answer.

                     Most of the problems are long-answer type (the problems worth
                     2 points or more)

                     With these problems, it is not enough with just a short answer, it
                     requires
                     • that you write down what you do and explain your train of
                       thought
                     • that you draw figures when needed
                     • that you write down all of your computations.

                     Try to work all of the problems. It can be relative easy, even at
                     the end of the test, to earn some points for a started solution or
                     presentation.

Assessment requirements Decided locally and are dependant on the assessment rules that
                     have been established at the school. The test gives a maximum
                     of 62 points in the recommended evaluation guide.

                     Recommendations for the minimum requirement for the course
                     grade
   • Passed (G):   20 points
                     • Passed with Distinction (VG):   41 points

1. Compute

a) $\dfrac{7.67 - 3.89}{1.50}$ (1p)

b) $\dfrac{38.94}{93.6 - 22.8}$ (1p)

2. In the movie theater, Rio, there is a rectangular film screen which covers 21 m^2.
The width of the screen is 6.0 m.
How high is it? (2p)

3. In the table and diagram, there is information on how Sweden's population and
Sweden's land area are distributed within the different parts of the country.
The information is taken from Statistisk årsbok 1995.

Population in the different parts of the country 12/31/1993	
Section	*Population*
Götaland	4 193 840
Svealand	3 340 238
Norrland	1 211 031
Entire country	8 745 109

Area

Götaland 21%

Svealand 20%
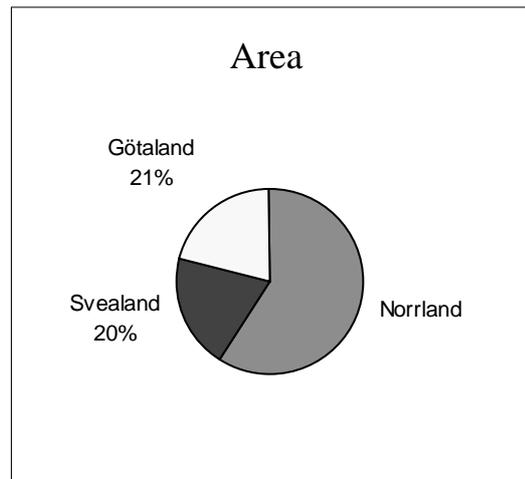
Norrland

Use the table and circle graph to answer the questions below.

a) The percent number for Norrland has been lost in the diagram.
   What percent of Sweden's area is located in Norrland? (1p)

b) What percent of Sweden's population lived in Norrland 12/31/1993? (2p)

c) On the last day of December 1982 the population of Svealand was 3 142 159.
   Eleven years later, it was 3 340 238.
   What was the percent of increase in Svealand's population during this time? (2p)

d) Götaland is more densely populated than Svealand.
   Use the information in the table and in the diagram to support this statement. (2p)

4. In order to connect to the computer net, INTERNET, a school paid costs according to the chart below. One day the school was connected between 08:00 - 08:30 and 09:30 - 14:15.

Time	Cost per hour (kr)
00:00 - 02:00	2.00
02:00 - 10:00	0.50
10:00 - 24:00	2.00

a) How many hours and minutes was the school connected during that day? (1p)

b) How much did the connection cost during that day? (2p)

5. Investigate what isosceles triangles, which have one angle $70°$, can look like.
Find the measures of the other angles in the triangles that you discover. (3p)

6. Solve the equations

a) $50x + 3 = 143$ (2p)

b) $3x + 8 = 2 - x$ (2p)

7. You are going to build an aquarium made of glass which holds about 160 liter.
Suggest some appropriate measurements.
Describe how you found those measurements and draw a sketch of the aquarium with your measurements. (3p)

8. a) Find a number that lies somewhere between 5×10^{-3} and 5×10^{-2}. (1p)

b) Find a number in fraction form which is larger than $\dfrac{3}{4}$ but smaller than 1. (1p)

9. A municipality wants to investigate how regularly people car-pool to work. They set up an investigation station beside the road towards the industrial area. There, the total number of people in the cars that passed were counted.
A partial result from the morning of December 19 is shown in the table.

Total number of people per car	Total cars
1	12
2	7
3	3
4	6
5	2

a) In how many of the cars were there more than one person? (1p)

b) Describe the investigation results with an approriate diagram. (2p)

c) When car-pooling was later discussed within the traffic authority, Gunnel and Robert had different understandings:

Gunnel: - The investigation shows that car-pooling is quite common, over 80%. There is obvioulsy no problem.

Robert: - I have a different oppinion. According to my calculations, only six out of every ten car-pool. This is not enough.

Can both of them be right? Justify your answer. (2p)

10. Outside a school, there is a rectangular lawn, 250 m long and 100 m wide. During a gym lesson, Eric measured the average length of his footstep to be 75 cm.

a) How many footsteps does Eric take if he walks from A to B along the edge of the lawn? (2p)

b) How many footsteps would he save by cutting across the diagonal from A to B instead of following the edge of the lawn? (3p)
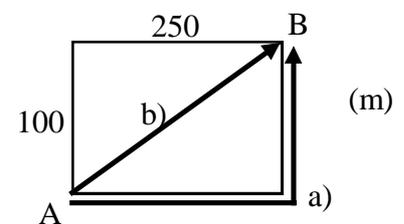
Note: The figure is not drawn to scale.

11. A company has eight employees.
They are 58, 27, 34, 32, 43, 27, 19 and 57 years old.

    a) Compute the mean age of the employees.   (1p)

    b) Compute the median age of the employees.   (1p)

    c) One of the employees leaves.
   Investigate how the age of the one who leaves affects the median value.   (2p)

12. Throughout history, mathematicians have tried to find a standard approximation for π.
Here are some of the values that have been used:

| Indians	Egyptians	Romans	Greeks
$\sqrt{10}$	$\dfrac{256}{81}$	$3\dfrac{1}{8}$	$\dfrac{22}{7}$

    a) Which value is closest to π and which is farthest from π?   (2p)

    b) Use the Egyptian´s value for π and compute the circumference of a circle with a diameter of 125 m.   (2p)

13. A geometrical method for finding an approximation for π is based on the figure below. There is a circle drawn with a center of A. In the figure, there is also an octagon drawn in. Each box in the figure is a square with a side length of 1 cm.

a) Find the octagon's area. (2p)

b) What approximate value for π do you get when you assume the circle's area is equal to the octagon's area? (2p)

+ A
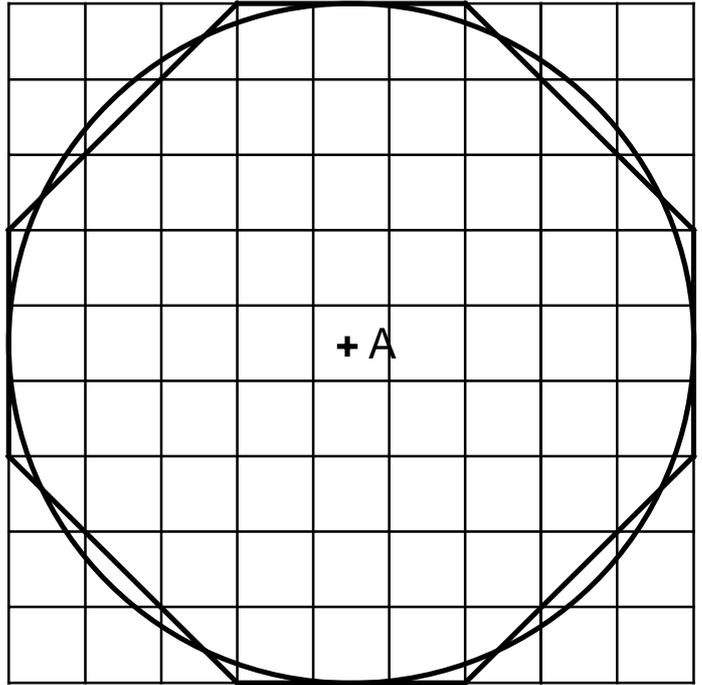
14. Amanda, Elin and Martin are classmates and live along the same road to school. All three walk to school every morning. They begin their first lesson at 8:15. The diagram shows how far each student is from the school at different times one morning.
Study the diagram and describe everything you can read from it. (4p)
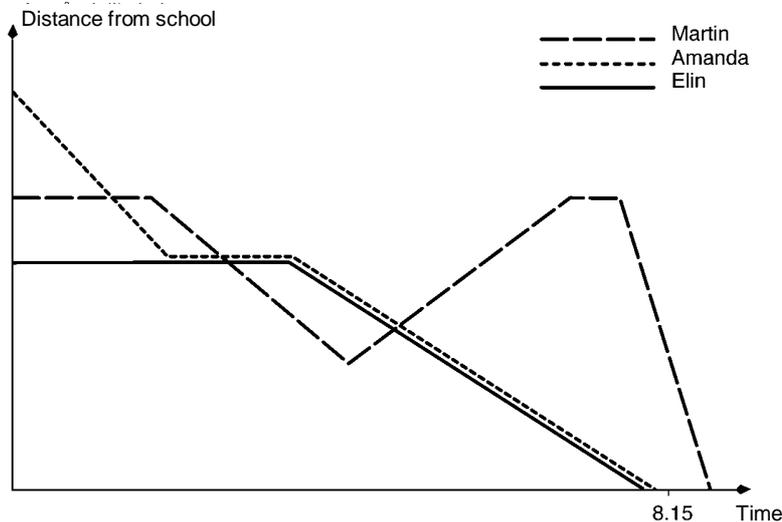
15. A truck's value, y kr, is assumed to be a function of the truck's age, x years, $y = 750000 \times 0.80^x$.

    a) How much did the truck cost when it was new? (1p)

    b) Motivate your answer in a). (1p)

    c) Describe how the truck's value changes with age. (2p)

16. The December issue of a magazine weighs 125 g. It is sent from the Post Office through a specific agreement. Each letter costs 2.58 kr. There is also a charge of 16 kr/kg for the whole shipment.

    a) How much does it cost to send out 5000 copies? (2p)

    b) Assume that it costs y kr to send out x copies of the December issue. State y as a function of x. (2p)

17. Eva has forgotten her new calculator at school. In order to do her homework, she must know the value of $\cos 32^o$.
Describe how she can find out that value with the help of a ruler and a protractor. (2p)