NATIONAL TEST
IN MATHEMATICS COURSE A

FALL 2001

Part I

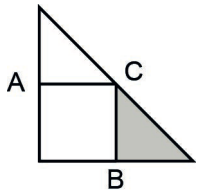
Instructions

Test period	180 minutes for Part I and Part II as a whole. We recommend that you use at the most 30 minutes to work with Part I. You must not use the calculator before you have handed in Part I.
Tools	Formula sheet and ruler.
Part I	Part I is composed of short answer items, which shall be solved without the use of a calculator. A correct answer gives 1 g-point (1/0) (Pass level) or 1 vg-point (0/1) (Pass with distinction level).
Mark limits	The test gives totally (Part I + Part II) at the most 63 points, out of which 29 vg-points. To pass the test you must have at least 18 points and to get the test character Pass with distinction you must have at least 34 points out of which at least 12 points on Pass with distinction level.

Name: _____ School: _____

Adult education/study program: _____

1. A, B and C are the midpoints of the sides.
How large part of the figure is shaded?



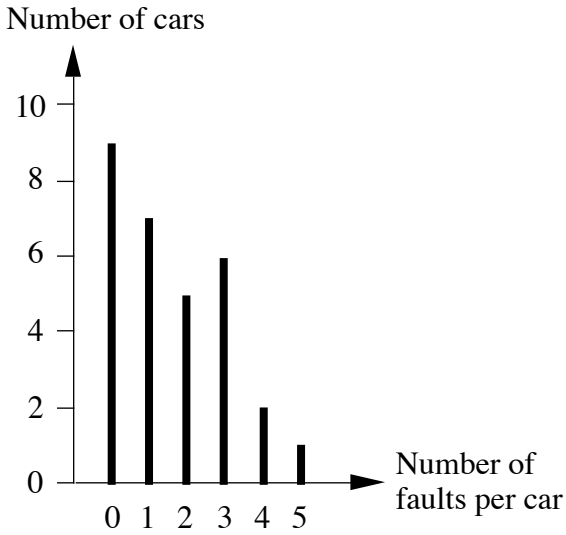
Answer:_____ (1/0)

2. $5 \cdot \frac{1}{4} =$ Circle your answer.

$\frac{5}{4}$ $\frac{6}{4}$ $\frac{21}{4}$ $\frac{5}{20}$ $\frac{1}{20}$ (1/0)

3. Andreas rides a bike 6 km in 20 minutes.
Find the average speed in km/h. Answer:_____km/h (1/0)

4. At one of Svensk Bilprovning´s (The Swedish Motor Vehicle Inspection Company) stations the number of faults per car were taken down during one day. The result is shown in the diagram below.



a) How many cars were examined this day? Answer:_____ (1/0)

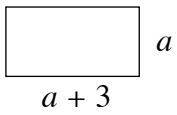
b) Find the median of the number of faults per car. Answer:_____ (1/0)

5. Solve the equation $7(x-3)=49$ Answer: $x =$_____ (1/0)

6. Linda put prices on all articles for sale in the shop.
She multiplied all old prices by 0.85.
Then she wrote a sign for the window.
What did she write on the sign?

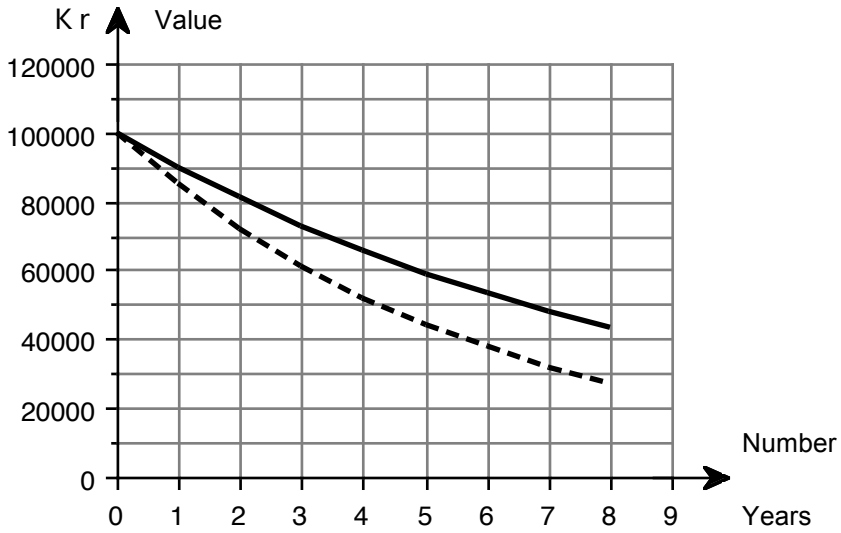
Answer: Discount _____ % (1/0)

7. Write an expression for the perimeter of the rectangle below.



Answer:_____ (1/0)

8. The price of a used car, which today costs 100 000 kr is expected to decrease. In the diagram is shown how the price changes if it decreases with 10 % respectively 15 % per annum.



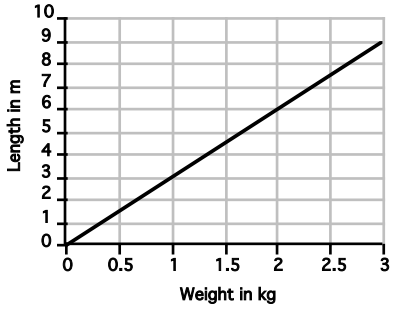
a) Which is the price after 3 years if the annual percentage decrease is 10 %?

Answer:_____ kr (1/0)

b) How much longer time is required to half the price when the annual percentage decrease is 10 % instead of 15 %?

Answer:_____ year (0/1)

9. The diagram shows the relation between the length and the weight of the cloth "Autumn leaves".



How long is a piece of cloth that weighs 5.0 kg? Answer:_____ m (0/1)

10. What is the value of $\sqrt{0.64}$? Circle your answer.

0.08 0.16 0.32 0.8 1.28 (0/1)

11. What is the relation between *a* and *b*?

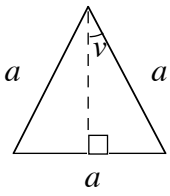
a	10	15	25	50
b	2	3	5	10

Answer:_____ (0/1)

12. What is the value of *x* when the equality is true?

$10 = \dfrac{10^3}{10^x}$ Answer: $x =$ _____ (0/1)

13. Find the angle *v* in the figure below.



Answer: $v =$ _____ degrees (0/1)

14. What number shall you put in the square to make the equality true for all numbers *a*?

$100 \cdot a = \dfrac{a}{\square}$ Answer:_____ (0/1)

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Part II

Instructions

Test period — 180 minutes for Part I and Part II as a whole. We recommend that you reserve at least 40 minutes to work with item 6.

Tools — Calculator, formula sheet and ruler.

Part II — Part II includes 9 items.

For most items a single answer is not enough. It is also expected
- that you write down what you do
- that you explain/motivate your reasoning
- that you draw any necessary illustrations.

For some items only an answer is required. They are marked with, *Only answer is required*.

After every item is given the maximum mark your solution can receive. (2/3) means that the item can give 2 g-points (Pass level) and 3 vg-points (Pass with distinction level).

Items marked with ¤ give you a possibility to show MVG-quality (Pass with special distinction quality). This means e g that you use generalised methods, models and reasoning, that you analyse your results and account for a clear line of thought in a correct mathematical language.

Item number 6 is a larger item that demands a longer time to solve than other items. It is important that you make a try to solve this item. Above the item is written what the teacher has to consider at the assessment.

Mark limits — The test gives totally (Part I + Part II) at the most 63 points, out of which 29 vg-points. To get the test character Pass you must have at least 18 points and to get the test character Pass with distinction you must have at least 34 points out of which at least 12 points on Pass with distinction level.

Write your name, adult education/study program and school on all sheets of paper you hand in.

Name: _____ School: _____

Adult education/study program: _____

1. The Trans-Siberian railway goes between Moscow and Beijing.

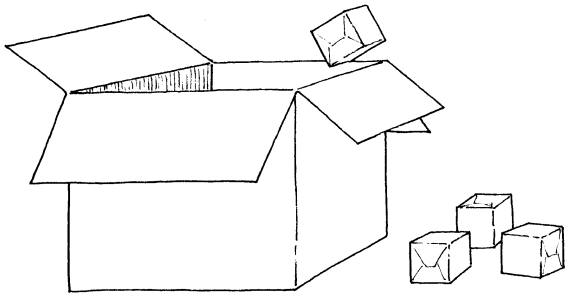
a) A train stopped in Omsk, where 43 passengers left the train and 77 entered it. When the train left Omsk there were 319 passengers on board. How many passengers were there when the train arrived in Omsk? (2/0)

b) The whole distance Moscow–Beijing is 7 800 km. To go by train this distance takes 5 days and 10 hours. Find the train's average speed in km/h. (2/0)

c) An express train is able to keep an average speed of 200 km/h. How long time should the train-journey take if one travelled by this train? (2/0)

2. A shop reduced the price on jeans, at first with 25 % and then with additional 25 %. Peter claimed that the price then had been reduced with a total of 50 %. Is Peter right? Motivate your answer. (1/1)

3. Small boxes with the external measures 4 cm × 4 cm × 4 cm are to be packed in a cardboard box with the internal measures 24 cm × 18 cm × 21 cm. How many small boxes can, at the most, be stored within the cardboard box? (1/2)



4.

Photo: Färjerederiet

A road ferry can carry cars, trucks and buses. The cargo capacity of the ferry can be described by a formula $a + 4b = 25$, where a is the number of cars and b is the number of trucks and buses.

a) Two buses drive on board the ferry. Then for how many cars is there room? (2/0)

b) Which is the largest number of cars the ferry can transport? (2/0)

c) How many cars can, by the formula, get room on the ferry instead of *one* bus? Motivate your answer. (1/1)

5. Yvonne and Inger play darts. Every series contains ten darts. After three series Yvonne has an average of 62 points. How many points must she have in the fourth series if the average result for the four series shall be 70 points? (0/2)

At the aspect evaluation of your work with this item the teacher will take into account

- what mathematical knowledge you have shown and how well you have carried out the task
- how well you have explained your work and motivated your conclusions
- how well you have accounted for your work and the quality of your diagram.

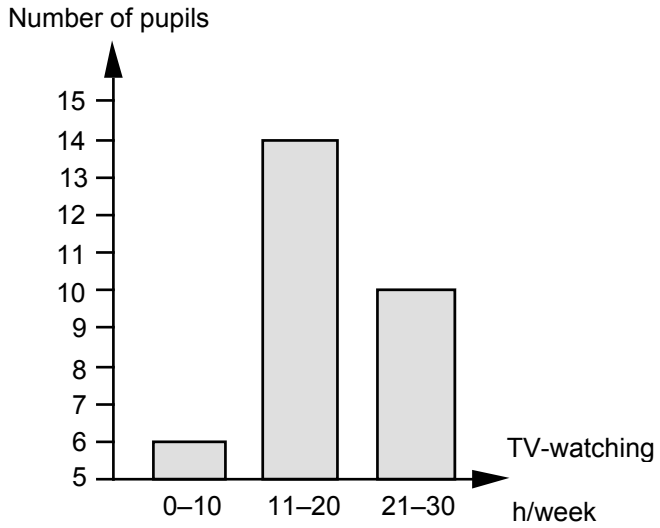
6. "How many hours weekly do you watch television?"

A class went through this study by taking notes of their own viewing time.

The class' results

0	16	18	19	12	6.5
19	20.5	7	5	21.5	18
21	12	22	14	19	17
8	24	11.5	23	28	21
23	18	22	12.5	19.5	2

One group in the class presented the result in the following diagram:



- The diagram is not totally correctly drawn. Draw a new diagram that shows the result in a better way.
- Investigate the diagram above and describe its mistakes and flaws. Also give an account for what uncertainties and misunderstandings these flaws might lead up to.

(5/5) ¤

7. The figure shows the first three of a set of patterns made of sticks.

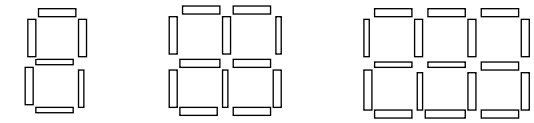


Figure 1 Figure 2 Figure 3

a) How many sticks are required to "build" figure 6? (2/0)

b) Investigate and describe in words or with a formula how many sticks that are required to "build" figure n. (1/1) ¤

c) One has 3 000 sticks and wants to build as large a figure as possible. How many sticks are left over? (0/2) ¤

8. Yngve lives on the Jormön. By measuring on the map he has calculated the length of the island to be 3.0 km. On the map the island is 3.0 cm long.

a) What scale does the map have? (1/1)

b) Yngve wonders how large the Jormön is. Since the island has an irregular form it is not easy to find its area. Yngve copies the island on a piece of board. On the board he also draws a square with the side 3.0 cm. Then he cuts out the island and the square and weighs them. The square weighs 6.5 g and the cut out island 1.6 g. Yngve calculates the island's area to 2.2 km^2. Is Yngve right? Motivate with calculations and reasoning. (1/2)

c) Yngve has a theory. He is of the opinion that the longer perimeter an island has the larger is its area. Is Yngve's theory correct? Motivate your answer. (0/2) ¤

9.

Wolfgang Amadeus Mozart wrote music from the time when he was a child until he died at the age of 35 years.

In the table you can see how many works Mozart had composed at some different ages (x = the age of Mozart and y = the number of works).

x	8	12	16	20	24	27	32	35
y	16	45	133	250	338	425	551	626

a) How many works did Mozart compose from the age of 8 years to the age of 12? *Only answer is required*. (1/0)

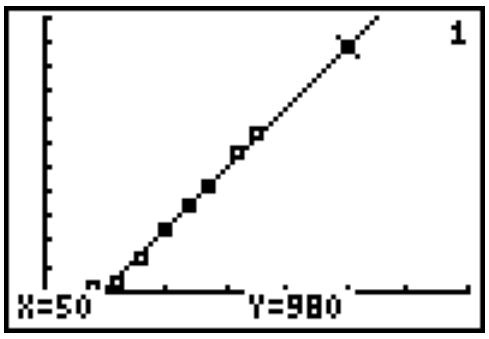
b) Estimate how old Mozart was when he wrote his work number 525, Eine kleine Nachtmusik. Make a clear account. (1/1)

c) Explain why Agnes and Isabel got different answers when they solved the task below. (0/2) ¤

Imagine that Mozart had become 50 years old and kept on composing at the same pace. How many works would he then have composed?

Agnes´ solution

I did the following solution on my calculator:



I plotted the different values as points in a coordinate system, adapted a line between the points and read what value y gets when x is 50.

Answer:
He would have composed about 980 works.

Isabels´ solution

Every year he wrote on an average

$$\frac{626}{35} \approx 17.9$$

Answer:
He probably would have composed $17.9 \cdot 50 = 895$ works.

