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**National Test in
MATHEMATICS
COURSE A**

Autumn 2008

Part II

Instructions

Time 120 minutes for Part II.

Aids Calculator, approved formula page and ruler.

Part II Part II consists of 9 questions. Most of the questions require not only an answer, you must also

- write your solution
- explain your line of thought and reasoning so that it is easy to follow
- draw clear figures when needed.

Some questions require only the answer. These are indicated by the text “*Only answer is required*”.

After each question the maximum number of points available for your solution is shown. For example (2/3) indicates that the question can give 2 g-points and 3 vg-points.

In questions marked **M** you have an opportunity to demonstrate MVG-quality. This means that you use general methods, models and reasoning, that you analyse your results and present a clear line of thought with correct mathematical language.

| | |
|---------|--|
| Grading | The test (Part I + Part II) gives a total maximum of 61 points, of which 28 are vg-points. |
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Lower limits for examination grade

Pass: 19 points

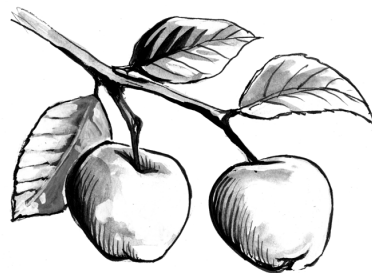
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|------------------------|--|
| Pass with distinction: | 35 points of which at least 11 vg-points |
|------------------------|--|

Pass with special distinction: At least 19 vg-points. In addition you must demonstrate several of the MVG-qualities that are possible to show in the questions marked **☆**.

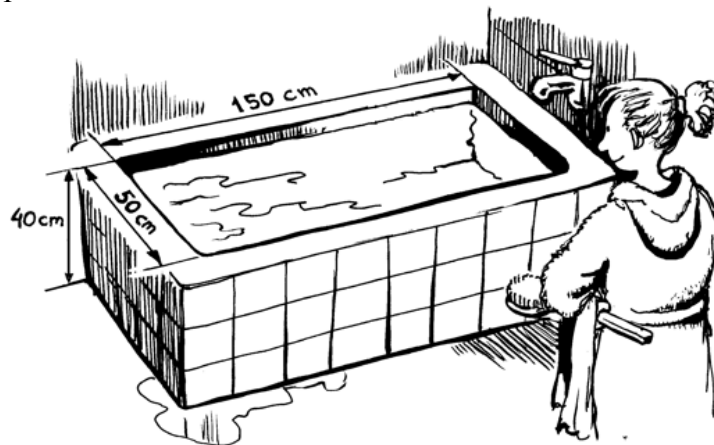
Write your name, date of birth, and adult education/secondary school program on the papers you hand in.

1. Daniel's neighbour bought a carton containing 18 eggs for 35.60 SEK. Daniel goes to his neighbour and asks if he may buy 5 eggs. How much should Daniel pay for the eggs? (2/0)
2. In 2005 Sweden had about 9 million inhabitants. That year 78 % of Sweden's population had Internet in their homes. 74 % of these had a fixed connection. How many people had access to Internet via a fixed connection? (2/0)
3. In 2007 the price of apples in six European countries is compared. The prices are given in Swedish crowns (SEK).

| Country | Price (SEK/kg) |
|---------|----------------|
| Sweden | 22.95 |
| Holland | 12.85 |
| England | 18.74 |
| France | 22.11 |
| Norway | 28.63 |
| Denmark | 16.53 |



- a) What is the average price of one kilogram of apples in these countries? (2/0)
 - b) How many kilograms of apples can you buy for 100 Swedish crowns in Denmark? (1/0)
 - c) How many percent more expensive are apples in the most expensive country compared with the cheapest country? (1/1)
4. Milla, who is 15 years old and weighs 50 kg, is going to take a hot bath. She fills the bathtub up to 5 cm from the top. Then she submerges her entire body into the water in the tub. Will the tub run over? Explain your answer with calculations. You may assume that one kilogram body weight corresponds to a volume of 1 litre. (2/1)



5. In the late summer and fall of 2000 it rained a lot at many places in Sweden. In the diagram below you can see the water level in Lake Vänern for the period July 1, 2000 to December 16, 2000 compared to the mean water level.



- a) How much higher than the mean water level was the water level on November 18? *Only answer is required.* (1/0)
- b) From the beginning of November to the middle of December the water level rose rather regularly. By how much did the water level rise per day on the average during this period? (1/1)
- c) To what level would the water have risen by the end of the year if it had continued to rise at the same rate? (1/1)



6. A company “Merry Christmas” makes plastic Christmas trees. They have three different standard models described in the table below.

| Model | Height | Greatest circumference | Number of lights | Price |
|--------|--------|------------------------|------------------|---------|
| Small | 8 dm | 16 dm | 64 pcs. | 192 SEK |
| Medium | 12 dm | 24 dm | 144 pcs. | 312 SEK |
| Large | 20 dm | 40 dm | 400 pcs. | 600 SEK |

- a) What is the greatest diameter of the large plastic tree? (1/0)
- b) Each light costs 0.50 SEK. What fraction or percentage of the price of the small tree is the cost of the lights on it? (2/0)
- c) To calculate the price of the trees, P , the formula $P = 20a + 0.5b$ is used. What might the letters a and b stand for? Show that your interpretation of the letters works for the smallest tree. (0/2)
- d) The company “Merry Christmas” is going to start producing a new tree model that is 150 cm high and has the same shape as the other trees. How many lights will the new model need to have if the lights are to be placed at the same closeness to each other as on the other trees. (0/2) ❏



7. In a language course there were 16 participants. Of these, 10 persons paid full price while 2 persons got a 25 % discount on the course fee since they had participated in other courses. Four persons were under 18 and paid half price. In total the participants paid 16 200 SEK. How much did young people under 18 pay as course fee? (1/1) ❏

8. Cats can grow quite old, it is not unusual that they live to 20 years of age. A cat ages faster than a human. To compare a cat's age with that of a human, one may use various models. In the table you can see a cat's age compared to that of a human according to model A.

Another way to make a comparison is according to model B, in which each year corresponds to seven cat years.

- a) Copy this table and calculate the missing values. *Only answer is required.*

(1/0)

| No. of years | 0 | 1 | 2 | 3 | 4 | 5 |
|--------------------|---|----|----|----|----|----|
| Cat's age, model A | 0 | 15 | 24 | 28 | 32 | 36 |
| Cat's age, model B | 0 | 7 | | | | |

- b) Draw a coordinate system with the number of years on the x -axis and the cat's age on the y -axis. Make two graphs in your coordinate system, one for model A and one for model B.

(1/1)

- c) After how many years do the two models give the same age for a cat?

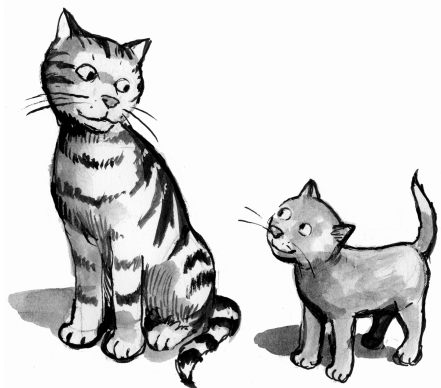
(0/1)

- d) Write a formula that holds from year 2 for each of the models.

(0/2) ☐

- e) Compare the two models for a cat's life span. Which of the models is the most reasonable? Defend your conclusions.

(0/1) ☐



9. A triangle has a perimeter of 24 cm. One of the sides of the triangle is 10 cm. Investigate how long the other sides of the triangle might be. Explain using figures, calculations and reasoning.

(2/2) ☐