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**National Test in
MATHEMATICS
COURSE A**

Spring 2009

Part II

Instructions

Time 120 minutes for Part II.

Aids Calculator, approved formula page and ruler.

Part II Part II consists of 11 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

Pass with distinction:	35 points of which at least 12 vg-points
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Pass with special distinction: At least 20 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. Dennis worked 2.5 hours and earned 155 SEK. How much would he earn if he worked 4.5 hours at the same hourly wage? (2/0)
2. Throughout history mathematicians have tried to reach a good approximate value for the number π . Here are some of the values that have been used.

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

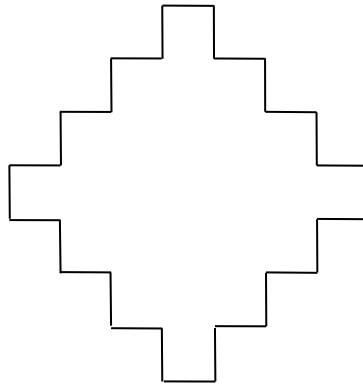
- a) Which value is closest to π and which one is the farthest from π ? (3/0)
- b) A wagon wheel has a diameter of 125 cm. The circumference is to be calculated. How many centimetres longer will the value for the circumference be if you use the Egyptian value instead of π ? (1/1)



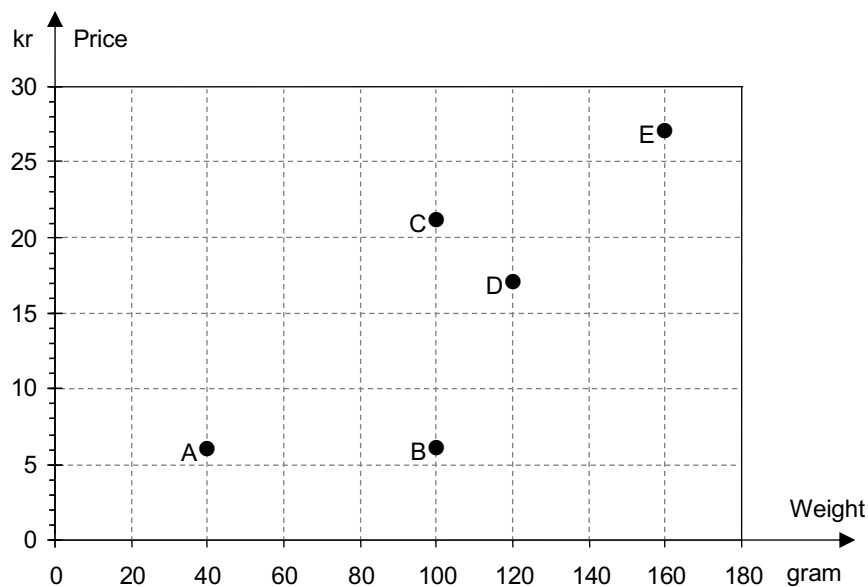
3. You are to calculate $\frac{284}{56.7 - 4.2}$ on your calculator. Suppose you get the result 0.81. Your classmate Hanna has no calculator and says that your answer is unreasonable. How can Hanna see that? (1/1)

4. In a dance club with 40 members, 60 % of the members are girls. 8 new members join the club. All of the new members are boys. What percentage of the club members are girls now? (2/1)

5. The perimeter of the figure is 42 cm. All of the “short sides” in the figure are the same length and all angles are right angles. Find the area of the figure. (2/1)



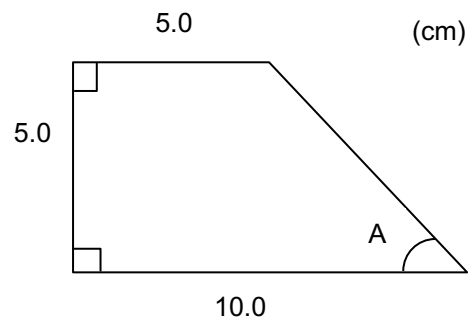
6. A store makes a survey about the weight and price of chocolate bars. The results are shown in the following diagram.



- a) Which of the chocolate bars weigh the same? *Only answer is required.* (1/0)
- b) Which chocolate bar has the highest price per kilogram? Explain how you reach your answer. (1/1)

7. Show by calculations and/or reasoning that angle A is 45° .

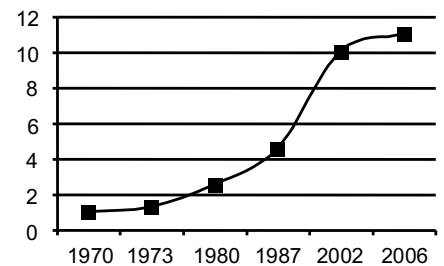
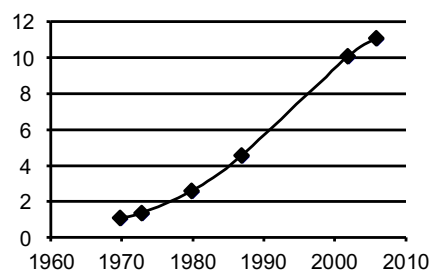
(1/1) 



8. Robert investigates how much ice cream bars costs in different years. He wants to make a graph showing how the price changes and uses a spreadsheet program to do this. He makes two diagrams that look different.



Diagram 1



- a) Which diagram is unsuitable and why?

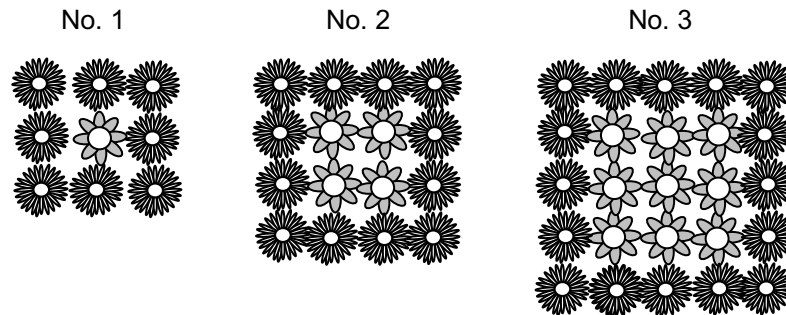
(0/1)

	A	B	C	D	E	F	G
1							
2							
3		Price for an ice cream bar with chocolate					
4		Year	Price (kr)				= (c10-c5)/(b10-b5)
5		1970	1,00				
6		1973	1,25				
7		1980	2,50				
8		1987	4,50				
9		2002	10,00				
10		2006	11,00				
11							

- b) Robert does a calculation in his spreadsheet program in cell G4. What has he calculated and how much will it be?

(0/2)

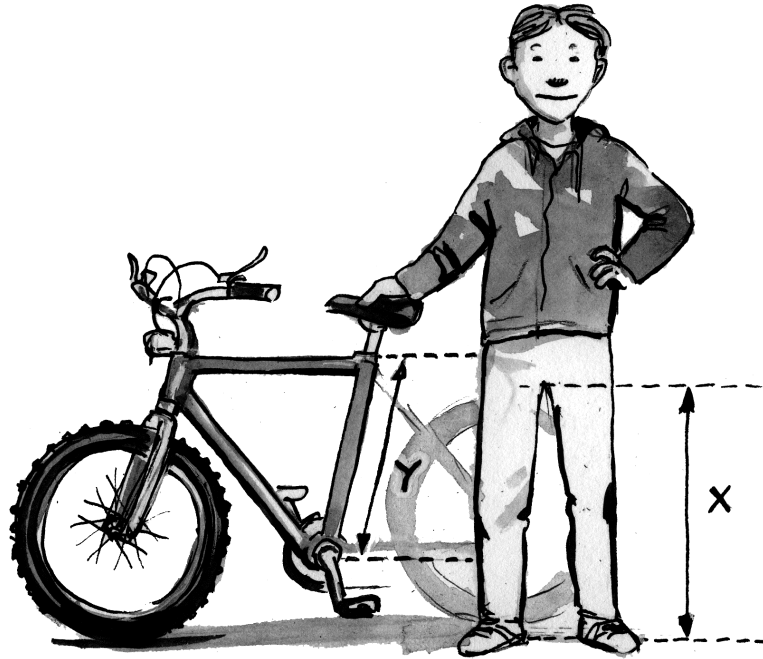
9. In a park there are flowerbeds of different sizes. In each flowerbed there are two kinds of flowers. In the figures the middle flowers are marked as  and the edge flowers are marked as .



- a) How many edge flowers are there in bed no. 5? Explain your answer. (1/0)
- b) Lovisa has 32 edge flowers. How many middle flowers are needed to make this flowerbed? Explain your answer. (2/0)
- c) Lovisa figured out that the expression $n^2 + 4n + 4$ can be used to calculate the sum of the number of edge flowers and the number of middle flowers, where n is the number of the flower bed. Explain your reasoning to show why this expression is correct. (0/2)



10.



The size of a bicycle is determined by the length of the seat tube. In order to know what size of bicycle you should buy you can measure the inner leg length for the person who is to use the bicycle. Then you can calculate the best size of bicycle in two different ways:

Formula A: $y = x - 23$

Formula B: $y = \frac{2x}{3}$

x is the inner leg length in cm and y is the length of the seat tube in cm. The formulas hold for inner leg length between 30 cm and 90 cm.

- a) Marcus is going to buy a bicycle and his inner leg length is 63 cm. Use formulas A and B respectively to calculate what length Marcus should have for his seat tube. *Only answer is required.*

(2/0)

- b) What inner leg length gives the same seat tube length no matter which of the two formulas you use?

(0/2) ☐

11. Linda and Maria started a business together. They both put in the same amount of money. Linda's money was not enough for her share of the starting capital, she had to borrow an amount corresponding to 20 % of the money she had from the beginning. Maria on the other hand had 10 % of her own money left. So Maria of course had more money than Linda from the beginning. What percentage more?

(1/2) ☐

