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**National Test in
MATHEMATICS
COURSE A**

**Autumn 2009
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 solutions
- 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 \boxtimes 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 60 points, of which 26 are vg-points.

Lower limits for examination grade

Pass: 20 points

Pass with distinction: 34 points of which at least 10 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 \boxtimes .

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

1. Calculate: $\frac{5661}{1.85 \cdot 45}$ Only answer is required. (1/0)

2. Human hair grows about 0.35 mm/day.

a) About how much does a strand of hair grow in a month? (1/0)

b) One strand of Adam's hair is 5.6 cm long. How long does it take until that hair strand will be twice as long? (2/0)

3. Malin made a survey about how many films her classmates watch in a week.

Number of films per week	1	2	3	4	5
Frequency	III	IIII III	IIII I	II	I

When Malin calculates the mean she looks at her frequency table and does the following calculation:

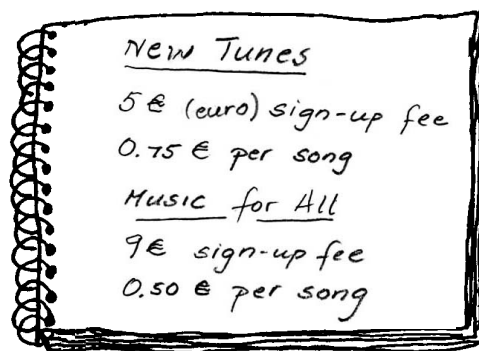
$$3 + 8 + 6 + 2 + 1 = 20 \quad 20/5 = 4$$

Answer: The mean is 4 films per week

a) Explain how you can see at once that this must be wrong. (1/0)

b) Calculate the correct mean. (2/0)

4. Hanna compares how much it costs to download music from two different web sites.



a) Hanna wants to download 8 songs. Which web site should she choose to buy them as cheaply as possible? (2/0)

b) Write a formula that represents the cost of downloading songs from New Tunes. (1/1) ✖

c) For what number of songs is the cost of downloading the same for both web sites? (1/1) ✖

5.

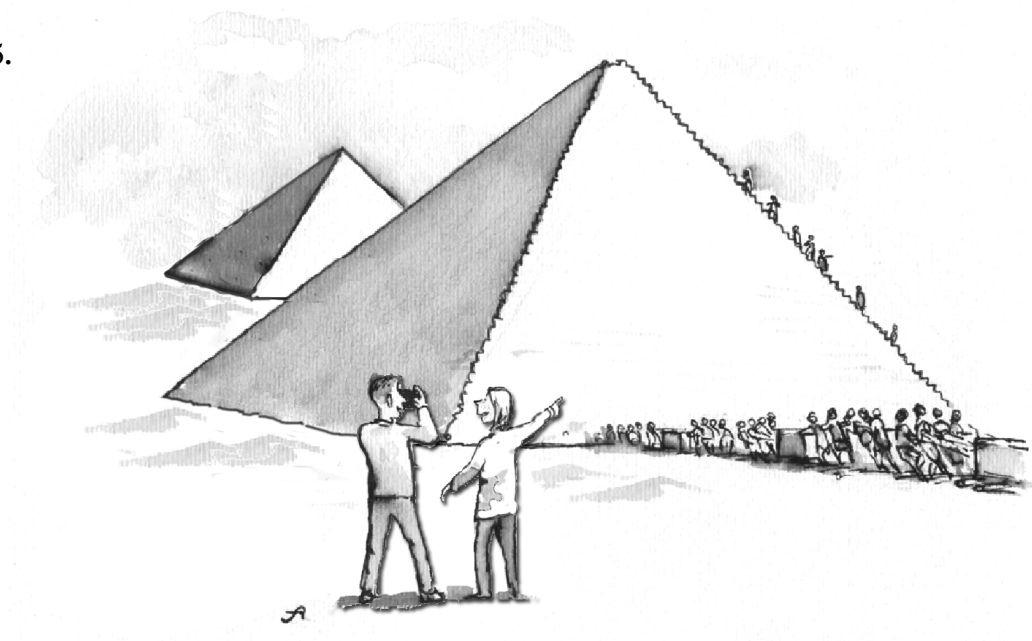
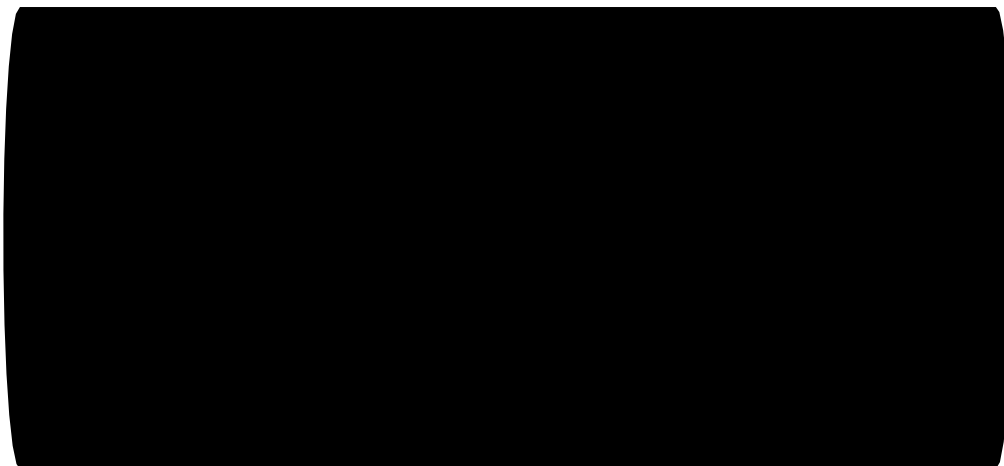


Illustration: Jens Ahlbom

Linda and Andreas were in Egypt. There they walked up along the edge of a pyramid. Each step was 20 cm high. Their path is described by the diagram below.

Number of steps



Time

- How many steps had Linda done after 12 minutes? *Only answer is required.* (1/0)
- Study the diagram and describe carefully, but briefly, Andreas' path to the top. (2/1)

6. A sports club arranged a party. The admission fees were 10 kr for youth and 20 kr for adults. 108 people came to the party and the total income from admission fees was 1 400 kr. One member set up the following equation:

$$10 \cdot x + 20 \cdot (108 - x) = 1400$$

- a) What does $(108 - x)$ stand for in the equation? *Only answer is required.* (0/1)
- b) Solve the equation: $10 \cdot x + 20 \cdot (108 - x) = 1400$ (1/1)

7.

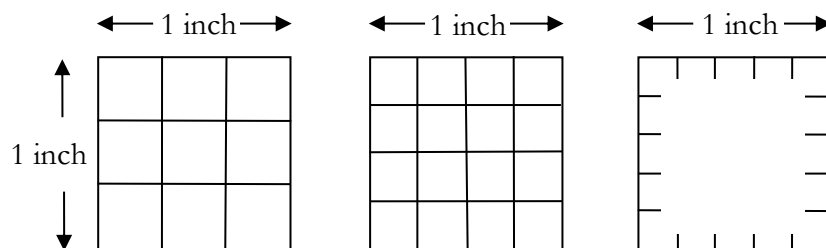


10 ppi

30 ppi

100 ppi

In order for a photo from a digital camera to be clear it must consist of many image points, called pixels. As a measure of how good the resolution of the photo is you can state the number of pixels per inch (1 inch \approx 2.54 cm). The number of pixels per inch is abbreviated as ppi (pixels per inch). You measure along one side.

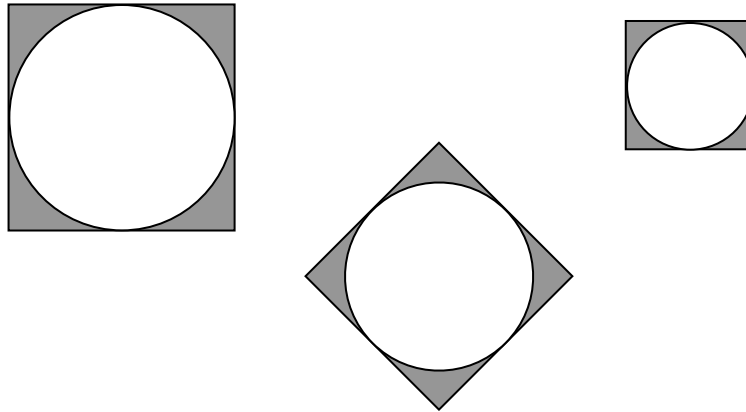


Resolution:	3 ppi	4 ppi	5 ppi
Number of image points:	9 pixels	16 pixels	? pixels

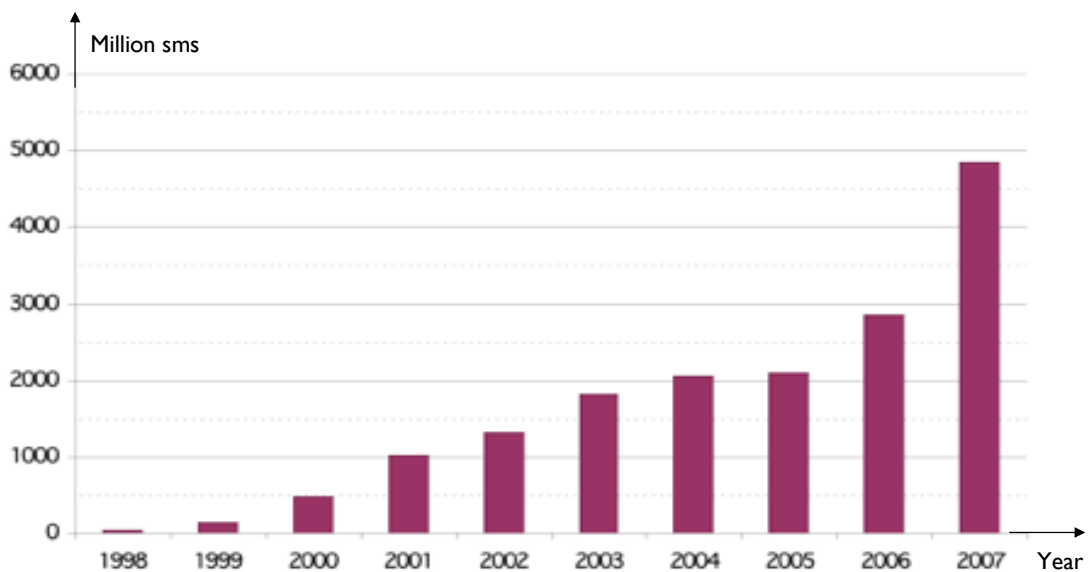
- a) How many pixels are there in the square with resolution 5 ppi? *Only answer is required.* (1/0)
- b) The middle photo of the girl above is 2 inches \times 2 inches. Calculate the number of pixels. (1/1)
- c) Suppose you print a 13 cm \times 10 cm photo with resolution 500 ppi. How many pixels does this photo have? (0/2)

8. Rebecca has square silver plates of *different sizes*. From these she wants to cut out circular silver trays as shown in the figures. Investigate what percentage of the silver plate will be left over. Present your conclusions using calculations and reasoning.

(1/2) ✖



9. The number of text messages (sms) sent from cell phones in Sweden during the years 1998 to 2007



Source: Post och Telestyrelsen

- a) About how many sms were sent in Sweden in 2007? Give the answer in billions. *Only answer is required.*

(1/0)

b) Anton claims that according to the diagram the increase was greatest from 2006 to 2007. But Jonatan does not agree. Jonatan says that the increase is greatest from 1999 to 2000. Explain how they might have reasoned. Write your solution account using explanations and calculations.

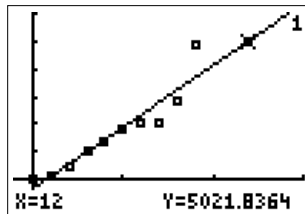
(1/2)

c) Anton and Jonatan also get different answers when they try to estimate how many sms will be sent in 2010. Explain why Anton and Jonatan get different answers.

(0/2) ✖

Anton's solution

I made the following calculation on my calculator:



I marked the different numbers as points, fitted a line to these points, and read off what the y -value would be when x is 12.

Answer

In 2010 about 5 000 million sms will be sent.

Jonatan's solution

sms-increase, on the average, is

$$\frac{4\,900 - 2\,100}{2} = \frac{2\,800}{2} = 1\,400$$

Answer

The number of sms in 2010 will be about $4\,900 + 1\,400 \cdot 3 \approx 9\,100$ million.