

## Instructions – Part II

**Time** 120 minutes for Part II.

**Aids** Calculator, approved formula page and ruler.

**Part II** Part II consists of 10 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 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 (2/1) indicates that the question can give 2 g-points and 1 vg-point.

In questions marked  $\alpha$  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 27 are vg-points.

*Lower limits for examination grade*

Pass: 19 points.

Pass with distinction: 35 points of which at least 9 vg-points.

Pass with special distinction: At least 18 vg-points. In addition you must demonstrate several of the MVG-qualities that are possible to show in the questions marked  $\alpha$ .

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

Illustrations: Jens Ahlbom

1. Calculate  $\frac{5\ 656}{305 - 52.5}$

*Only answer is required.*

(1/0)

2. In a sports club 120 of the members play soccer. This is 40 % of all the club members. How many members are there in the club?

(2/0)

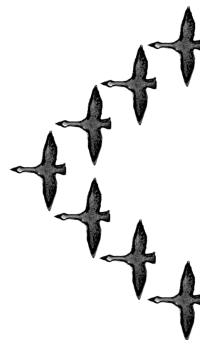
3. When fall comes, migrating birds fly to warmer countries. The migrating birds fly in a V-formation. The figures below show such patterns when 3, 5 and 7 birds fly together.



No. 1



No. 2



No. 3

- a) How many birds would there be in figure No. 6?  
*Only answer is required.*
- b) What figure number would the V-formation have which has 37 birds flying in it?
- c) State a relationship between the number of flying birds (B) and the V-formation's number ( $n$ ). *Only answer is required.*

(1/0)

(1/0)

(0/1)

4. The table shows the estimated changes in the earth's population for the year 2010.

|        | Born        | Dead       | Increase   |
|--------|-------------|------------|------------|
| Year   | 131 940 516 | 56 545 138 | 75 395 378 |
| Month  | 10 995 043  | 4 712 095  | 6 282 948  |
| Day    | 361 481     | 154 918    | 206 563    |
| Minute | 251         | 108        | 143        |
| Second | 4.2         | 1.8        | 2.4        |

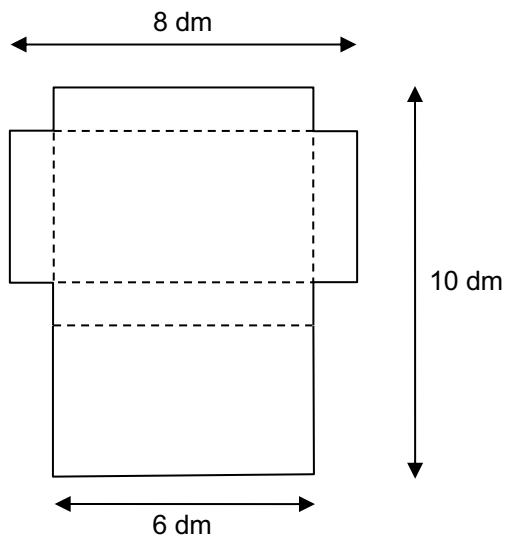
Source: U.S. Census Bureau

- a) In Sweden there are about 9 million people. Use the table and calculate about how long it takes for the population of the earth to increase by 9 million. (1/1)
- b) Pelle claims: "For every breath I take there is about one new person born." Can Pelle be right? Explain your answer. (0/1)
5. Hanna compares how much it costs to download music from two different web sites.



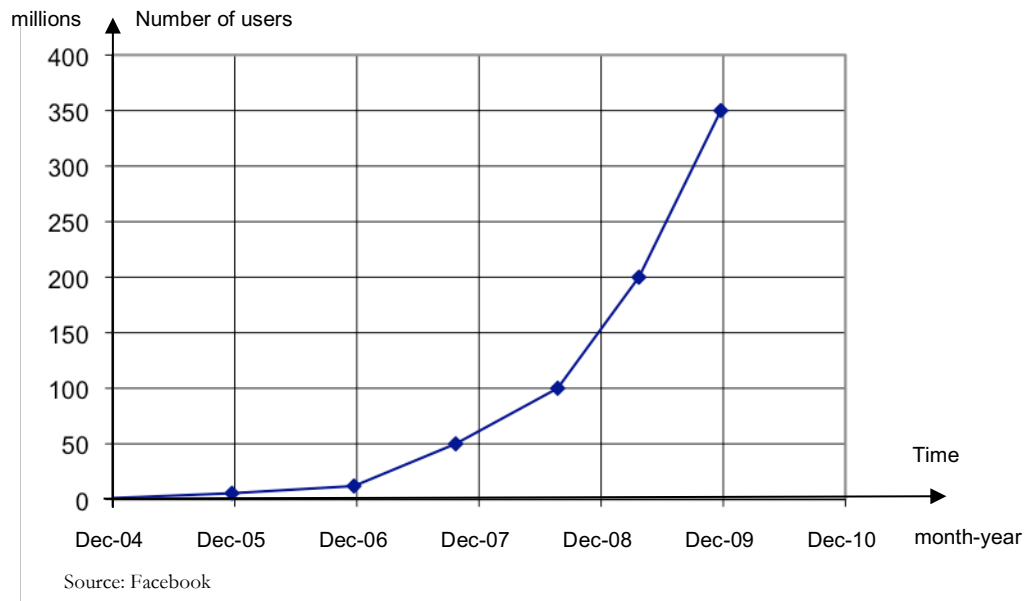
- a) Hanna wants to download 8 songs. Which web site should she choose to buy them as cheaply as possible? (2/0)
- b) Write a formula that represents the cost of downloading songs from New Tunes. (1/1)
- c) For what number of songs is the cost of downloading the same for both web sites? (1/1) ✖

6. The figure shows a drawing of a box (a parallelepiped).  
The figure is not drawn in true scale.



- a) Draw a picture of how the box will look when it is folded up properly.  
Mark the lengths of the sides. (2/0)
- b) Another box is to have twice the volume of this one. How long should the sides be? Explain your suggestion. (1/1)
7. The median for four numbers is 10. Three of the numbers are 8, 3 and 12.  
What values can the fourth number have? (1/1)

8. More and more people use Facebook. The line diagram shows about how many users there were in the world at different times.

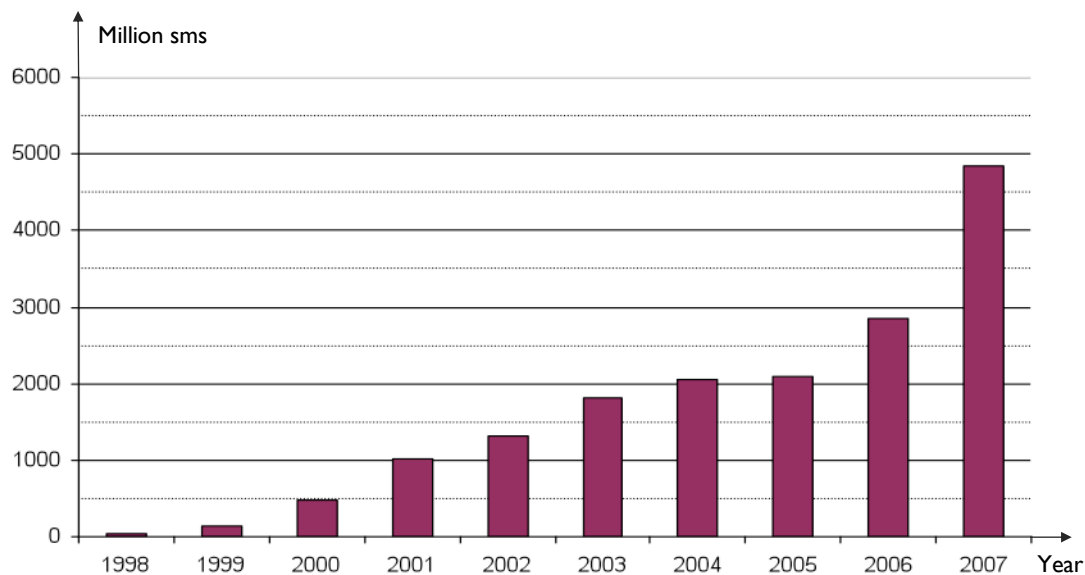


- a) The number of users in December 2004 was about 1 million. What was the average increase per year in the number of users in the world from December 2004 to December 2007? (2/0)
- b) In December 2009 the number of Facebook users in Sweden was about 2.1 million. How many per mille is this of all Facebook users in the world? (2/0)
- c) In November of 2007 the number of users in Sweden was 1 million. The number of users had by then increased by 400 % from September to November. How many users were there in September 2007? (0/2)

9. In the equation  $\frac{15}{c} = \frac{d}{4}$   $c$  and  $d$  are positive integers.

- a) Give *one* suggestion for what values  $c$  and  $d$  might have so that the equality holds. (0/1)
- b) Investigate what values  $c$  and  $d$  can have so that equality will hold. (0/1)□

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

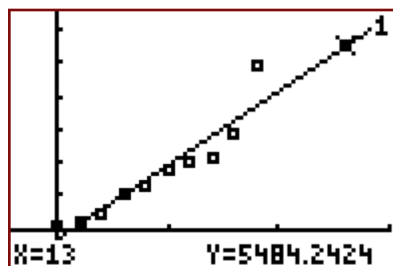


Source: Post och Telestyrelsen

- 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 2011. 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 13.

Answer: In 2011 about 5 500 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 2011 will be about:

$$4\,900 + 1\,400 \cdot 4 \approx 10\,500 \text{ million}$$

