

Mathematics

A

Spring 2012

This test will be re-used and is therefore protected by **Chapter 17 paragraph 4 of the Official Secrets Act**. The intention is for this test to be re-used until **2018-06-30**. This should be considered when determining the applicability of the Official Secrets Act.

Part II

Time: 120 minutes

Name

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 $\boxtimes$ 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: 18 points.

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

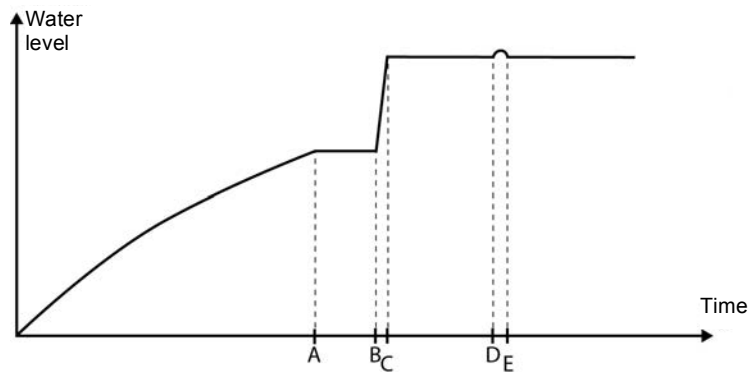
Pass with special distinction: At least 18 vg-points. In addition you must demonstrate several of the MVG-qualities that are possible to show in the questions marked $\boxtimes$.

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

Illustrations: Jens Ahlbom

1. Ludvig worked 2.5 hours and earned 180 kr. How much would he earn if he worked 4.5 hours at the same hourly wage? (2/0)

2. Sara is going to take a bath. The graph shows the water level in the bathtub.



- a) What happens at time A?
 b) What happens between times B and C?
 c) Give a reasonable possible explanation for what happens between times D and E.



3. Below you can see a pattern with dots. For each figure the number of dots increases as shown in the figures.



Figure 1

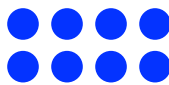


Figure 2

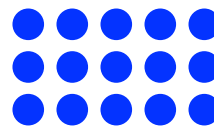
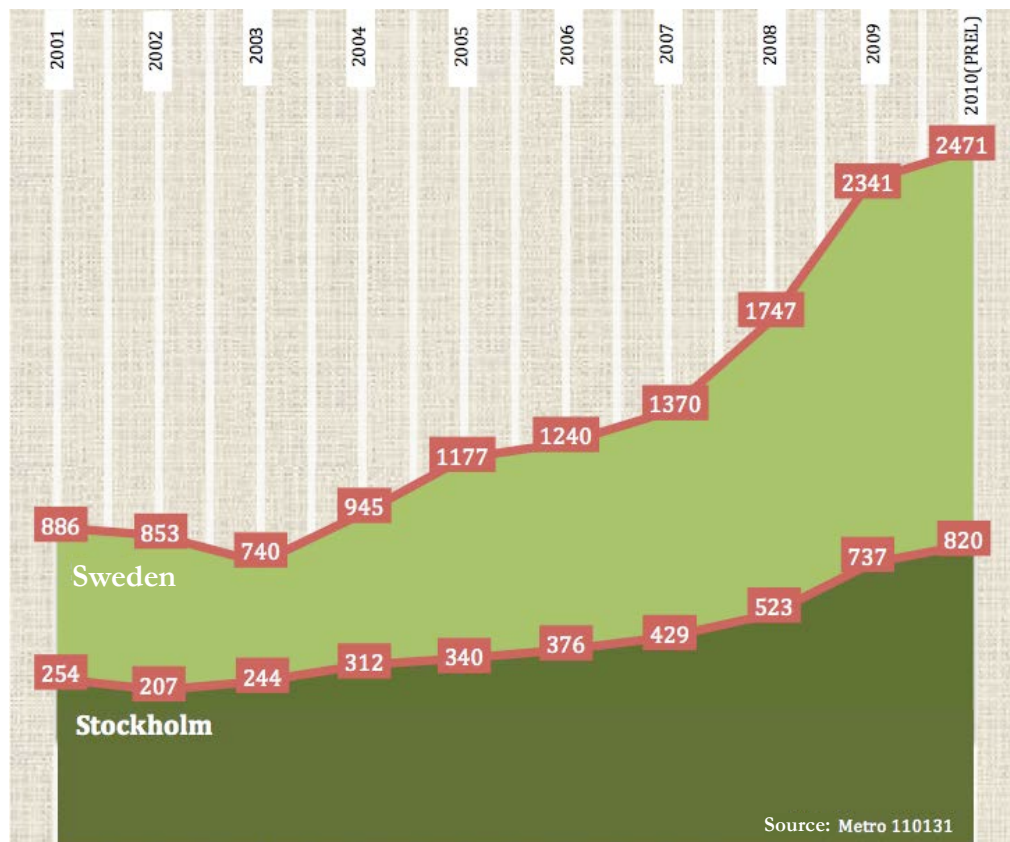


Figure 3

- a) How many dots are there in figure 4? *Only answer is required.* (1/0)
 b) In figure 19 there are 399 dots. How many dots are there in figure 20? Explain your answer. (1/1)
 c) Do any of the figures in this pattern have exactly 1 000 dots. Explain your answer. (1/1)

4. Therese is going to do a project about kidnappings and threats. She finds a diagram in a newspaper. According to the newspaper the diagram shows the number of reported kidnappings and threats per year.



- a) The article states that the number of kidnappings and threats in Sweden has increased by 179 percent over the years 2001–2010. Show that this is true.

(1/1)

- b) Therese claims that the diagram in the newspaper is erroneous.

"I do not want to use this diagram. It looks as if in 2001 there were twice as many kidnappings and threats in Sweden as in Stockholm. That cannot be true."

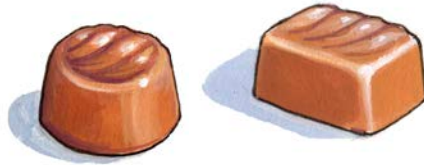
Explain what is wrong with the diagram.

(1/1)

5. A chocolate factory sells chocolates in boxes of different sizes. In each box there are two kinds of chocolates and the ratio of the quantities of these two kinds is 3:5.

a) How many chocolates are there of each kind in a box containing 16 chocolates? (1/0)

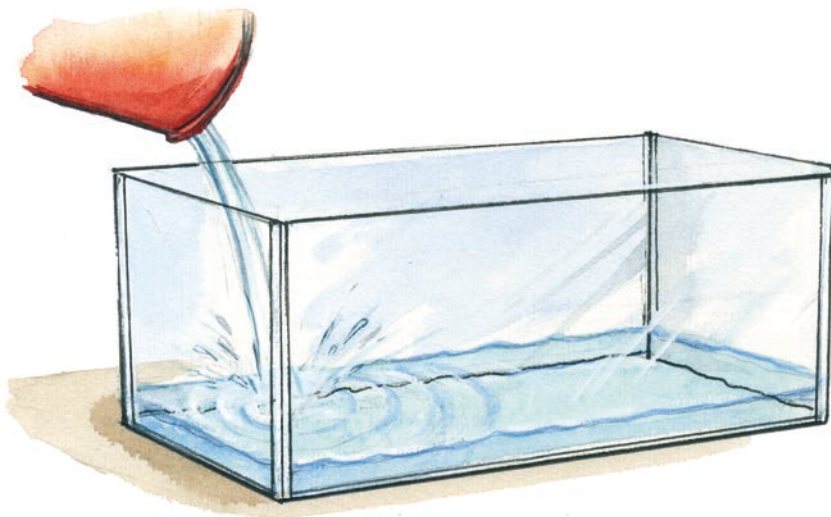
b) In another box there are 15 chocolates of the one kind. How many chocolates might there be altogether in the box? (1/1)



6. An empty aquarium in the shape of a rectangular block has the following interior measurements: 1.0 m long and 4.0 dm wide.

a) How high up does the water level go if you pour in 10 liters? (2/0)

b) Another empty aquarium is half as long and half as wide. If you pour 10 liters of water into this one too, Peter claims that the water level will rise to twice the height. Is this true? Explain your answer. (1/1) ✖



7. **Use of cell phones in the whole world**

In 1999, 1 out of 10 people used a cell phone.



In 2009 the use of cell phones has increased to 2 out of 3 people.



By what percentage did the use of cell phones increase between the years 1999 and 2009?

(1/1)

8.

SALE!

Bargain-priced floor!

Whole carton (50 tiles) costs 299:-
and covers 2.25 m²

In the picture you can see six floor tiles in a pattern. What are the dimensions of one of these tiles (length and width)?

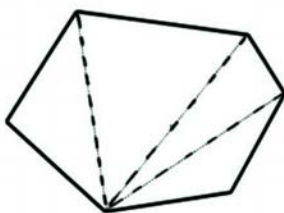
(1/2) ✖

9. Anna and Erik want to find the sum of the angles in a hexagon. They split it up in different ways. Here you can see how they split it up and made their calculations:

Anna's solution

$$4 \cdot 180^\circ = 720^\circ$$

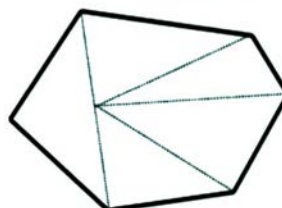
Sum of the angles is 720°



Erik's solution

$$5 \cdot 180^\circ - 180^\circ = 720^\circ$$

Erik: The sum of the angles of the hexagon is 720°.



Both Anna and Erik reach the correct result but in different ways. Explain how Anna and Erik might have reasoned.

(1/1) ✖

10.

	Calendar	
	Gregorian (official calendar in Sweden)	Islamic
Length of year (not leap years)	365 days	354 days
Length of month	28–31 days	29–30 days
Number of months	12	12

- a) How many months of the year have 30 days in the Islamic calendar? *Only answer is required.* (1/0)
- b) Muhammad's flight from Mecca to Medina initiates the counting of time for the Islamic calendar. This time of this event corresponds to July 15, 622 for the Gregorian calendar. The relationship between the years for the two calendars can be described using the formula:

$$H = \frac{33(M - 622)}{32}$$

where M is the year in the Gregorian calendar and H is the year in the Islamic calendar. What year is it **now** according to the Gregorian calendar according to the formula? (2/0)

- c) Give an explanation for $\frac{33}{32}$ in the formula. (0/1) ✖
- d) In what year do both calendars show the same year according to the formula? (0/2) ✖

