Mathematics

Student Booklet

Part III

1a

Elevens namn och klass/grupp

Skolverket

Instructions – Part III

Time   120 minutes for Part III.

Aids   Digital devices, approved formula page and ruler.

Part III   Part III 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 answer. These are indicated by the text *Only the answer is required.*

Grading limits   The test (oral part and written parts) gives a total maximum of 87 points.

Lower limit for the test grade
E: at least 21 points.
D: at least 34 points of which at least 10 points at level C or higher.
C: at least 46 points of which at least 19 points at level C or higher.
B: at least 55 points of which at least 5 points at level A.
A: at least 65 points of which at least 8 points at level A.

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

Illustration: Jens Ahlbom

Part III

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

16. Olivia is going to do a project about kidnapping and threats.
She finds a diagram in a newspaper. According to the paper,
the diagram shows the number of kidnappings and threats per year.
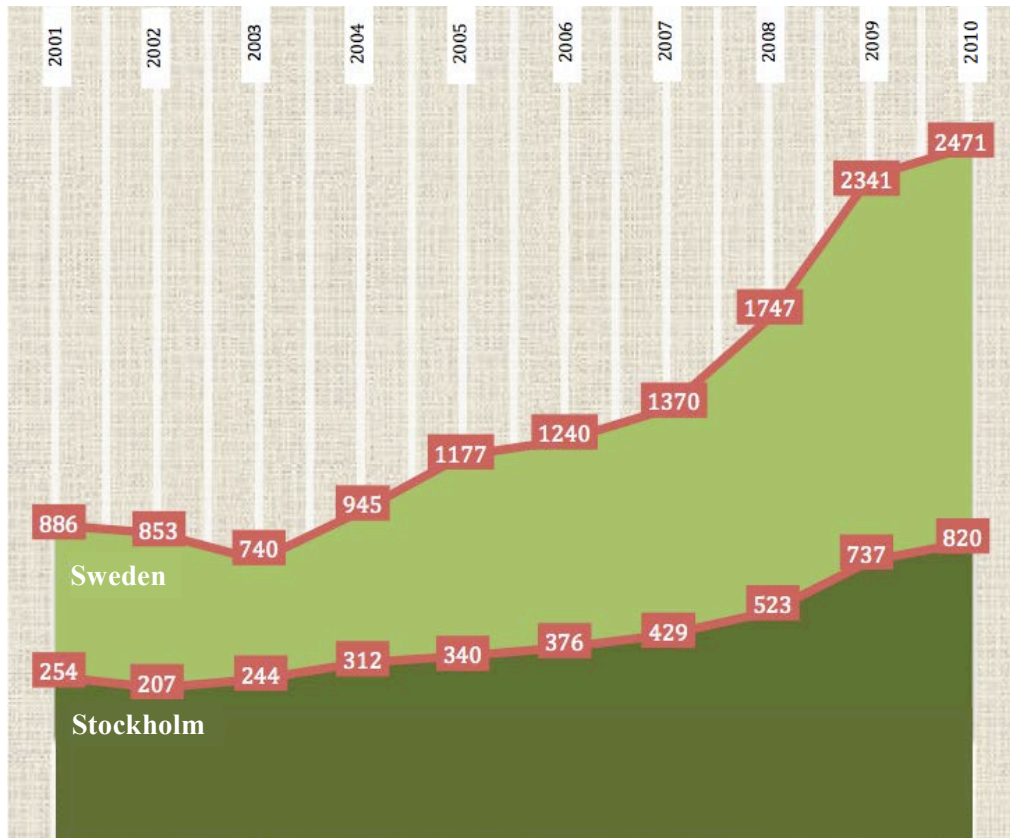
Source: Metro

a) The article says that the number of reported kidnappings and threats in
Sweden has increased by 179 percent for the period 2001–2010.
Explain why this is correct. (2/0/0)

b) Olivia claims that the diagram in the paper is incorrect.
*"I don't want to use this diagram. It looks as if there were twice as many
kidnappings and threats in Sweden as there were in Stockholm in 2001.
That surely cannot be true."*
Explain what is wrong with the diagram. (1/1/0)

17. You are supposed to calculate $\dfrac{284}{56.7 - 4.2}$ on your calculator.

You see the result 0.81 on the display screen. Your classmate Hanna
who has no calculator says that this is unreasonable.
How can Hanna see that?   (1/2/0)

18. An empty aquarium in the shape of a rectangular block has
the following inside dimensions:
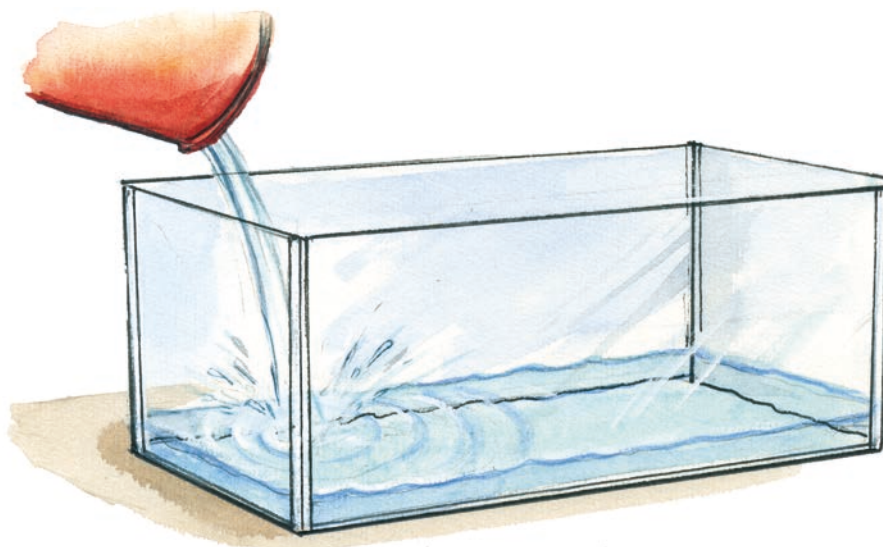1.0 m long and 4.0 dm wide.

a) How high will the water level be if you pour in 10 litre?   (1/1/0)

b) Another empty aquarium is half as long and half as wide. If you pour in
10 litres of water into this aquarium, Peter claims that the water level
will be twice as high compared to the first one.
Is that true? Explain your reasoning.   (1/1/1)

19. An advertising flyer shows the following information.

Amount	Interest rate	Repayment (10 yr)	Repayment (12 yr)
300 000 kr	4.45 %	3 061 kr/month	2 644 kr/month
100 000 kr	6.85 %	1 121 kr/month	982 kr/month

The repayments include amortization, interest etc.
Renée is considering borrowing 100 000 kr and repaying over 10 years.

a) Use the information in the flyer to calculate the total amount she
   will have paid back to the bank when the loan is paid off. (2/0/0)

b) What proportion of the first month's payment is interest? (1/2/0)

20. Adam tosses two six-sided dice. He studies the difference between
the numbers of dots on the two faces that come up.
Find the probability that the difference will be three? (1/2/0)

21. The number of visitors at a web site increases by the same percentage each year, two
years in a row. Find the yearly percentage increase if the total percentage increase for
the two-year period is 37 %. (1/1/1)

22. A survey shows the price of hamburgers for different years. The results are shown in the table below. The table can be used to make a price index series for hamburgers.

Year	1990	1995	2000	2005	2010
Hamburger price (kr)	23.00	26.00	24.00	31.00	40.00

a) Calculate the price index for hamburgers for 2010 using the year 2000 as the base year. (1/2/0)

b) In 1986 the price index for hamburgers is 68.8 using year 2000 as base year. How much did a hamburger cost in 1986? (0/2/0)

23.

	Calendar	
	Gregorian (Official calendar in Sweden)	*Islamic*
Year length (not leap year)	365 days	354 days
Month length	28–31 days	29–30 days
Number of months	12	12

a) How many months of the year in the Islamic calendar have 30 days? Explain your answer. (1/0/0)

b) Mohammed's flight from Mecca to Medina marks the starting point for the measurement of time for the Islamic calendar. This corresponds to July 15 in the year 622 on the Gregorian calendar. The relationship between the years in the two calendars can be described with the formula:

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

where H is the year in the Islamic calendar and M is the year in the Gregorian calendar, the official calendar in Sweden.

What year is it now, this year, in the Islamic calendar, according to the formula? (3/0/0)

c) Give an explanation for $\frac{33}{32}$ in the formula. (0/2/2)

d) In what year will both calendars show the same year, according to the formula? (0/2/2)

PRIM
gruppen