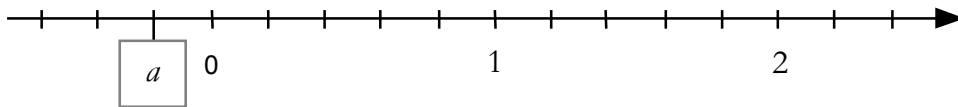


Name:..... Class/Group:.....

Part I

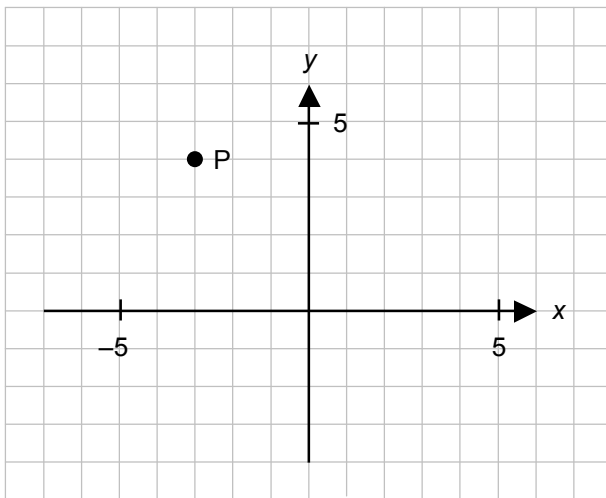
1. What number is 0.1 greater than 3.96? Answer: _____ (1/0)

2. What number, in decimal form, should be in the square?



Answer: $a =$ _____ (1/0)

3. What coordinates does the point P have?



Answer: _____ (1/0)

4. Julia makes a copy of her drawing using the school's photocopier. A face which is 12 cm long on her drawing is 4 cm long on the copy. In what scale does Julia do her copying?

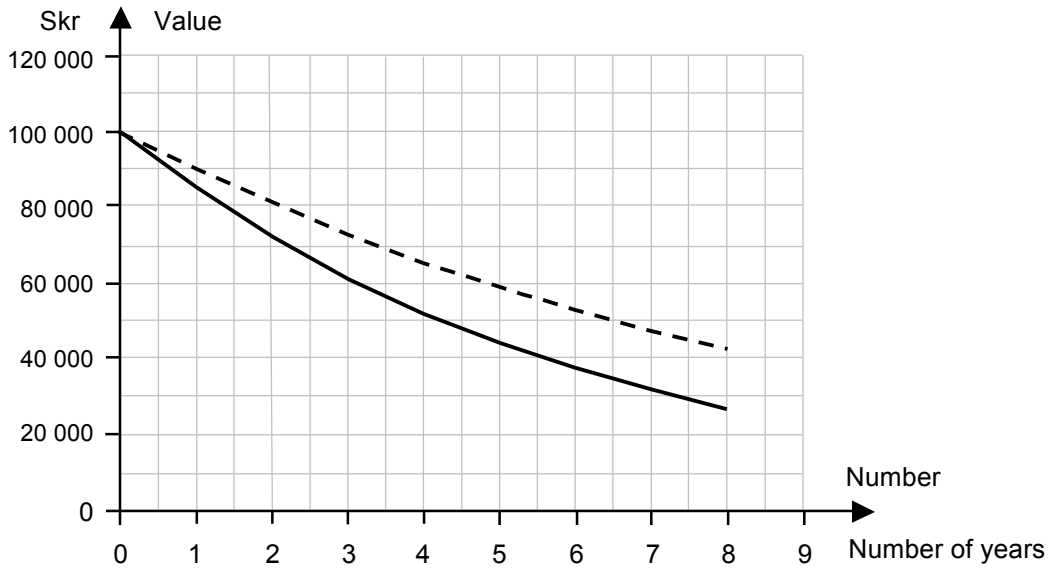
Answer: _____ (1/0)

5. What is the *approximate* value of $\sqrt{880}$? Circle your answer.

(1/0)

- 3 30 60 300 440

6. Sarah buys a used car for 100 000 Skr. The value of the car will decrease. In the diagram you can see how the value will change if it decreases by 10 % or 15 % per year respectively.



- a) What will the value of the car be after three years if the annual percentage decrease is 10 %?

Answer: _____ Skr (1/0)

- b) How much longer does it take for the value to be halved if the percentage decrease is 10 % rather than 15 % per year? Explain your solution using the diagram and the answer box below.

Answer: _____ years (1/1)

7. Which of the following expressions gives the perimeter of the figure?
Circle your answer.

$a + b$

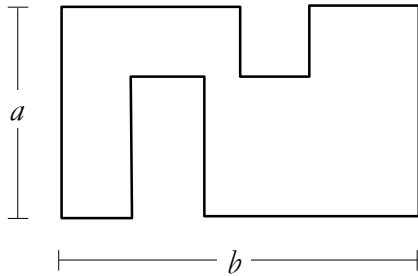
$2a + 2b$

$3a + 2b$

$3a + 3b$

$4a + 2b$

Explain how you got your answer using the figure and the box below.



(1/1)

8. Sanna is to take 15 ml of her medicine twice every day. How long will her bottle of medicine last if it contains 0.3 litres?

Answer: _____ days

(0/1)

9. $\frac{2}{5}$ of a certain number is 1. What is the number?

Answer: _____

(0/1)

10. Solve the equation $\frac{0.3}{x - 0.5} = 1$ Answer: $x =$ _____ (0/1)

11. Petter weighs p kg and Simon weighs s kg. Write a formula which expresses that Petter weighs 12 % more than Simon. Answer: _____ = _____ (0/1)

12. In a rectangle the long side is 4 cm longer than the short side. What expression gives the length of the short side if the length of the long side is written as $x + 2$? Answer: _____ (0/1)

13. The number $5.83 \cdot 10^{-3}$ is written in scientific form. What number must you subtract so that the digit "eight" will be changed to a "six"? Answer in decimal form. Answer: _____ (0/1)



Stockholms universitet

Instructions – Part I

Time 90 minutes for Part I. It is recommended that you use a maximum of 45 minutes for working with the part where calculator is not allowed. You may not use your calculator until you have submitted your answers to this part.

Aids **Part where calculator is not allowed:** Approved formula page and ruler.

Question 14: Calculator, approved formula page and ruler.

The part without calculator This part consists of questions to be solved without a calculator. Two of the questions require that you explain your solution. Present your solutions in the figure and the box nearby the question. The rest of the questions require only the answer. After each question the maximum number of points available for your answer/solution is shown.

Question 14 This question is a larger question, which normally requires more time. In the box below the question you can see what considerations the teacher will make in assessing your solution.

Grading The test (part I + part II) gives a total maximum of 61 points, of which 28 are vg-points.

Lower limits for examination grade

Pass: 20 points

Pass with distinction: 36 points of which at least 10 vg-points

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 \square .

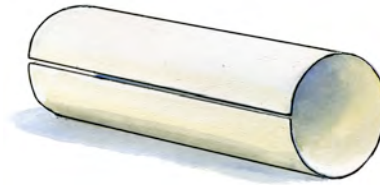
Name: _____

Date of birth: _____

Adult education/Secondary school program: _____

Question 14 – A roll of paper

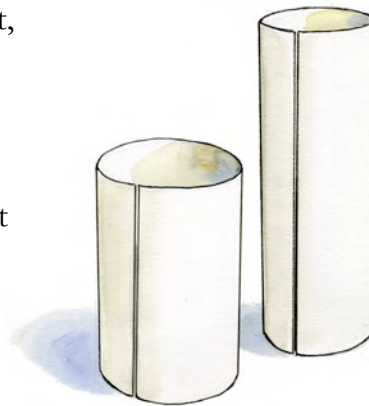
A rectangular sheet of paper can be rolled to make a tube (cylinder) as shown in the figure.



Such a tube is made by rolling a square piece of paper with side length 10 cm.

- The diameter of the tube will be about 3.2 cm. Find the volume of this tube (cylinder).
- Show that the diameter of the tube will be about 3.2 cm if the side length of the sheet of paper used is 10 cm.

If the length and width of the paper are different, you can make two different tubes (cylinders) depending on how you roll the paper.



- Starting with rectangular sheets of paper with dimensions 10 cm x 20 cm, two different tubes are made. Find the volumes of the two tubes (cylinders).
- Compare these two volumes and calculate the ratio between them.
- Investigate the ratio between the cylinder volumes using sheets of paper with other dimensions. What affects the volume ratio between the tall and the short cylinder?
- Show that your conclusion is true for all rectangular papers.

(4/7) ✖

In assessing your work the teacher will take into consideration

- what mathematical knowledge you have shown and how well you have carried out the task
- how well you have explained your work and defended your conclusions
- how well you have presented your solution.

Instructions – Part II

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 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 (2/3) 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 61 points, of which 28 are vg-points.

Lower limits for examination grade

Pass: 20 points.

Pass with distinction: 36 points of which at least 10 vg-points.

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 \boxtimes .

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

1.

Chocolate cake

6 persons

Ingredients:

100 g dark chocolate	2 dl wheat flour
100 g butter	1 tsp baking powder
2 eggs	50 g finely shopped nuts
2 dl sugar	



Photo: S Edlund

How much dark chocolate is needed according to the recipe if you want to make a cake for 15 people? (2/0)

2. In 2009 the population of Sweden was 9 million. In that year 81 % of the population had Internet at home. 93 % of these had a fixed cable connection. How many people had Internet via a fixed cable connection? (2/0)

3. Emran is going to buy a new fence for his garden. The fence looks like the one shown in the picture that is, two posts have three boards between them and three posts have 6 boards between them.



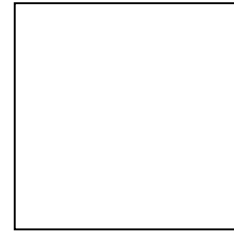
a) How many boards will be needed if you make such a fence with 10 posts? *Only answer is required.* (1/0)

b) Write a relationship between the number of posts and the number of boards using words or a formula. (1/1)

4. When the time is 12.00 in Stockholm it is 05.00 early in the morning in Chicago. On airline tickets the departure and arrival times are given in local times. How long does a flight take that leaves Chicago at 16.25 and arrives in Stockholm at 08.20? (1/1)



5. M and N are the midpoints of the sides. What proportion of the area of the square is coloured? Make your own drawing of this figure and explain your solution.



(1/1) ✖

6. Linus has seen an ad for an sms loan and wants to compare it with a loan from a bank.

Sms-loan

Borrow 3 000 kr for 30 days.
Cost 375 kr.

Bank loan

Annual interest rate:
5.6 % and no set-up fee.

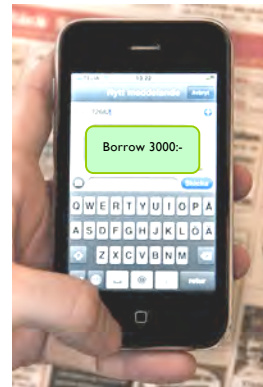


Photo: C Reuterfalk

- a) Calculate the annual interest in crowns if you borrow 3 000 kr from the bank. (1/0)
- b) The cost for the sms-loan is 375 kr for 30 days. What annual interest rate in % does this correspond to if the cost is the same every month? (1/1)

7. When Peter and Lisa go to the café, the milk for their coffee comes in a regular tetrahedron. Lisa knew that the volume for such a carton could be calculated using the formula:

$$V = \frac{k^3 \cdot \sqrt{2}}{12}, \text{ where } k \text{ is the edge length.}$$

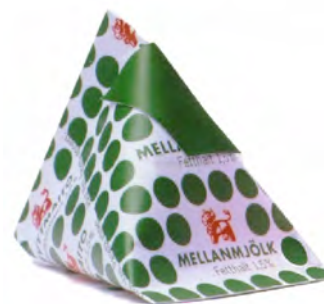


Photo: Arla

Peter measures the edge length of the tetrahedron and finds it to be 6 cm and then calculates the volume using the formula. On the package it says that it contains 2 cl of milk. Is there room for this much in the carton? Explain your reasoning using calculations. (2/1)

8. Anton is going to compare costs of printing advertisement flyers. Digitaltryckeriet has a fixed basic charge of 20 kr and then 24 öre per copy on top of that. Tryckeriservice AB has no basic fixed charge but instead charges 36 öre per copy.

a) Write this table on your own paper and fill in the missing values.

Only answer is required.

(2/0)

Number of copies	100	500
Cost at Digitaltryckeriet		
Cost at Tryckeriservice AB		

b) Anton has been given 320 kr to spend on printing. How many copies can he get from Digitaltryckeriet for this amount of money?

(2/0)

c) Use a formula to describe the cost for printing x advertisement flyers at Digitaltryckeriet.

(1/1)

d) How many copies must you have printed, at least, in order for it to be cheaper to get it done at Digitaltryckeriet rather than at Tryckeriservice AB?

(1/1) ✖

9. The thighbone is the longest bone in the human body. You can calculate the approximate length of a person by measuring the length of the thighbone. The table shows the linear relationship between the length of the thighbone and the man's length.

Length of thighbone (mm)	Approx. length of a man (cm)
435	165.2
450	168.9
465	172.6
480	176.3

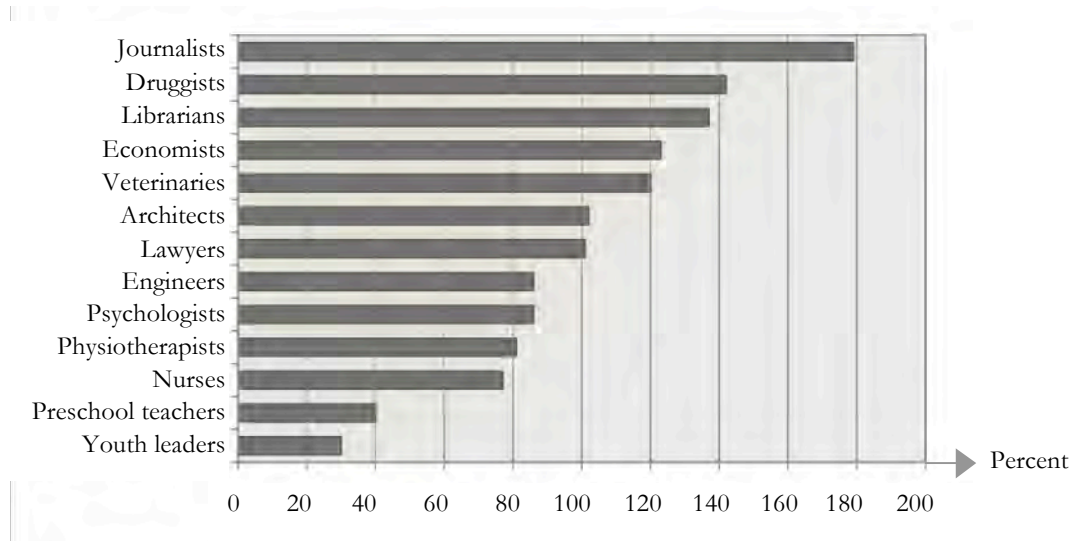


Photo: A McCormack

At an archaeological site a man's thighbone was found. The length of the thighbone was 425 mm. What should the approximate length of this man have been?

(1/1)

10. The diagram shows the number of university graduates as a percent of how many that are expected to be hired up until the year 2020.



Source: Högskoleverket (Diagram refers to programs beginning in fall 2008.)

- a) Emma reads off the value 180 for journalists. What does that number mean? (1/1)
- b) The bars for psychologists and engineers are about the same length. Emma says that this means that about the same number of psychologists as engineers should be produced as university graduates. Johanna says that you cannot draw that conclusion from the diagram. Who is right and why? (0/1)

11. The five numbers 6, 1, x , 9 and 4 are all integers (whole numbers).

- a) What will the median be for the various values of x ? Explain. (1/1)
- b) For what values of x do the five values for the numbers give the same value for both the median and the mean? (0/2)

