

Kursprov, höstterminen 2014

Mathematics

Delprov D

1c

Elevens namn och klass/grupp

Instructions – Part D

Time for the test	120 minutes for Part D.
Aids	Allowed aids on part D are digital devices, formula sheet and ruler.
Tasks	This part consists of several tasks. The solutions are to be written on separate paper, which is to be submitted together with the test booklet. For most of the tasks in this part it is not enough to only give an answer, you also have to • show your solutions • explain/motivate your thinking • draw figures when required. For some tasks only the answer needs to be given. They are marked with “<i>Only answer required</i>”.
Grading limits	The test (Part A–D) gives a total maximum of 93 points. Limit for test grade E: At least 20 points. D: At least 35 points of which at least 13 points at level C or higher. C: At least 45 points of which at least 22 points at level C or higher. B: At least 60 points of which at least 8 points at level A. A: At least 70 points of which at least 14 points at level A.

Name: _____

Date of birth: _____

Program: _____ Class: _____

Also write your name, date of birth, program and class on the sheets you hand in.

Illustration: Jens Ahlbom

16. Göran has taken out an interest-only mortgage of SEK 800 000. How much does he pay in interest per month if the annual interest rate is 3.6 %?

(2/0/0)

17. For a car with good tyres and brakes the approximate braking distance on dry asphalt is calculated using the formula:

$$s = \frac{v^2}{200}$$

where s is the braking distance in metres and v is the speed in km/h.

How much longer is the braking distance according to the formula if you drive at a speed of 70 km/h compared with if you drive at 50 km/h?

(2/1/0)

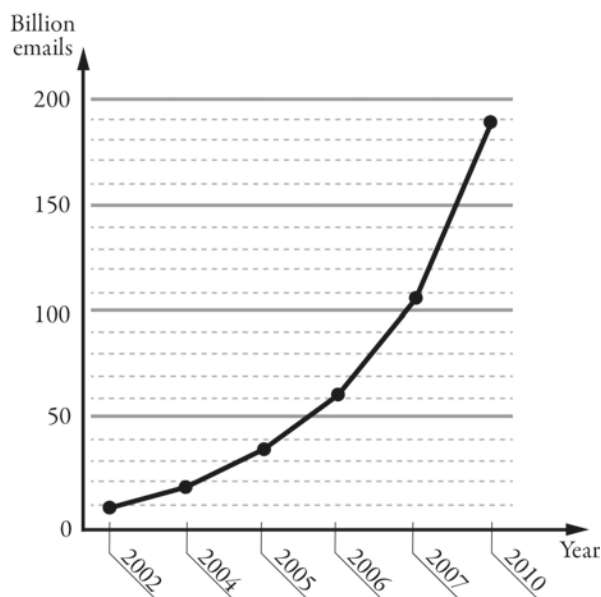


18. The diagram shows the number of billion emails sent on average in the world every day.
- Out of all the emails sent, it is estimated that about 82 per cent are spam (unwanted email). About how many spam were sent in a day in 2010?
 - The diagram is misleading. What is misleading in the diagram?
 - If the diagram was drawn correctly, how would this affect the appearance of the diagram?

(2/0/0)

(1/1/0)

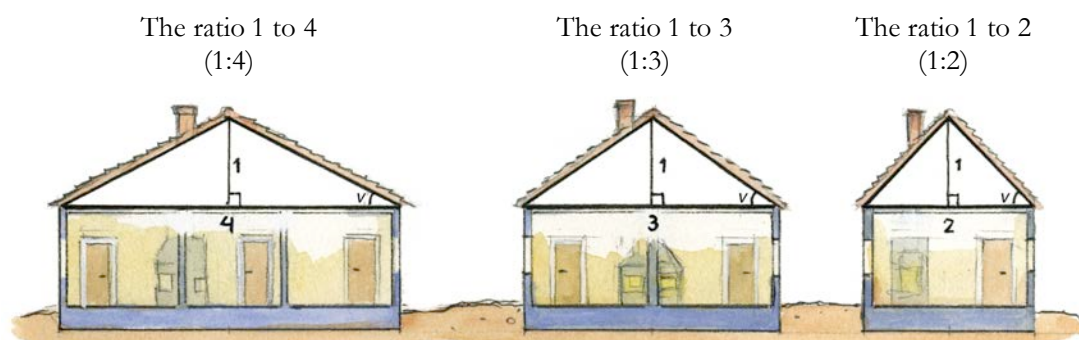
(1/1/0)



19. On a packet of seeds it says that the germination rate is 80 %. This means that on average 8 out of 10 seeds will sprout.



- a) How many seeds will likely sprout if you sow 25 seeds? (1/0/0)
- b) What is the probability that both seeds will sprout if you sow two seeds? (0/1/0)
- c) What is the probability that just one seed will sprout if you sow two seeds? (0/2/0)
20. In the old days, the slope of a roof was indicated as a ratio between two distances, see figure.



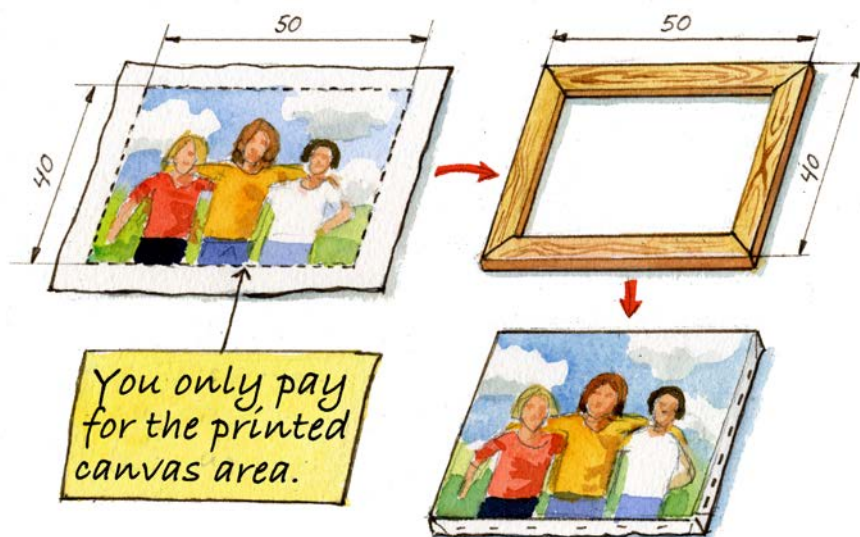
Source: ICA bokförlaget, Så renoveras torp och gårdar

Nowadays, the roof's slope is indicated with the roof pitch, which is the angle ν between the roof and the horizontal plane expressed in degrees, see figure.

- a) What is the roof pitch which corresponds to the ratio of 1 to 3? (2/0/0)
- b) Will the roof pitch be doubled if the ratio of 1 to 3 is changed to the ratio of 1 to 1.5? Motivate. (0/2/0)
21. Kasper buys shares in a fund for SEK 12 000. He calculates that the shares' value will increase by 12.5 % per year. In that case, how much will the shares be worth after 10 years? (0/2/1)

22. In the equality $\frac{15}{c} = \frac{d}{4}$ c and d are positive integers.
- a) Give *one* suggestion for what values c and d might have so that the equality holds. *Only answer required.* (1/0/0)
- b) Investigate what values c and d can have so that equality will hold. (1/1/1)

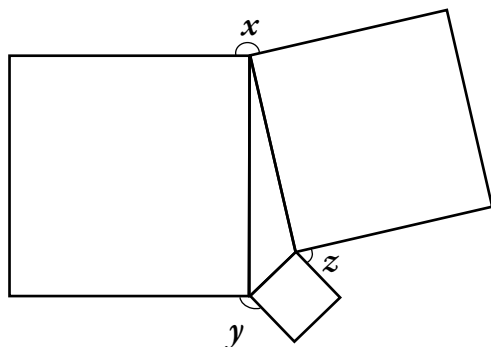
23. A photographic dealer's prints rectangular pictures on canvas and then mounts the picture on a wooden frame. The wooden frame costs SEK 0.45/cm. Canvas with print costs SEK 0.12/cm². The cost of mounting is SEK 169 for all frame sizes.



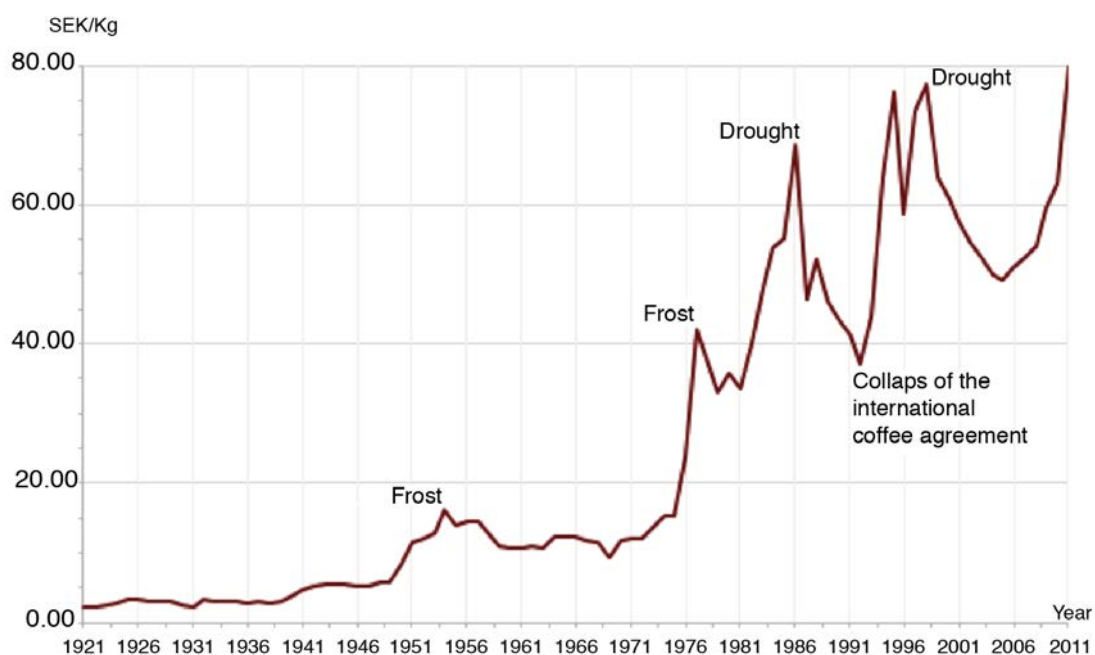
- a) Yasmin wants to print a picture and have it mounted. She wants the picture 50 cm high and 40 cm wide. What will be the cost? (1/2/0)
- b) To calculate the price of mounted pictures, the staff needs a formula which includes height and width. The price has to include the canvas with printing, frame and cost of mounting. Help the photographic dealer's to create such a formula. (0/2/2)

24. In a triangle, squares are drawn based on the triangle's sides, see figure. Show that $x + y + z = 360^\circ$.

(0/2/2)



25. The graph shows the price development for one kilogramme of coffee in Sweden. According to an index series, the index for the coffee price was 330 in the year 2011. What year was the index series' base year?



(0/0/2)

26. The associative law, i.e. $(a + b) + c = a + (b + c)$, applies when adding numbers.

For example, $(3 + 2) + 5 = 5 + 5 = 10$ and $3 + (2 + 5) = 3 + 7 = 10$.

This associative law also applies to the addition of vectors.

Show using an example that this is true for the vectors $\vec{u}$, $\vec{v}$ and $\vec{w}$.

(0/1/2)

