

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 different 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.

Grading limits The test (Part A–D) gives a total maximum of 83 points.

Limit for test grade

E: At least 19 points.

D: At least 34 points of which at least 13 points at level C or higher.

C: At least 41 points of which at least 19 points at level C or higher.

B: At least 53 points of which at least 7 points at level A.

A: At least 64 points of which at least 13 points at level A.

Name: _____

Date of birth: _____

Programme: _____ Class: _____

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

Illustration: Jens Ahlbom

18. Suppose that the time is 9 o'clock in the morning.
What will the time be 1 000 hours later?

(2/0/0)

19. 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.

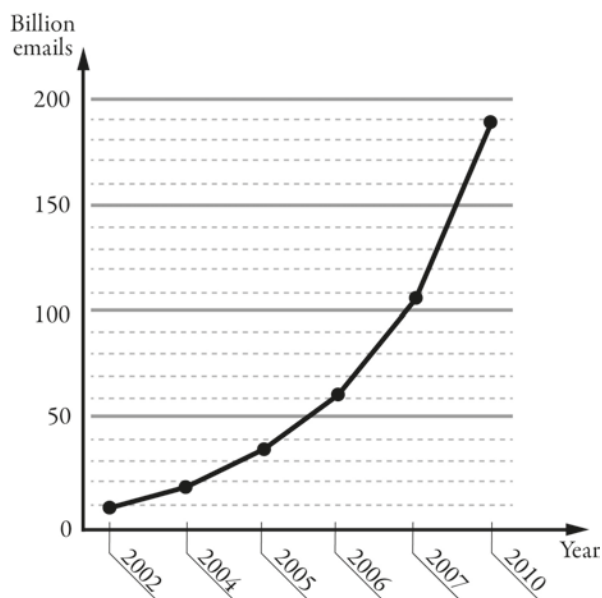
How much longer is the braking distance according to the formula if you drive at a speed of 70 km/h compared to driving at a speed of 50 km/h?

(2/1/0)

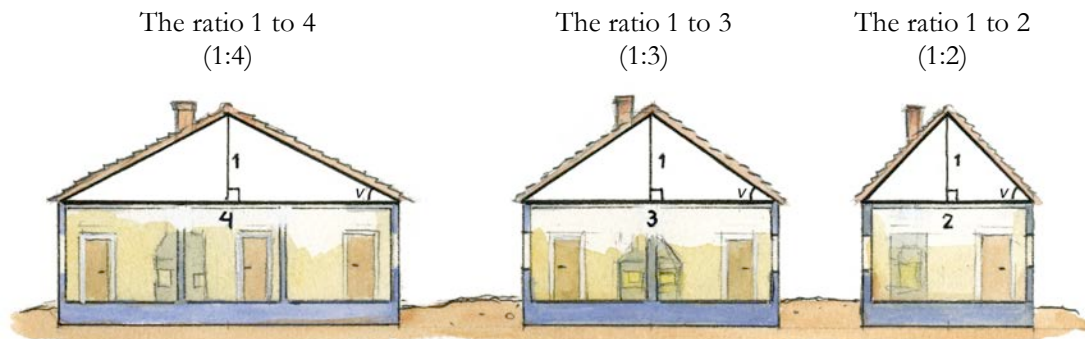


20. The diagram shows the number of billion emails sent on average in the world every day.

- a) Out of all the emails sent, it is estimated that about 82 per cent are spam (unwanted emails). About how many spam were sent in a day in 2010? (2/0/0)
- b) The diagram is misleading. What is misleading in the diagram? (1/1/0)
- c) If the diagram was drawn correctly, how would this affect the appearance of the diagram? (1/1/0)



21. 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 roof pitch 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)

22. In 2014, the price of electricity was 27 öre per kWh. That was 40 % lower than the year before. How much did 1 kWh cost in 2013?

1 kWh = 1 kilowatt hour

(0/2/0)

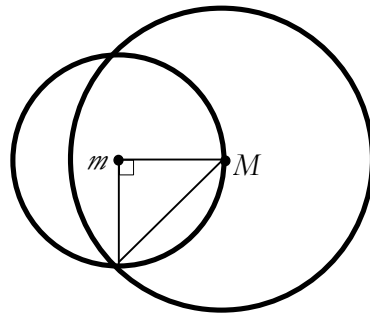
23. In 1750, the world's population was 750 million. In 1870, the world's population was twice as large. By how many per cent did the population increase on average per year? (0/2/0)

24. Kalle's class is collecting money for the class fund and wants to organise a school disco. They have found a place that costs SEK 500 to rent and a DJ with a sound system that costs SEK 1 500. They are going to sell tickets for SEK 50 per ticket.



- a) How much profit will the class make if they manage to sell 100 tickets? (1/0/0)
- b) Specify a function $V(x)$ that shows the class' profit/loss after x number of sold tickets. (1/1/0)
- c) There will be a maximum of 200 paying guests at the disco. Determine the range of the function. (1/1/1)
25. Frida takes out an SMS loan of SEK 1 000. The loan is to be repaid after one month and the monthly interest rate is 20 %. At the end of the month Frida cannot afford to pay her debt.
- In order to pay her debt she takes out a new SMS loan for the whole amount she owes. The new loan has the same monthly interest rate.
- Frida continues to borrow in the same way every month.
- How large is Frida's debt one year after she took out her first SMS loan? (0/2/1)

26. Show that the area of the large circle is twice as large as the area of the small circle. M is the centre point of the large circle, and m is the centre point of the small circle. (0/2/2)



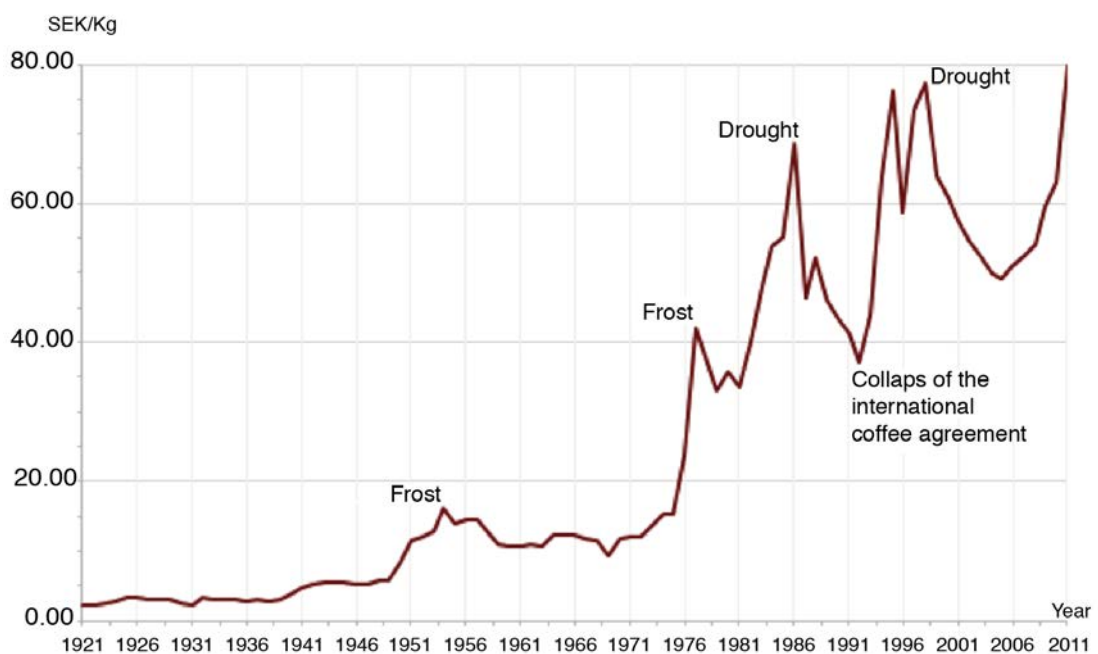
27. The associative law, i.e. $(a + b) + c = a + (b + c)$, applies when adding numbers.

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)

28. 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)

