

Mathematics

Part III

1c

Elevens namn och klass/grupp

Instructions – Part III

Time 120 minutes for Part III.

Aids Digital calculating 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 The test (oral part and written parts) gives a total maximum of 94 points.

Lower limits for examination grade

E: At least 19 points.

D: At least 33 points of which at least 11 points on lowest level C.

C: At least 44 points of which at least 19 points on lowest level C.

B: At least 60 points of which at least 7 points on level A.

A: At least 72 points of which at least 13 points on level A.

An additional requirement is that you score points in various abilities.

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

Illustration: Jens Ahlbom

Part III

15. State a value for the angle ν if $\sin \nu = 0.352$. Answer with one decimal.
Only the answer is required.

(1/0/0)

16. Hanna compares how much it costs to download music from two different web sites.

- a) Hanna wants to download 8 songs. Which web site should she choose to buy them as cheaply as possible?

- b) Write a formula that represents the cost of downloading songs from New Tunes.

- c) For what number of songs is the cost of downloading the same for both web sites?

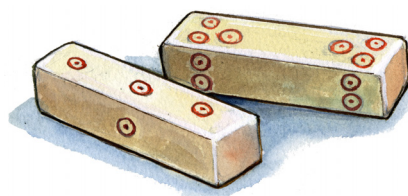


(2/0/0)

(0/2/0)

(1/1/3)

17. The ancient Romans played a game with a four-sided die called a talus. The sides had 1, 3, 4 and 6 dots respectively. Suppose that you toss two such symmetrical talus dice and then add the number of dots showing.

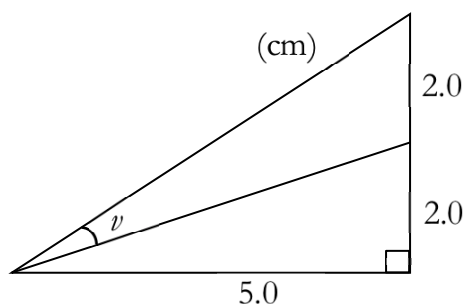


- a) What is the most probable sum?
- b) Find the probability that at least one of the dice shows an even number of dots?

(1/2/0)

(0/2/0)

18. Find the angle ν in the figure.
The figure is not drawn to scale.



(2/2/0)

19. In the equation $\frac{15}{c} = \frac{d}{4}$ c and d are positive integers.

a) Give *one* suggestion for what values c and d might have so that the equality holds. *Only the answer is required.*

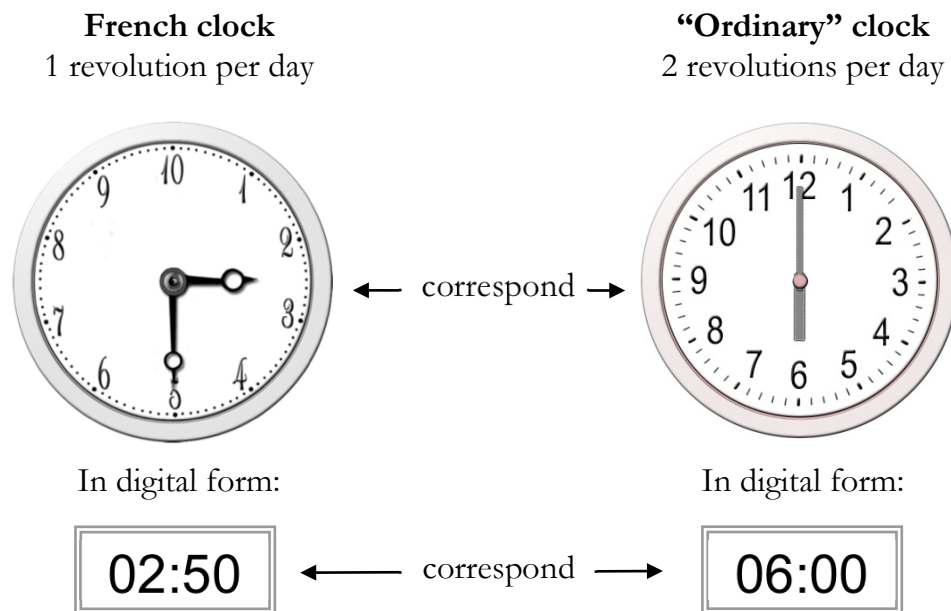
(1/0/0)

b) Investigate what values c and d can have so that equality will hold.

(1/1/1)

20. At the end of the 18th century a different way of dividing time was used in France (French clock).

- a day was divided into 10 “hours”
- each “hour” had 100 ”minutes”
- each “minute” had 100 “seconds”



a) What time does the “ordinary” clock show when the French clock shows 05:00? Explain your answer.

(0/1/0)

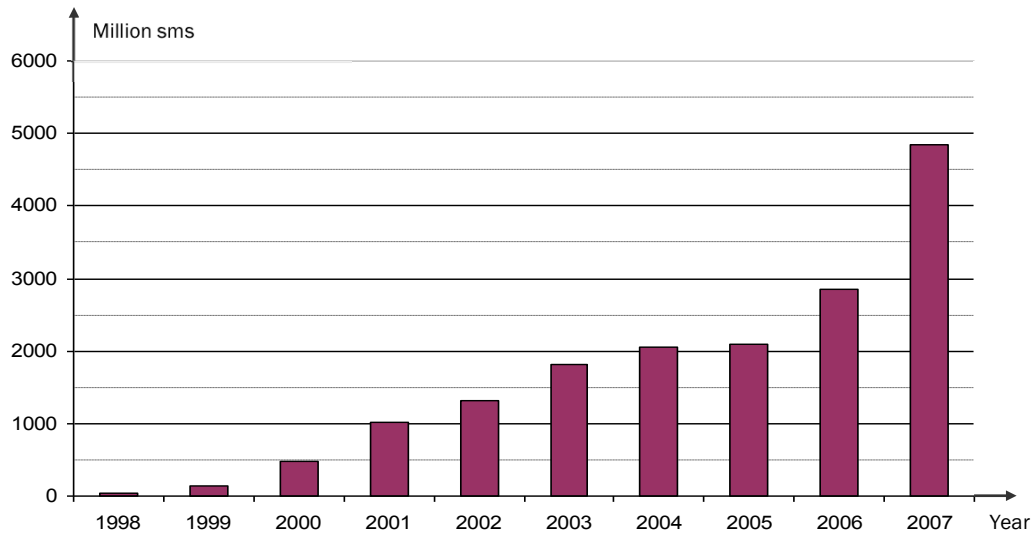
b) What time does the French clock show when the “ordinary” clock shows 15:00? Explain your answer.

(0/0/2)

21. About 1.3 per mille of the entire population of the world lived in Sweden in 2010. Of those who lived in Europe about 1.3 per cent lived in Sweden. What proportion of the world population lived in Europe in 2010?

(1/2/0)

22. The diagram shows the number of text messages (sms) sent from cell phones in Sweden during the years 1998 to 2007.

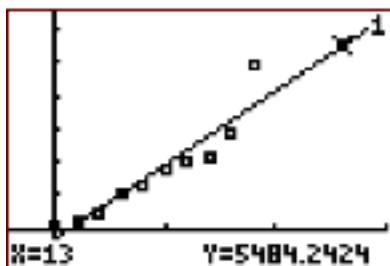


Source: Post och Telestyrelsen

- a) Anton claims that according to the diagram the increase was greatest from 2006 to 2007. But Jonatan does not agree. Jonatan says that the increase is greatest from 1999 to 2000. Explain how they might have reasoned. Write your solution account using explanations and calculations. (1/3/0)
- b) Anton and Jonatan also get different answers when they try to estimate how many sms will be sent in 2011. Explain why Anton and Jonatan get different answers. (0/3/2)

Anton's solution

I made the following calculation on my calculator:



I marked the different numbers as points, fitted a line to these points, and read off what the y value would be when x is 13.

Answer: In 2011 about 5 500 million sms will be sent.

Jonatan's solution

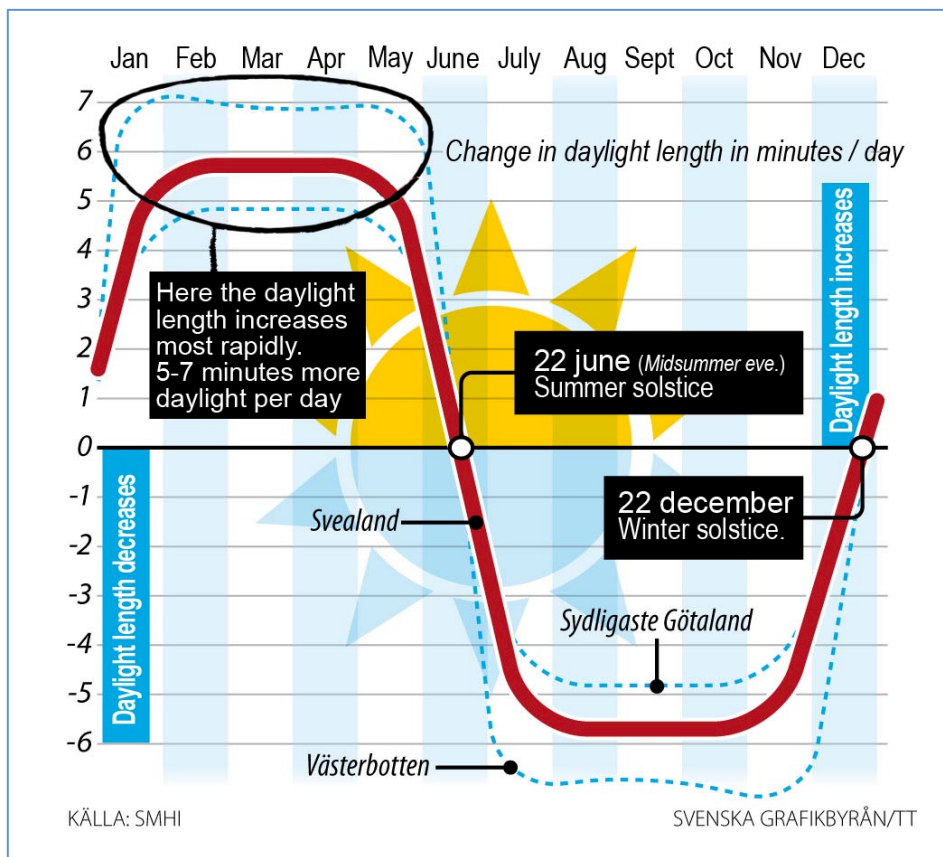
Sms-increase, on the average, is:

$$\frac{4900 - 2100}{2} = \frac{2800}{2} = 1400$$

Answer: The number of sms in 2011 will be about

$$4900 + 1400 \cdot 4 \approx 10\,500 \text{ million.}$$

23. The diagram shows the change in the length of daylight time in minutes/day for different regions of Sweden.



- a) In which month is the day when the length of daylight decreases most rapidly in Svealand? Explain your answer.
- b) About how much longer are the daylight hours in Svealand at the end of April compared with the beginning of April?
- c) "On June 22 the length of daylight is the same all over Sweden since the curves intersect each other."

(0/0/1)

(0/1/2)

Can you tell from the diagram whether this claim is true or false?

(0/2/0)

