

Mathematics

Student Booklet

Part III

1C

Elevens namn och klass/grupp

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 89 points.

Lower limit for the test grade

E: at least 20 points.

D: at least 32 points of which at least 11 points at level C or higher.

C: at least 44 points of which at least 20 points at level C or higher

B: at least 54 points of which at least 7 points at level A.

A: at least 64 points of which at least 12 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. $\sin v = 0,5$

a) Find the value of: $2 \sin v$

(1/0/0)

b) Find the value of: $\sin 2v$

(1/2/0)

16. An advertising flyer shows the following information.

LÅNEBANKEN Can I get a loan?
SURE! YOU DON'T NEED A DOWNPAYMENT OR COLLATERAL

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

BEST REGARDS **LÅNEBANKEN**

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)

17. 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)



18. Find the angles in a right-angled triangle in which the hypotenuse is 50 % longer than one of the other sides. (0/3/0)
19. 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)



20. What is the smallest positive integer that is divisible by all integers from 1 to 9? Explain your answer. (1/1/2)
21. Anna and Erik want to determine the sum of the angles in a six-sided polygon. They split it up into parts in different ways. Here you can see how they split it up and made their calculations:

Anna's solution

$$4 \cdot 180^\circ = 720^\circ$$

SUM OF THE ANGLES IS 720° .

 A diagram of a regular hexagon. Dashed lines are drawn from the bottom-left vertex to the top-left, top, and top-right vertices, dividing the hexagon into four triangles.

Erik's solution

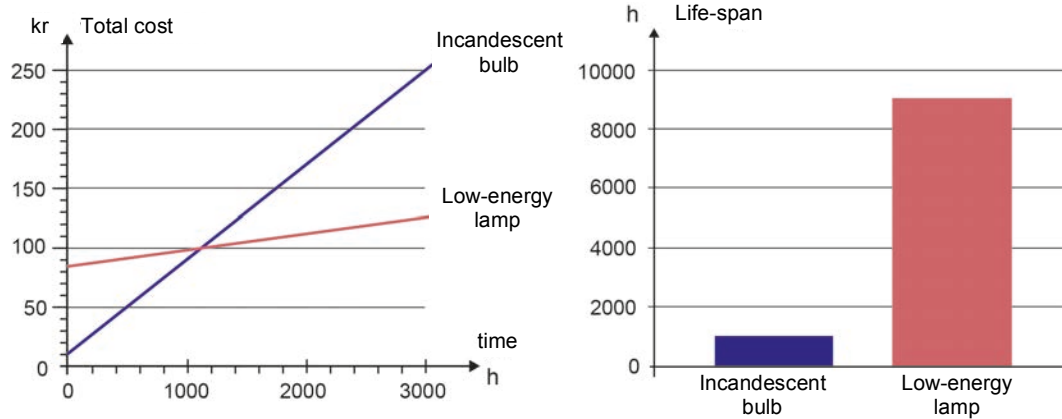
$$5 \cdot 180^\circ - 180^\circ = 720^\circ$$

ANSWER: THE SUM OF THE ANGLES IN THE SIX-SIDED POLYGON IS 720° .

 A diagram of a regular hexagon. Dashed lines are drawn from the top-left vertex to the top, top-right, bottom-right, and bottom-left vertices, dividing the hexagon into five triangles.

Both Anna and Erik arrived at the correct result but in different ways. Explain how Anna and Erik might have reasoned. (1/1/1)

22. Milo wants to compare the costs for two different lamp bulbs. One of them is a low-energy lamp and the other is an incandescent bulb. The left-hand diagram shows the total cost (purchase and energy consumption) as a function of the number of hours the lamp is turned on. The right-hand diagram shows the average life-span for the two different kinds of lamp bulbs.



- a) About how much does it cost to purchase each of these lamps? (2/0/0)
- b) Compare the cost for a low energy lamp of average life-span with the cost for an incandescent bulb for the corresponding time. In your comparison you should include both the cost for purchasing the lamp and the energy consumption costs. (1/1/2)

23.

	Calendar	
	<i>Gregorian</i> (Official calendar in Sweden)	<i>Islamic</i>
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)

