The Niels Henrik Abel mathematics competition: First round 2026–2027

12. november 2026 (English)

Do not turn the page until told to do so!

The first round of the Abel competition consists of 20 multiple choice problems to be solved in 100 minutes. Only one of the five alternatives is correct. Write your answers in the lower left hand side of the form.

You get 5 points for each correct answer, 1 point for a blank answer, and 0 points for a wrong answer. This yields a total between 0 and 100 points. A totally blank response results in 20 points.

No aids other than scratch paper and writing implements (including compass and ruler, but not protactor) are allowed.

When told to, you may turn over the page and begin working on the problems.

Fill in using block letters

Name	Date of birth
Email	Gender F ☐ M ☐
School	Class
☐ Check the box to allow us to put your name on the score board. (Only applies to the highest scores, approx. top 33 %.)	

Answers

1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

For the teacher

Correct: ☐ · 5 = ☐

Unanswered: + ☐

Points: = ☐

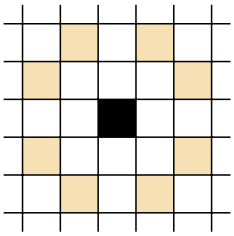
Problem 1

Which one of these lengths is the shortest?

A 10^5 cm **B** $2 \cdot 10^4$ dm **C** 0.3 km **D** $\frac{40}{10^{-3}}$ mm **E** $\frac{0.1}{0.005}$ m

Problem 2

A single move for a knight on a chessboard consists of moving it two squares in one direction, and one square crosswise to that direction. That is, from the black square in the picture it can move to one of the eight shaded squares (assuming that it does not leave the board, of course).



A knight starts in a corner of a 4×4 board, and takes exactly four consecutive moves. In how many different squares can the knight end up after its fourth move?

A 7 **B** 8 **C** 12 **D** 15 **E** 16

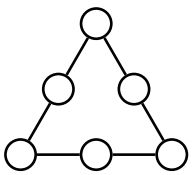
Problem 3

Which one of these numbers is divisible by 11?

A 38273942 **B** 548347938 **C** 736198239
D 93249238 **E** 1417121123

Problem 4

Each one of the numbers 1, 2, 3, 4, 5 and 6 are to be written into distinct circles in the picture, so that the sum of the three numbers along each of the three lines are all equal to a given integer n. For how many different values of n is this possible?



A 1 **B** 2 **C** 3 **D** 4 **E** 5

Problem 5

Three points A, B, and C lie on a circle, with AB being a diameter of the circle. The point D lies on AB such that CD is perpendicular to AB. If $AD = 144$ and $BD = 6$, how long is BC?

A 20 **B** 22 **C** 24 **D** 27 **E** 30

Problem 6

Nina writes all the perfect squares from 1 up to and including 10000 on a blackboard. Then she erases all the digits except the final digit of each number. For example, the number 144 is now replaced by 4. What is the average of the remaining digits?

A 4.5 **B** $\frac{45}{100}$ **C** $\frac{450}{10000}$ **D** $\frac{25}{10}$ **E** $\frac{500}{100}$

Problem 7

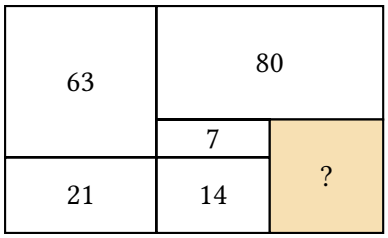
If n is a natural number, $n!$ is the product of the integers from 1 up to and including n. For example, $1! = 1$, and $3! = 1 \cdot 2 \cdot 3 = 6$.

What is the remainder when you divide $1! + 2! + 3! + \cdots + 100!$ by 12?

A 1 **B** 3 **C** 7 **D** 9 **E** 11

Problem 8

A rectangle is divided into smaller rectangles as indicated in the figure. (The figure does not have correct measures.) The white rectangles have the areas indicated. What is the area of the shaded rectangle?



A 9 **B** 27 **C** 33 **D** 45 **E** 57

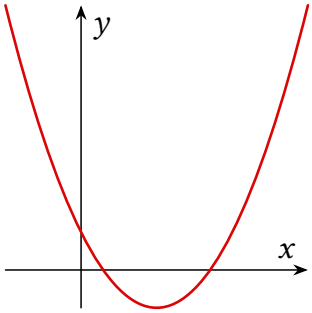
Problem 9

Four friends meet in a cafeteria. Anne buys a coffee and a school bun for 96 kroner. Bente buys a coffe and a Danish pastry for 100 kroner. Carl buys a tea and a Danish pastry for 107 kroner. David buys a tea and a school bun. How much must David pay?

A 85 **B** 96 **C** 103 **D** 111 **E** 120

Problem 10

Sofia graphed a function. The axes need not have the same scale, but they do intersect at $(0, 0)$ as usual. Which function might it be?



A $f(x) = 2x^2 + 4x + 1$ **B** $f(x) = 2x^2 - 4x + 1$
C $f(x) = 2x^2 - 4x + 2$ **D** $f(x) = 2x^2 + 4x + 3$
E $f(x) = 2x^2 + 4x + 2$

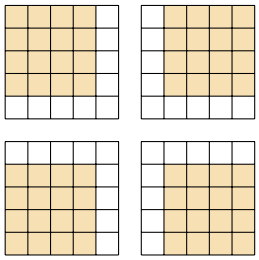
Problem 11

Nordelg high school has three grade levels (1, 2, and 3). There are two sections at each grade, and twenty students in each section. The students are to form a council. The student council is to consist of one representative from each section, and one of the representatives from the third grade is to be the leader of the council. In how many different ways can they form a student council?

A $2^{12} \cdot 5^6$ **B** $2^{13} \cdot 5^6$ **C** $2^{14} \cdot 3 \cdot 5^7$ **D** $2^{15} \cdot 5^7$ **E** $2^{16} \cdot 5^8$

Problem 12

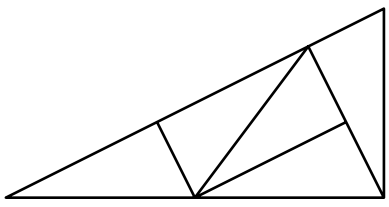
A 5×5 square is filled with the numbers 1, 2, ..., 25 so the the sum in each connected 4×4 subsquare (as shown in the figure) is the same. The numbers 4, 12, and 19 are found in three of the four corners. What is the number in the fourth corner?



A 8 **B** 11 **C** 14 **D** 18 **E** 21

Problem 13

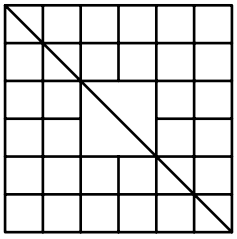
A right triangle is divided into 5 congruent right triangles as in the figure. Assuming the large triangle has area 80, how long is the hypothenuse?



A 18 **B** 20 **C** $10\sqrt{5}$ **D** $12\sqrt{5}$ **E** $14\sqrt{5}$

Problem 14

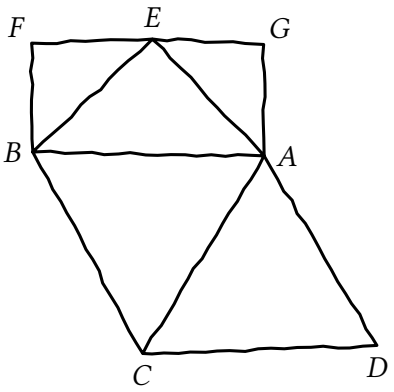
How many triangles are there in the figure?



A 26 **B** 30 **C** 34 **D** 38 **E** 42

Problem 15

Niels drew this figure by hand, with the following comments: The triangle ABC is equilateral, while the triangles CDA, AGE, AEB, and EFB are all isosceles with $CD = DA = 10$, $AG = GE$, $AE = EB$, $EF = FB$ and $\angle CDA = 60^\circ$, $\angle EAG = \angle BEF = 45^\circ$ and $\angle AEB = 90^\circ$. What is the distance between points D and G?



A 10 **B** $5\sqrt{5+2\sqrt{3}}$ **C** 15
D $7+4\sqrt{3}$ **E** Impossible to decide

Problem 16

Lene wrote the calculation $ABBA + A - HA = AQUA$ on a blackboard, where distinct letters represent distinct digits. What is the largest possible value for Q?

A 5 **B** 6 **C** 7 **D** 8 **E** 9

Problem 17

All the corners of the hexagon $ABCDEF$ lie on a common circle. Additionally, $AB = CD = EF$ and $BC = DE = FA$. Given that $\angle DAC = 18^\circ$, what is $\angle DBE$?

A 18° **B** 24° **C** 36° **D** 42° **E** 48°

Problem 18

What is $\left(\sqrt{2025 + 2026 \cdot 2116} - 2026\right)^2$ equal to?

A 2025 **B** 2026 **C** 2116 **D** $2025 \cdot 2116$ **E** $2026 \cdot 2116$

Problem 19

Arne writes down all five digit numbers in which the digits 1, 2, 3, 4, and 5 each occurs once. Among these numbers, which of the following types is the most common?

A Numbers whose first digit is 5
B Numbers divisible by 4
C Numbers divisible by 5
D Numbers in which 5 is to the right of 1 and left of 3
E Numbers in which 5 is to the right of 4, and 2 is to the left of 1

Problem 20

Karl Erik thinks of an integer n, and computes the sum of the digits of its square n^2. Which one of these sums can he not possibly get?

A 9 **B** 16 **C** 18 **D** 24 **E** 27