

INFORMATION FOR FOREIGN CANDIDATES TAKING THE ENTRANCE EXAM OF BASIC MATHEMATICAL KNOWLEDGE

Foreigners applying for admission to first cycle studies or single master's studies on the basis of a document issued abroad, which is not a document confirming the right to apply for admission to studies, referred to art.326a (1) of the Law on Higher Education and Science - **shall take an entrance exam of basic mathematical knowledge.**

The exam will be held in remote form in synchronous mode on the Teams platform.

July 8th and 9th, 2025 (Tuesday and Wednesday).

- The exact date and time of the exam will be announced a few days before the exam.
- No registration is required for the exam.
- The list of candidates for the exam will be prepared on the basis of educational documents, which candidates **must compulsorily** upload in the IRK system.

For detailed information about the exam, please contact **the Unit for Teaching Administration** by writing to studiainfo@uek.krakow.pl

I. BASIC INFORMATION

1. The exam consists of 50 tasks.
2. Each task has exactly one correct answer.
3. Number of points for a correct answer: 4p.
4. Maximum number of points to obtain: 200p.
5. Test duration: 60 minutes.
6. The number of points qualifying for admission to each major programme will be published in the Online Candidate Admission platform on July 17th, 2025.

Notice

Before the exam, prepare a calculator, paper, and something to write with (some tasks require short calculations).

II. SCOPE OF TOPICS FOR THE ENTRANCE EXAM

- *Mandatory mathematical knowledge*

1. Operations on real numbers

- knowledge of the concepts: natural number, integer, rational number, irrational number,

- knowledge of basic operations on numbers and their properties: addition, subtraction, multiplication, division, raising to the power, square root, absolute value of a number,
- algebraic transformations,
- short multiplication formulas,
- knowledge of percentage calculations.

2. Properties of functions of one variable

- knowledge of the concepts: domain, set of values, zeros, increasing function, decreasing function,
- knowledge of graphs and basic properties of functions: linear, quadratic, rational $f(x) = \frac{a}{x}$, exponential $f(x) = a^x$, logarithmic $f(x) = \log_a x$,
- determining the domain of a rational function and a function with a square root.

3. Equations and inequalities

- solving simple equations and inequalities: linear, quadratic, rational,
- solving simple polynomial equations (polynomial in product form),
- knowledge of Viète's formulas for quadratic function,
- solving a system of linear equations.

4. Arithmetic and geometric sequences - formula for the n-th term.

5. Planimetry

- knowledge of the concepts: side, area, radius of a circle, diameter,
- knowledge of formulas for area of: square, rectangle, triangle, circle.

6. Probability calculus

- arithmetic and geometric mean,
- median, dominant,
- calculation of the number of elementary events,
- classical probability.

Selected mathematical symbols and notations - tab. pp. 3-4

(the following mathematical symbols and notations may be used in the tasks)

Sets			
\emptyset	empty set; null set		
$a \in A$	a belongs to A ; a is an element of set A		
$a \notin A$	a does not belong to A ; a is not an element of set A		
$A \subset B$	A is a subset of B		
$\{a, b, c\}$	set containing elements a, b and c		
\mathbb{N}	set of natural numbers (positive integers) $\mathbb{N} = \{1, 2, 3, \dots\}$		
\mathbb{Z}	set of integers $\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$		
\mathbb{Q}	set of rational numbers $\mathbb{Q} = \{\frac{a}{b} : a \in \mathbb{Z} \wedge b \in \mathbb{Z} \setminus \{0\}\}$		
\mathbb{R}	set of real numbers		
Absolute Value of Number			
$ x $	the absolute value of a number $x \in \mathbb{R}$; interpreted as a distance of x from 0 on a number line; $ x \geq 0$; $ x = \begin{cases} x, & \text{for } x \geq 0; \\ -x, & \text{for } x < 0; \end{cases}$		
Mathematical Constant			
π	3.141592 653589793 . . .		
Basic Algebra Formulas			
Binomial formulas: <ul style="list-style-type: none">$(a + b)^2 = a^2 + 2ab + b^2$$(a - b)^2 = a^2 - 2ab + b^2$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$		Difference of two squares: <ul style="list-style-type: none">$a^2 - b^2 = (a - b)(a + b)$ The Sum and Difference of Two Cubes: <ul style="list-style-type: none">$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$	
Intervals			
(a, b)	open interval	$(a, b) = \{x \in \mathbb{R} : a < x < b\}$	
$[a, b]$	closed interval	$[a, b] = \{x \in \mathbb{R} : a \leq x \leq b\}$	
$[a, b)$	half-closed interval	$[a, b) = \{x \in \mathbb{R} : a \leq x < b\}$	
$(a, b]$	half-closed interval	$(a, b] = \{x \in \mathbb{R} : a < x \leq b\}$	
Equality and Inequalities			
$=$	equal to	$a = b$	a is equal to b
\neq	not equal to	$a \neq b$	a is not equal to b , a is different from b
$< >$	strong inequalities		
$\leq \geq$	weak inequalities		
$<$	less than	$a < b$	a is less than b , b is greater than a
$>$	greater than	$a > b$	a is greater than b , b is less than a
\leq	less than or equal to	$a \leq b$	a is less than or equal to b
\geq	greater than or equal to	$a \geq b$	a is greater than or equal to b

Exponents		
$a^n = a \cdot a \cdot \dots \cdot a$	n factor of a , where $n \in \mathbb{N}$ is an <i>exponent</i> , $a \in \mathbb{R}$ is a <i>base</i>	
Basic properties of exponents:		
<ul style="list-style-type: none">$a^n \cdot a^m = a^{n+m}$$\frac{a^n}{a^m} = a^{n-m}$$(a^n)^m = a^{n \cdot m}$$(a \cdot b)^n = a^n \cdot b^n$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	<ul style="list-style-type: none">$a^0 = 1$$a^1 = a$$a^{-1} = \frac{1}{a}$$a^{-n} = \frac{1}{a^n}$	<ul style="list-style-type: none">$a^{\frac{1}{n}} = \sqrt[n]{a}$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$
Logarithms		
$\log_a b$	logarithm to the base a of b ($\log_a b = c \Leftrightarrow b = a^c$)	
$\log b = \log_{10} b$	common logarithm, decimal logarithm	
Basic properties of logarithms:		
For $a, b \in (0, 1) \cup (1, +\infty)$, $x, y \in (0, +\infty)$, $n \in \mathbb{R}$:		
<ul style="list-style-type: none">$\log_a a = 1$$\log_a 1 = 0$$\log_a a^n = n$$n = a^{\log_a n}$	<ul style="list-style-type: none">$\log_a x + \log_a y = \log_a (x \cdot y)$ product property$\log_a x - \log_a y = \log_a \left(\frac{x}{y}\right)$ quotient property$\log_a x^n = n \log_a x$ power property$\log_a x = \frac{\log_b x}{\log_b a}$ change-of-base formula	<p>inverse property</p>

III. PROCEDURE AND RULES FOR CONDUCTING REMOTE EXAMINATIONS FOR FOREIGN CANDIDATES FOR STUDIES AT THE KRAKOW UNIVERSITY OF ECONOMICS

1. The procedure purpose

The purpose of this procedure is to ensure transparent and fair rules for conducting entrance examinations and language proficiency examinations in remote form, in synchronous mode, including effective verification of candidates' identities and ensuring the integrity of the examination process.

2. The scope of examination

The procedure applies to all candidates taking examinations organized by the Krakow University of Economics remotely, regardless of the form and level of study and the type of examination.

3. Examination platforms

Exams are conducted in remote form, in synchronous mode. Examination tests are made available on the Moodle platform (e-rekrutacja.uek.krakow.pl), with the simultaneous use of the MS Teams platform to supervise the course of the exam and communicate with the exam committee.

4. Technical and organizational requirements

The candidate must have:

- a computer/laptop with a camera and microphone (**the exam should not be written on a mobile device**),
- a stable Internet connection (it's a good idea to prepare an alternative Internet source (such as a hotspot from your phone),
- speakers or headphones (ability to play sound),
- an up-to-date version of a web browser,
- a quiet, enclosed space, in which the exam will be taken.

5. Verification of a candidate's identity

- the candidate is required to attach a scan or clear photo of a valid identity document (foreign passport – with photo page) in the Online Candidates Admission Platform (IRK) system by the applicable recruitment deadline,
- during the exam, the candidate is required to show the same identity document to the camera in real time, when called upon by a member of the exam committee.

6. Conditions for taking the exam

The condition for taking the exam is that the candidate must confirm the statement, that he/she is taking the exam on his/her own and agree to monitor and record the exam, which reads:

"I declare that I am taking the exam on my own, without the assistance of third parties and without the use of unauthorized materials. I am aware that violation of these rules may result in invalidation of the exam and termination of the recruitment procedure.

I also declare that I have familiarized myself with the applicable procedure and I accept its provisions."

Without confirmation of the statement, the exam will not be available.

7. Rules of supervision and monitoring

During the exam, the candidate is under constant supervision via webcam and microphone. The entire course of the exam is recorded.

In particular, it is forbidden to:

- use of supporting materials (printed and electronic) in any form,
- communicating with third parties,
- changing the camera setting,
- leaving the frame,
- use of additional electronic devices (e.g. phone, tablet, smartwatch).

8. Violation of exam rules

In case of:

- refusal to show a passport at the request of the examination committee,
- it is determined that the person taking the exam is not an authorized person,
- violation of the rules of integrity, or use of unauthorized external support,

the examination committee has the right to take the following actions:

- immediately stop the examination of the candidate and invalidate his/her score, or
- refer the case to the University Recruitment Committee.

9. Course, evaluation and results of the exam

- the candidate logs on to the Moodle and MS Teams platforms at least 15 minutes before the exam,
- each candidate can take the exam only once,
- duration of the exam: 60 minutes,
- maximum number of points: 200 (entrance exam), 50 (language exam),
- the exam is scored automatically - the result is presented immediately after the exam,

- the number of points from the entrance exam qualifying for admission to individual major programmes will be published in the Online Candidates Admission Platform on the day the recruitment results are announced,
- obtaining from the language exam a number of points lower than 30 means negative verification of language proficiency.

10. Internet connection breaks during examination

Candidate's action

- if the Internet connection breaks, the candidate should immediately attempt to reconnect to the exam platforms (Moodle, MS Teams) and report this to the committee via chat in MS Teams,
- if the connection is restored - the candidate continues with the exam, and the time of interruption can be recorded by the committee,
- if the Internet connection is not restored during the time allotted for writing the exam, the candidate should, within 3 working days, contact with the exam committee (by email to: studiainfo@uek.krakow.pl) stating the reason for the interruption of the exam with documentation of the problem (e.g., screenshot, report from the Internet provider, etc.).

Exam's committee action

In case of the above-described problems, the commission may:

- allow the exam to continue (after positive verification of the causes of the failure),
- abort the exam and set an additional date for the candidate,
- declare the exam failure if there is no contact with the candidate or explanations have not been provided by the candidate,

Each case is considered individually, taking into account the principle of equal treatment of candidates.