Azonosító jel: | | | | | | | | | | |

ÉRETTSÉGI VIZSGA ● 2005. október 25.

MATEMATIKA
ANGOL NYELVEN
MATHEMATICS

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA
STANDARD LEVEL
WRITTEN EXAMINATION

2005. október 25., 8:00

I.

Időtartam: 45 perc
Time allowed: 45 minutes

Pótlapok száma / Number of extra sheets	
Tisztázati / Final version	
Piszkozati / Draft	

OKTATÁSI MINISZTÉRIUM
MINISTRY OF EDUCATION

Instructions to candidates

- The time allowed for this examination paper is 45 minutes. When that time is over, you will have to stop working.
- You may solve the problems in any order.
- In solving the problems, you are allowed to use a calculator that cannot store and display verbal information. You are also allowed to use four-digit data tables. The use of any other electronic devices or printed material is forbidden!
- **Write the final answers in the appropriate frames.** You are not required to write down details of the solutions, except where you are instructed by the problem to do so.
- Write in pen. Diagrams are also allowed to be drawn in pencil. If you cancel any solution or part of a solution by crossing it over, it will not be assessed.
- Only one solution to each problem will be assessed.
- Please do not write anything in the grey rectangles!

1. Simplify the following fraction: (x is a real number, $x \neq 0$)

$$\frac{x^2 - 3x}{x}$$

The simplified fraction:	2 points	

2. Peter wrote a seven-digit number divisible by three on a piece of paper, but the last digit got blurred and it cannot be read. His friend thinks that the last digit was a zero. The number that can be read is 314726□. May Peter's friend be right? Explain your answer.

	1 point	
Answer:	1 point	

3. The hypotenuse of a right-angled triangle is 4.7 cm long. One of its acute angles is 52.5°. What is the length of the leg adjacent to the angle in cm? Sketch a diagram showing the given data. Justify your answer by calculation and round it to one decimal place.

	2 points	
The length of the leg is cm.	1 point	

4. d and e denote arbitrary real numbers. Which of the equalities below is always true? (Which of them is an identity?)

A: $d^2 + e^2 = (d + e)^2$

B: $d^2 + 2de + e^2 = (d + e)^2$

C: $d^2 + de + e^2 = (d + e)^2$

The letter marking the equality that is always true:	2 points	

5. Find the equation of the line of normal vector **n** (5; 8) passing through the point (–2; 7).

The equation of the line:	2 points	

6. Write the expression $\left(\frac{x}{y}\right)^{-2}$ (where $x \neq 0$ and $y \neq 0$) in a different form so that it does not contain a negative exponent.

The expression is	2 points	

7. Given the vectors **a** = (6; 4) and **a** – **b** = (11; 5), find vector **b**, expressed with its coordinates.

Vector **b** is	3 points	

8. For what real numbers is the following inequality true: $\frac{-3}{\sqrt{10-x}} < 0$?

Solution:	2 points	

9. 5 players have qualified for the finals of a chess tournament. There is 1 player among them who knows all the others. Each of the remaining players knows 2 participants of the finals. Illustrate the acquaintance relationships in a diagram (by means of a graph), assuming that acquaintance is mutual.

3 points	

10. Decide whether each of the statements below is true or false:

A: The regular pentagon has central symmetry.

B: There exists a triangle for which the centroid and the orthocentre coincide.

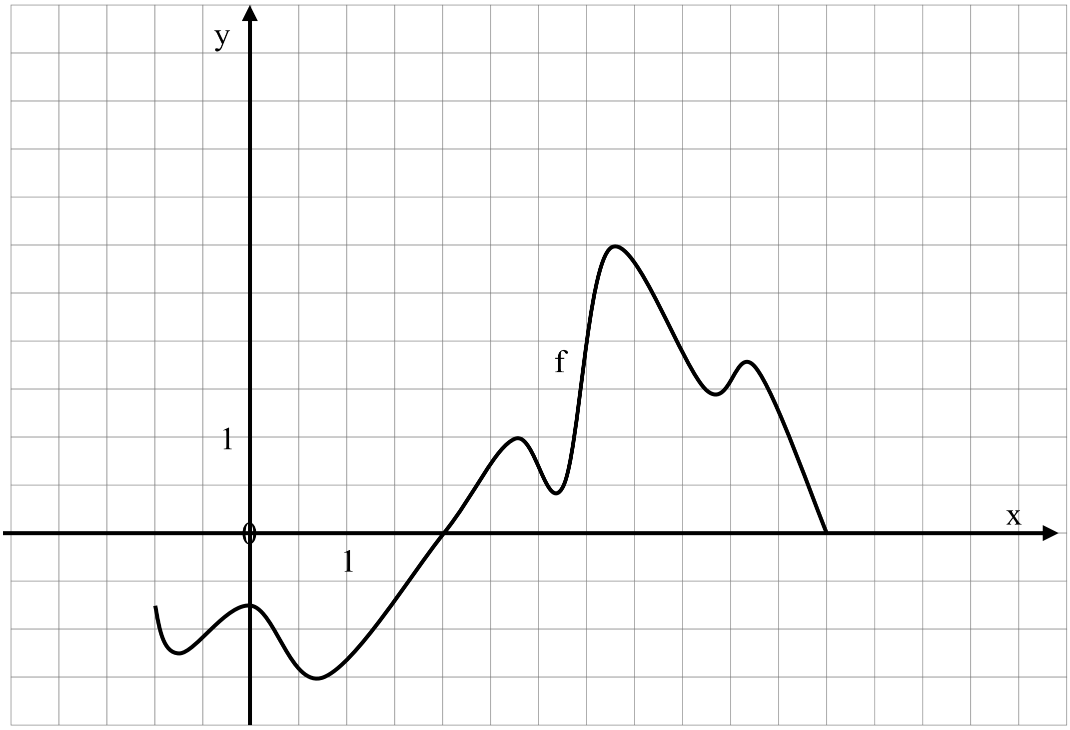
C: Every parallelogram has an axis of symmetry.

A:	1 point	
B:	1 point	
C:	1 point	

11. The five graduating classes in a school perform 1 dance each at the graduation ball. The class A perform the opening dance, a "palotás". The order of the other dances is decided by a draw. How many different orders are possible? Explain your answer.

	2 points	
The number of possible orders is	1 point	

12. The rule of assignment of the function $f(x)$ defined on $[-1; 6]$ is given by the graph of the function.



a) Determine the solution of the inequality $f(x) \geq 0$.

b) Find the largest value of $f(x)$.

The solution of the inequality:	2 points	
The largest value of $f(x)$:	1 point	

		maximum score	score attained
Paper I.	Problem 1.	2	
	Problem 2.	2	
	Problem 3.	3	
	Problem 4.	2	
	Problem 5.	2	
	Problem 6.	2	
	Problem 7.	3	
	Problem 8.	2	
	Problem 9.	3	
	Problem 10.	3	
	Problem 11.	3	
	Problem 12.	3	
	TOTAL	**30**	

date teacher

	score (pontszám)	score input for program (programba beírt pontszám)
Paper I (I. rész)		

date
(dátum)

teacher
(javító tanár)

registrar
(jegyző)

Note:

1. Leave this table blank, and do not sign here if the candidate has started working on Paper II.
2. If the examination was interrupted during the candidate working on Paper I, or it was not continued with Paper II, fill out this table and sign.

(Megjegyzések:

1. Ha a vizsgázó a II. írásbeli összetevő megoldását elkezdte, akkor ez a táblázat és az aláírási rész üresen marad!
2. Ha a vizsga az I. összetevő teljesítése közben megszakad, illetve nem folytatódik a II. összetevővel, akkor ez a táblázat és az aláírási rész kitöltendő!)

ÉRETTSÉGI VIZSGA ● 2005. október 25.

MATEMATIKA ANGOL NYELVEN MATHEMATICS

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA STANDARD LEVEL WRITTEN EXAMINATION

2005. október 5., 8:00

II.

Időtartam: 135 perc
Time allowed: 135 minutes

Pótlapok száma / Number of extra sheets	
Tisztázati / Final version	
Piszkozati / Draft	

OKTATÁSI MINISZTÉRIUM MINISTRY OF EDUCATION

Instructions to candidates

- The time allowed for this examination paper is 135 minutes. When that time is over, you will have to stop working.
- You may solve the problems in any order.
- In part **B**, you are only required to solve two out of the three problems**. When you have finished the examination paper, write in the square below the number of the problem NOT selected.** *If it is not clear* for the teacher marking the paper which problem you do not want to be assessed, then problem 18 will not be assessed.

- In solving the problems, you are allowed to use a calculator that cannot store and display verbal information. You are also allowed to use four-digit data tables. The use of any other electronic devices or printed material is forbidden!
- Always write down the reasoning used in obtaining the answers, since a large part of the attainable points will be awarded for that.
- Make sure that the calculations of intermediate results are also possible to follow.
- In solving the problems, theorems studied and given a name in class (e.g. the Pythagorean theorem or the altitude theorem) do not need to be stated precisely. It is enough to refer to them by the name, *but their applicability needs to be briefly explained.*
- Always state the final result (the answer to the question of the problem) in words, too!
- Write in pen. Diagrams are also allowed to be drawn in pencil. If you cancel any solution or part of a solution by crossing it over, it will not be assessed.
- Only one solution to each problem will be assessed.
- Please do not write anything in the grey rectangles.

A

13. A high school has 700 students. 10% of them are members of at least one of the two sports clubs of the school. The athletics club has 36 members, and there are exactly 22 students who are members of both the athletics and the basketball clubs.

a) Draw a set diagram of the students of the school, showing the information given in the problem.

b) How many members are there in the basketball club?

c) In the sports clubs of another school, there are 50 players of basketball, 17 of whom also do athletics. In that other school, a basketball player is selected at random. What is the probability that the selected student also does athletics?

a)	4 points	
b)	4 points	
c)	4 points	
Total:	12 points	

14. The auditorium of a theatre is shaped like a symmetrical trapezium. The rows of seats get shorter as we move farther away from the stage. In the very back row there are 20 seats, and there are 2 more seats in each row than the row behind. 500 students and 10 accompanying teachers just fill the whole auditorium. How many rows of seats are there?

12 points	

15. Students in the physics lab were given a mass measurement task. The measurement was carried out by 19 students. They obtained the following data, to the nearest gram: 37, 33, 37, 36, 35, 36, 37, 40, 38, 33, 37, 36, 35, 35, 38, 37, 36, 35, 37.

a) Make a frequency table of the data obtained.

b) What is the mean of the data to the nearest gram?

c) Find the median and the mode of the results.

d) Draw a bar chart representing the results of the measurement.

a)	3 points	
b)	3 points	
c)	2 points	
d)	4 points	
Total:	12 points	

B

You are required to solve any two out of the problems 16 to 18. Write the number of the problem NOT selected in the blank square on page 2.

16. Solve the following equations:

a) $\log_3\left(\sqrt{x+1}+1\right)=2$ x is a real number and $x \geq -1$

b) $2\cos^2 x = 4 - 5\sin x$ x denotes an arbitrary angle of rotation

a)	6 points	
b)	11 points	
Total:	17 points	

You are required to solve any two out of the problems 16 to 18. Write the number of the problem NOT selected in the blank square on page 2.

17. A promotion gift of a company is a regular hexagon-based right pyramid made of wood. The sides of its base are 4.2 cm and the height of the pyramid is 25 mm.

a) How many cm^3 of wood is contained in such a pyramid?

b) The lateral faces of the pyramid are painted in colours. How many cm^2 is the surface to be painted on one pyramid?

c) The lateral faces of the pyramid are painted in six different colours, and each face is painted in a single colour. How many different colourings are possible? (Two colourings are considered different if they cannot be obtained from each other by rotating the pyramid.)

d) At the entrance to the company building, there is a ten times magnified version of this pyramid. By what factor does the magnified object contain more wood than the object given away as a present?

a)	4 points	
b)	8 points	
c)	3 points	
d)	2 points	
Total:	17 points	

You are required to solve any two out of the problems 16 to 18. Write the number of the problem NOT selected in the blank square on page 2.

18. In 2001 the monthly electricity bill for a household consisted of three entries.

- a flat fee of 240 Ft, independent of the energy consumed,
- the amount charged at the normal (daytime) rate, (19.8 Ft for 1 kWh consumed),
- the amount charged at the reduced (night-time) rate, (10.2 Ft for 1 kWh consumed).

12% of the total of the bill was added as consumption tax (VAT).

a) To the nearest forint, how much did a family pay in a month when their consumption was 39 kWh at the normal rate and 24 kWh at the reduced rate?

b) Create a formula for the amount F to be paid if the consumption at the normal rate is x kWh, and the consumption at the reduced rate is y kWh.

c) What was the family's consumption at each of the normal and reduced rates in the month when they paid 5456 Ft, given that they consumed twice as much energy at the normal rate as at the reduced rate?

d) What was the ratio of their normal and reduced rate consumptions in the month when they paid the same amount for the energies charged at the two different rates (without the flat fee and the tax)?

a)	3 points	
b)	3 points	
c)	8 points	
d)	3 points	
Total:	17 points	

	number of problem	score attained	total	maximum score
Part A	13.			12
	14.			12
	15.			12
Part B				17
				17
		← problem not selected		
	TOTAL			**70**

	score attained	maximum score
Paper I		30
Paper II		70
GRAND TOTAL		100

date teacher

	score attained (elért pontszám)	score input for program (programba beírt pontszám)
Paper I (I. rész)		
Paper II (II. rész)		

date
(dátum)

teacher
(javító tanár)

registrar
(jegyző)