ÉRETTSÉGI VIZSGA ● 2006. május 9.

MATEMATIKA ANGOL NYELVEN MATHEMATICS

2006. május 9. 8:00

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA INTERMEDIATE LEVEL WRITTEN EXAM

I.

Időtartam: 45 perc
The exam is 45 minutes long

Pótlapok száma/Number of extra sheets	
Tisztázati/Final essays	
Piszkozati/Drafts	

**OKTATÁSI MINISZTÉRIUM
MINISTRY OF EDUCATION**

Important information

- The exam is 45 minutes long, after that you should stop working.

- You may work on the problems in arbitrary order.

- You may work with any calculator as long as it is not capable of storing and displaying textual information and you may also consult any type of four digit mathematical table. The use of any other kind of electronic device or written source is forbidden.

- **The answer for a question should be entered into the frame** indicated below the text. The argument should be written down ony if the question itself asks you to do so.

- You are supposed to work in pen; diagrams, however, may also be drawn in pencil. Anything written in pencil outside the diagrams cannot be evaluated by the examiner. Any solution or some part of a solution that is crossed out will not be marked.

- There is only one solution will be marked for every question.

Please, do not to write anything in the shaded rectangular areas.

1.   The set *A* consists of those even numbers that are greater or equal to 10 and not exceeding 20. The set *B* consists of the positive numbers divisible by 4.
Determine the elements of the set $A \cap B$.

$A \cap B = \{ \qquad\qquad \}$	2 points	

2.   The hypotenuse of a right-angled triangle is 3 cm long and the measure of one of its angles is 42°. Find the length of the leg opposite to the angle 42° rounded to two decimal places.

The length of the leg is cm.	2 points	

3.   Decide about each of the following statements if it is true or false.

   a)   If a natural number is divisible by 4 then it is even.
   b)   If a natural number is even then it is divisible by 4.
   c)   To be even is a necessary condition of divisibility by 4.
   d)   To be even is a sufficient condition of divisibility by 4.

a)	1 point	
b)	1 point	
c)	1 point	
d)	1 point	

4.   The respective heights in centimeters of the participants of a biking trip are
174, 172, 172, 171, 173, 173, 174, 175, 174.
Find the mode and the median of this data set.

| The mode is	1 point	
The median is	1 point	

5.   Write down the equation of the graph of the linear function sketched in the diagram.
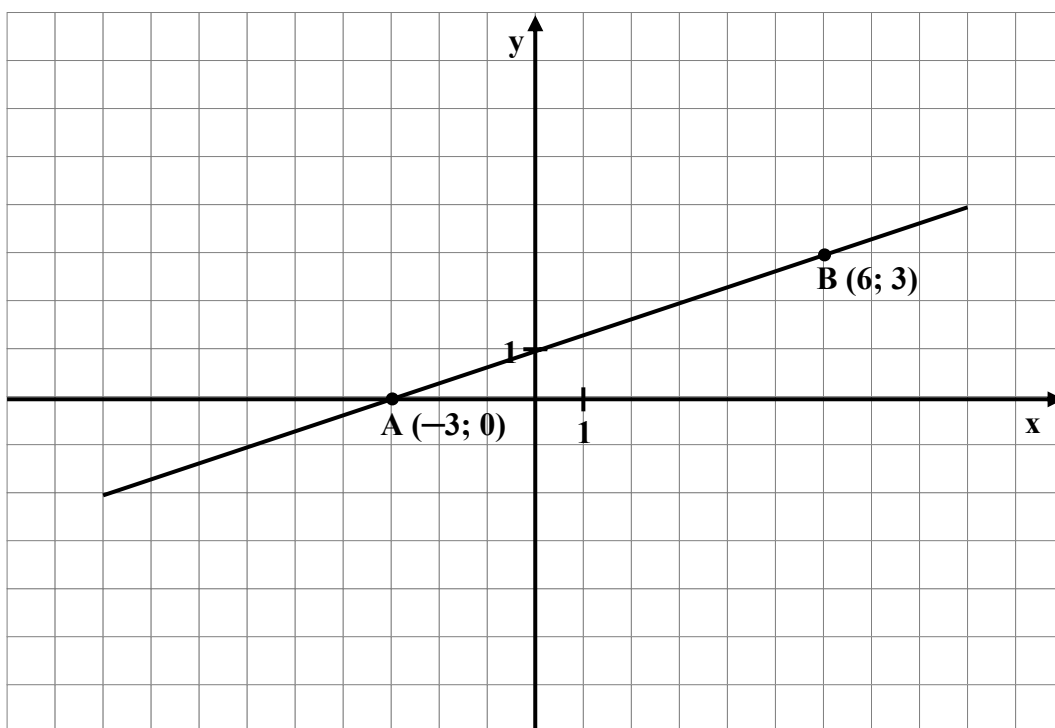
The equation of the graph of the function is	3 points	

6.   Seven cities are connected by a railway network as follows: there are direct lines connecting the city *A* to the cities *B*, *C* and *D*, respectively, there are direct lines between the city *B* and the cities *C* and *E*, respectively, finally there are also direct connections between the city *D* and the cities *F* and *G* , respectively.

Draw a graph displaying this railway system. What is the sum of the degrees of the vertices in this graph?

C
•

            B   *E*
A •   •   •

            G
D •   •

F •
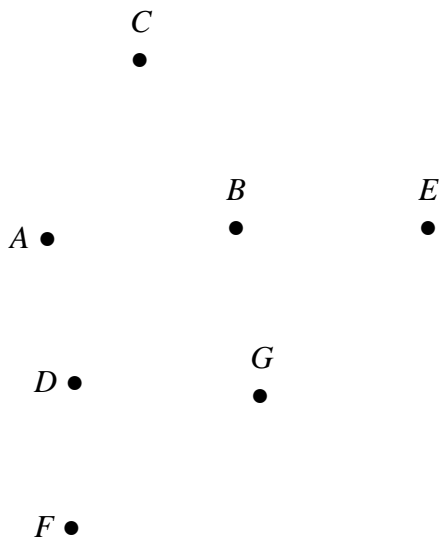
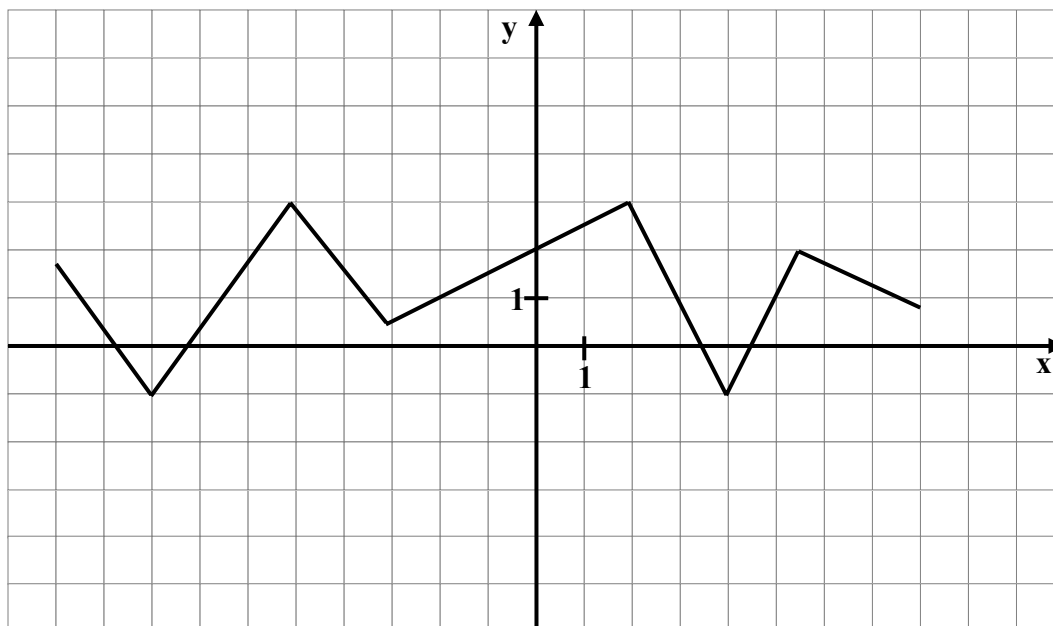|	1 point	
The sum of the degrees is	1 point	

7.   What is the negation of the following statement: "Every grandma is fond of her grandchild"?

	2 points	

8.   Which power of 10 is equal to $\dfrac{1}{\sqrt{10}}$?

The index is	2 points	

9.   Determine the range of the function whose graph is sketched in the diagram.


The range is	2 points	

10.   Four different kind of fruit trees are planted in a row: an apple tree, a pear tree, a peach tree and a plum tree. It is also given that there can be no peach tree at either end of the row. How many ways are there to plant these trees?

The number of possible arrangements is	3 points	

11.   What is the probability that the first number drawn in the National Lottery is a multiple of 10? (In the Hungarian lottery the five winning numbers are drawn from the integers between 1 and 90, without replacement.)
Justify your answer.

The probability is	3 points	

12.   Decide if the point $P(1,-3)$ is lying on the circle of centre $(-2,1)$ and radius 5.
You should justify your answer with appropriate calculations.
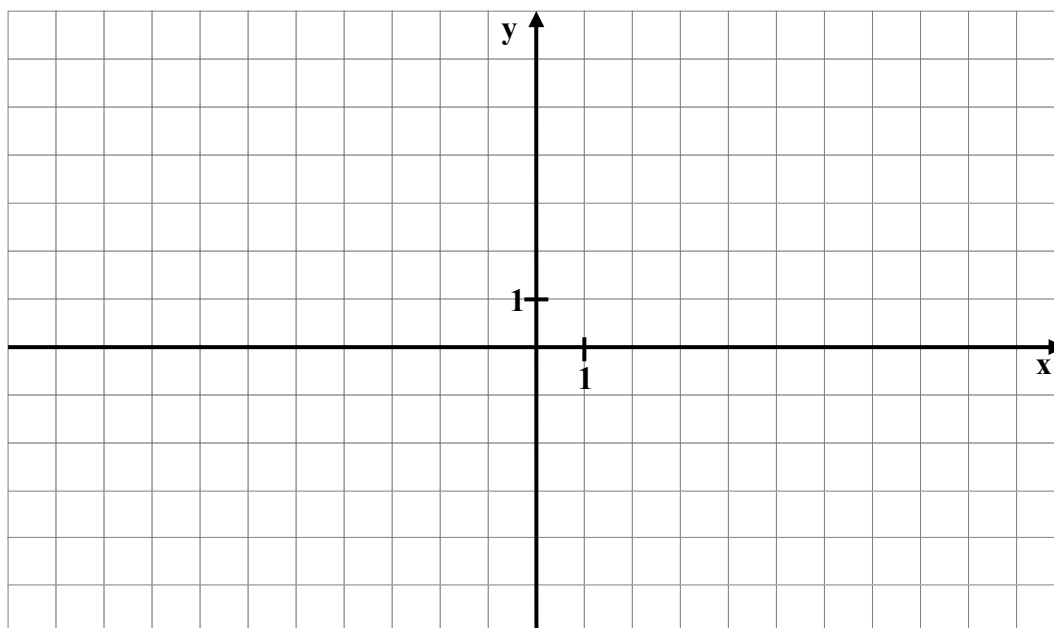
	3 points	

		maximal score	score
Part I.	Problem 1.	2	
	Problem 2.	2	
	Problem 3.	4	
	Problem 4.	2	
	Problem 5.	3	
	Problem 6.	2	
	Problem 7.	2	
	Problem 8.	2	
	Problem 9.	2	
	Problem 10.	3	
	Problem 11.	3	
	Problem 12.	3	
	TOTAL	**30**	

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            date   examiner

+
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	pontszáma /score	programba beírt pontszám /score written in the programme
I. rész /part I.		

_____
       dátum /date

_____   _____
    javító tanár /examiner   Jegyző /registrar

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!

Remarks:

1. If the candidate started working on Part II., this table and the signature area should be left blank.

2. If the exam is stopped while the candidate is working on Part I. or it is not continued with Part II, this table and the signature area should be filled.

ÉRETTSÉGI VIZSGA ● 2006. május 9.

MATEMATIKA ANGOL NYELVEN

MATHEMATICS

2006. május 9. 8:00

KÖZÉPSZINTŰ ÍRÁSBELI VIZSGA INTERMEDIATE LEVEL WRITTEN EXAM

II.

Időtartam: 135 perc

The exam is 135 minutes long

Pótlapok száma/Number of extra sheets	
Tisztázati/Final essays	
Piszkozati/Drafts	

OKTATÁSI MINISZTÉRIUM MINISTRY OF EDUCATION

Important information

- The exam is 135 minutes long, after that you should stop working.

- You may attempt the questions in arbitrary order.

- You are supposed to answer two out of the three questions in part II. **Please remember to enter the number of the question you have not attempted into the empty square below before finishing your paper.** Should there *arise any ambiguity* for the examiner as for which question should not be marked, it is question no. 18 that will not going to be assessed.

- You may work with any calculator as long as it is not capable of storing and displaying textual information and you may also consult any type of four digit mathematical table. The use of any other kind of electronic device or written source is forbidden.

- Remember to show your reasoning; a major part of the score is given for this component of your work.

- Remember to show your working, including substantial calculations.

- When you refer to a theorem that has been done at school and has a common name (e.g. Pithagoras' theorem, sine rule, etc.) you are not expected be state it meticulously; it is usually sufficient to put the name of the theorem. Its relevance and applicability, however, *should be breefly explained.*

- Remember to answer each question (i.e. the result) also in textual form.

- You are supposed to work in pen; diagrams, however, may also be drawn in pencil. Anything written in pencil outside the diagrams cannot be evaluated by the examiner. Any solution or some part of a solution that is crossed out will not be marked.

- There is only one solution will be marked for every question.

- Please, do not to write anything in the shaded rectangular areas.

A

13.   Solve the following equation on the set of real numbers.

$$\lg \sqrt{3x-2} + \lg \sqrt{4x-7} = \lg 2$$

12 points	

14. The diagram shows an umbrella hanging on the wall: its endpoints are denoted by *A* and *B*, respectively, and the arms of the string make an angle of 120°. It is also given that the total length of the string is 85 cm and the point of suspension is 25 cm distant from the endpoint *A*.

a)   Find the length of the umbrella to the nearest cm.
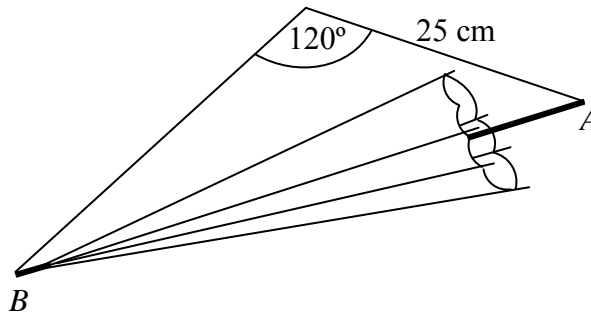
Next time this umbrella was hooked in such a way that the arms of the string made a right angle.

b)   Find, to the nearest centimeter, the disctance of the point of suspension from the endpoint *A* of the umbrella.

a)	5 points	
b)	7 points	
T.:	12 points	

15.   The following table shows the distribution of the ages, rounded to the nearest year, of a waterpolo team.

Age (years)	19	20	21	22	23	24	25	26	27	28
No. of players	1	1	3	2	3	1	4	3	1	3

a)   According to the training schedule, the players of this team are divided into three age-groups: those below 22 belong to the "recruitment" group, those above 25 are the "seniors" while the remaining players form the „main body" of the team. Display the number of players in these three age-groups on a bar chart.

b)   Calculate the mean age of the team.

c)   To participate on a press conference there are two players of age 25, another two of 28 and one player younger than 20 drawn randomly. How many outcomes of this draw are possible?

a)	4 points	
b)	3 points	
c)	5 points	
T.:	12 points	

B

You are supposed to answer any two out of the questions no. 16-18. The number of the question not attempted should be entered into the empty square on sheet no. 3.

16.   As a result of a monetary measure in Roumania the "hard" lej (NEW LEJ in the text) was introduced in the summer of 2005. The former currency, however, would also remain in circulation for an additional 18 months. Currency exchange and shopping is hence a pain in the neck for tourists, even if the exchange rule is pretty simple: the decimal point should be shifted by 4 places to the left, i. e. 10 000 lei = 1 NEW LEI. The exchange rate of the Hungarian currency is given as 1 HUF = 146 lej.

a)   A tourist purchases lejs for 20 000 HUF. How many lejs does he get if 2.5% of his payment is deducted for comission?

b)   Another tourist wants to receive 300 NEW LEJ. How much does she have to pay in HUF, if the comission is deducted as in the question **a)**?

c)   What is the exchange rate of the NEW LEJ relative to the Hungarian currency? Give the answer rounded to two decimal places.

d)   The small change of the NEW LEI is the NEW BANI: 100 NEW BANI = 1 NEW LEJ.
After shopping in a small store, the change is 90 NEW BANI. The cashier randomly picks up four ones out of one 50 NEW BANI coin, three 20 NEW BANI coins and four 10 NEW BANI coins. What is the probability that the change hence returned is correct?

a)	3 points	
b)	5 points	
c)	3 points	
d)	6 points	
T.:	17 points	

You are supposed to answer any two out of the questions no. 16-18. The number of the question not attempted should be entered into the empty square on sheet no. 3.

17.　The first term of a geometric progression is 5 and its common ratio is equal to r.

　　a)　　Write down, in terms of the given information, the third and the fifth terms of this geometric progression, respectively.

　　The first term of an arithmetic progression is 5 and its common difference is equal to d.

　　b)　　Write down, in terms of the given information, the fourth and the sixteenth terms of this arithmetic progression, respectively.

　　c)　　Find the value of d and r if it is given that the third and the fifth terms of the geometric progression are equal to the fourth and sixteenth terms of the arithmetic progression, respectively.

a)	2 points	
b)	2 points	
c)	13 points	
Ö.:	17 points	

You are supposed to answer any two out of the questions no. 16-18. The number of the question not attempted should be entered into the empty square on sheet no. 3.

18.   The rectangle on the diagram is the development of a cylinder of height 14 cm.

14 cm

31,4 cm
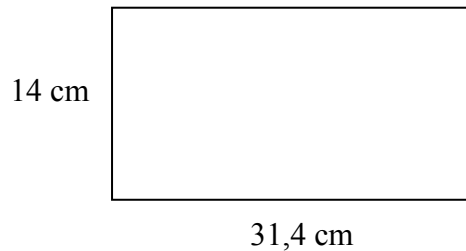
   a)   Find the volume of this cylinder correct to the nearest dm^3.

A semicircular disc of radius R is the development of a cone of height 14 cm.

   b)   Sketch the cone on a neat diagram, clearly indicating the data.
   c)   Find R correct to the nearest tenth of a centimeter.
   d)   What is the ratio of the area of the base of the cone to the surface area of its superficies?

a)	4 points	
b)	2 points	
c)	6 points	
d)	5 points	
T.:	17 points	

	No. of the question	score	total	maximal score
II./Part A	13.			12
	14.			12
	15.			12
II./ Part B				17
				17
		← question not chosen		
TOTAL				**70**

	score	maximal score
Part I.		30
Part II.		70
TOTAL		**100**

_____   _____
           date   examiner

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	Pontszám/Score	Programba beírt pontszám/Score entered in the programmme
I.rész /Part I.		
II. rész/Part II.		

_____
       dátum/date

_____   _____
    Javító tanár/examiner   Jegyző/Registrar of the Board of
                                            Examiners