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NUMER IDENTYFIKATORA:

MATHEMATICS EXAMINATION

29th of March 2014

Do not open the examination paper until instructed to do so.

The examination is divided into two parts:

- Part 1 contains eight short open questions. For each you can obtain 2 points. In the boxes provided for answers, please write your answer *only*. Additional calculations might be done on draft paper.
- In Part 2 you are asked to solve five exercises, showing all your work: calculations and reasoning. Write your answer in the box provided. Each exercise is worth 4 points.

Duration: 90 minutes.

PART ONE

Q 1

- a) How many two digit numbers are there, if they are composed only of 0, 1, 7, 8 and 9 and the digits are not repeated?
b) What is the highest common factor for the greatest two of them?

Answers: a)

b)

Q 2

In a rhombus, whose perimeter is 20, one of the diagonals is twice longer than the other.

- a) What is the length of the shorter diagonal?
b) What is the area of that rhombus?

Answers: a)

b)

Q 3

- a) How many different factors, besides oneself and 1, does 462 have?
b) Write them down.

Answers: a)

b)

Q 4

- a) Apples cost 2,50 zł a kilo, pears are 60% more expensive. By how many percent are apples cheaper than pears?
b) The price of oranges was decreased twice, each time by 20%. By how many percent should the present price be increased, in order to go back to the initial price?

Answers: a)

b)

Q 5

During a match a basketballer scored 27 points succeeding 9 shots worth two or three points.

- a) How many times did he succeed in shooting for three points?
- b) Is it possible to score 19 points?

Answers: a)

b)

Q 6

a) Sum of two positive numbers is greater than their difference by 5. What is the ratio of the greater by the smaller?

b) How much is n, if $18 - \sqrt{2^{2n+1} + 1} = 1$?

Answers: a)

b)

Q 7

The length of the diagonal of a cube is 3.

- a) What is the total surface area of this cube?
- b) What is its volume?

Answers: a)

b)

Q 8

A cubic meter of air weighs 1.2 kg.

- a) How many milligrams does one litre of air weigh?
- b) How many kilos does the air contained in a 3m high and 50m² large apartment weigh?

Answers: a)

b)

PART TWO

Remember to show clearly all your work

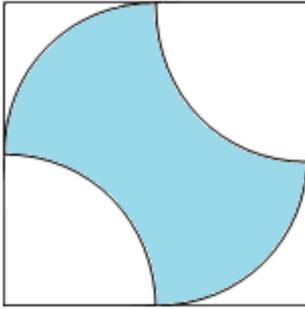
E 1: How many natural numbers such that $\frac{n+17}{n+2}$ is a natural number are there?

Answer:

E 2: Tap A fills the bath in one hour, tap B does it in half an hour. If the two taps are open, how much time do they need to fill the bath?

Answers:

E 3: Calculate the area of the shaded part. The side of the square is 2.



Answer:

E 4

A sheet of A4 paper is a rectangle in which the ratio $v = \text{length}/\text{width}$ is such, that if we fold the paper in two (by the longer side) we get a rectangle with the same $v = \text{length}/\text{width}$ ratio. How much is v ?

Answer:

E 5

In a rectangular cuboid the areas of the three sides meeting in one vertex are P, Q and R. What is its volume?

Answer: