ENTRANCE EXAM

SAMPLE PAPER

MATHS

Examination paper

Part I consists of 12 multiple-choice questions (Questions 1-12). There is **only one** correct answer to each question. Please mark the correct answer in the Answer sheet by shading the appropriate box mark with letters A, B, C, or D. If you would like to change your answer, draw **a circle** around the box that you do not want to select and shade another box.

Part II consists of 6 longer questions (Questions 13-18). Write your solutions carefully in the places provided in the examination paper. Underline your final answers. The final answers should be transferred to the appropriate places in the Answer sheet.

For each correct answer to the question in Part I, you can obtain **2 points.** The maximum number of points for Part I is **24**.
The maximum number of points for Part II is **26.**

Using calculators is not permitted.
Please use a black or blue pen for writing your answers and shading the boxes. White-outs should not be used. Pencils should only be used for drawing.

Duration of the exam – 90 minutes.

Good luck!

Part I

[2p]

Question 1

Consider an n- sided prism whose base is an n- sided polygon. Each edge has the same probability of being chosen. In a random selection, the probability that the base edge is chosen is:

A. $\frac{1}{n}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. It cannot be determined

[2p]

Question 2

Two litres of a 2% saline solution have been mixed with three litres of a 3% saline solution. The concentration of the new saline solution is:

A. 5%

B. greater than 1% but smaller than 3%

C. greater than

D. 1%

[2p]

Question 3

Inequality $(2x^2 + 1)^2 < 0$, where x is a real number

A. has one solution.

B. has infinitely many solutions.

C. does not have any solutions.

D. has exactly two solutions.

[2p]

Question 4

There is a class in which any group of 5 selected students does not have students whose birthday is on the same day of the week. The maximum number of students in this class is:

A. 35

B. 29

C. 28

D. Neither of the above answers is correct

[2p]

Question 5

The volume of a right hexagonal pyramid whose height is 3 and base is a hexagon whose side is 4 is :

A. $64\sqrt{2}$

B. $24\sqrt{3}$

C. $16\sqrt{6}$

D. $16\sqrt{2}$

[2p]

Question 6

An incline railway goes up the mountain slope that makes a 30^{o} angle with the horizontal line. The average speed of the train is $9\ \frac{\text{km}}{\text{h}}$ and it takes the train 12 minutes to go from the bottom station to the top station. Assuming that the tracks make the straight line, we can deduce that the difference in heights between the stations is :

A. 450 m

B. 900 m

C. $900\sqrt{3}$ m

D. 600 m

[2p]

Question 7

The price of the coffee- maker has been first increased by 10%, then decreased by 30%, and now is 154 zł. The original price of this coffee-maker was:

A. 200 zł.

B. 202 zł.

C. 196 zł.

D. 219 zł.

[2p]

Question 8

There are 25 students in class A and 15 students in class B. The mean grade in class A is 4 and the mean grade in class B is 4.4. The classes have been joined together. The mean grade of the new class is:

A. 4.15

B. 4.3

C. 4.25

D. 4.1

[2p]

Question 9

From the set of following numbers : 3, 4, 1, 5, 1, 3, 1 one number has been taken out, but the median of the set has not changed. The number that has been removed is :

A. 1

B. 3

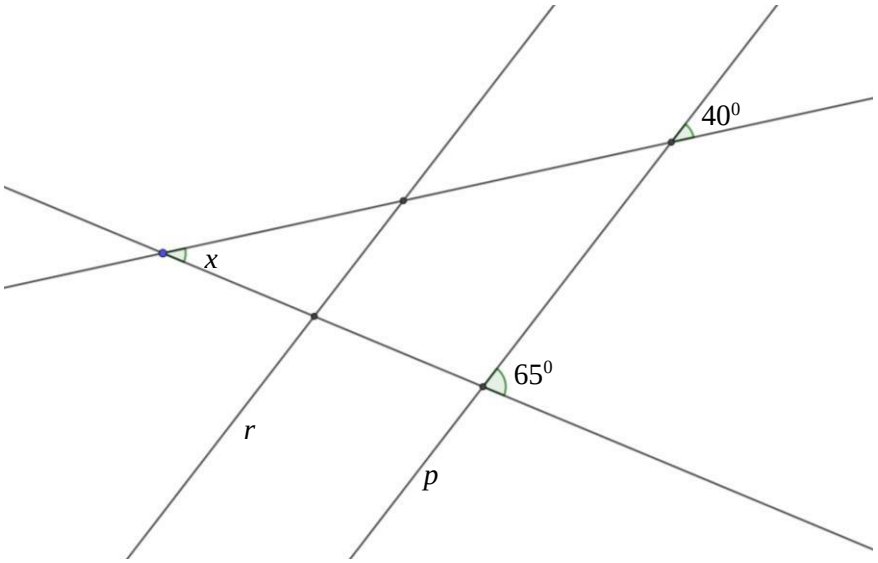
C. 4

D. 5

[2p]

Question 10

The lines *r* and *p* are **parallel.**



The size of the angle *x* is:

A. 25˚

B. 30˚

C. 35˚

D. 40˚

Question 11

[2p]

A fair coin is tossed 3 times. If the head is obtained, we write 5. If the tail occurs, we write 4. The result of this experiment is a three-digit number. What is the probability that the number obtained is divisible by **6**?

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{3}{8}$

D. $\frac{3}{4}$

[2p]

Question 12

The scale of the map is 1:50 000. The straight-line distance between two cities: A and B on this map is 4.5cm. The real distance along the straight line between these towns is equal to :

A. 2 km.
B. 2 km 500 m.
C. 3 km.
D. 2 km 250 m.

Część II

[4p]

Question 13

Solve the following equation:

$$(x-2)(x-5)+2\frac{2}{5}=x^2-\frac{32x-56}{5}$$

[2p]

Question 14

Compare the following numbers : $\frac{10}{16}$ and $\frac{4+\sqrt{3}}{8}$.

Explain your answer.

[3p]

Question 15

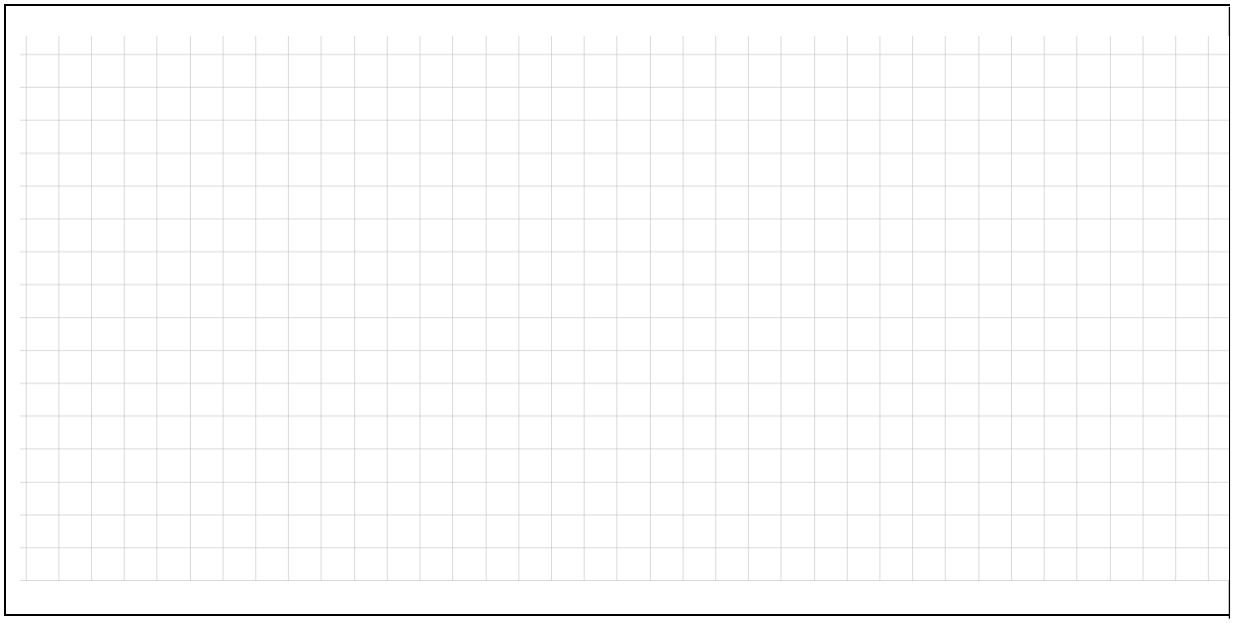
The mean age of students attending a Math Club is 14.5 years. If the oldest student is 18 years old and the mean age of the remaining students is 14 years, how many members attend the Math Club?

[5p]

Question 16

An ant walked along the straight lines on the surface of the cuboid (squared-base right prism) from vertex *A* to vertex *C'* where *A C'* is the diagonal of this cuboid. The distance travelled by the ant was the shortest. The dimensions of the cuboid are: 5cm x 5cm x 7 cm.

a) Draw the net of this cuboid in scale 1:2 (1 square represents 1 cm^2). **[2p]**



b) Calculate the distance traveled by the ant. **[3p]**

[3p]

Question 17

Find all integers (whole numbers) that are the solutions to the following inequality:

$$|2x + 6| < 5$$

Mark the solutions on the number line.

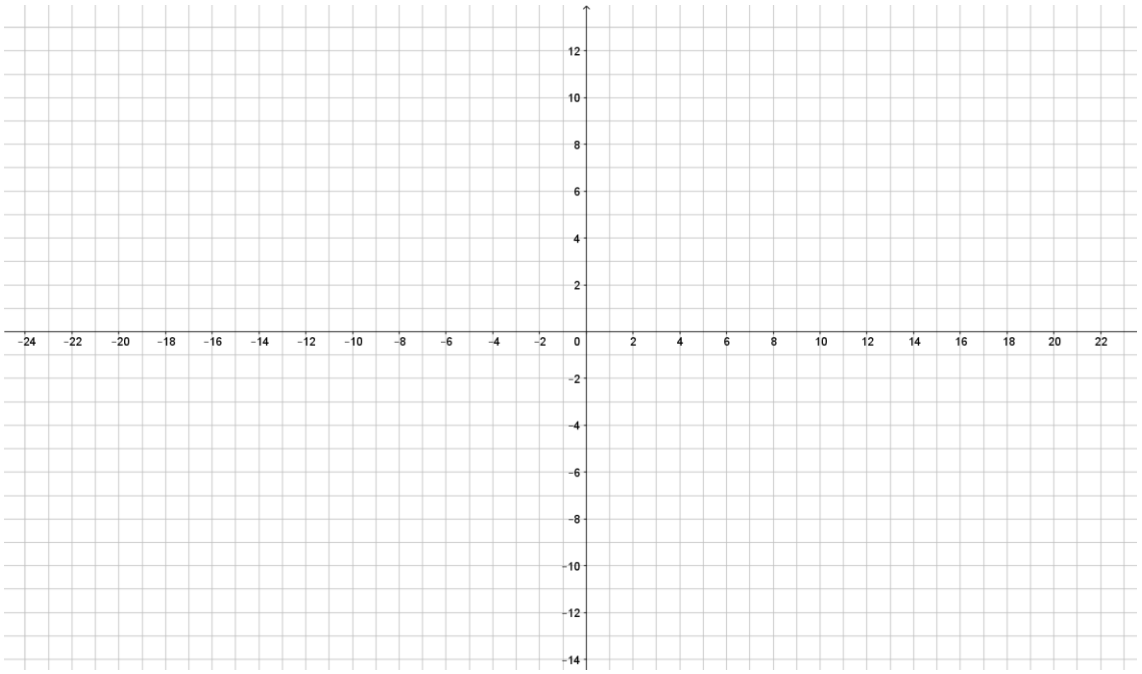
[9p]

Question 18

a) On the coordinate plane below mark the following points :

[1p]

$A(-3, -1)$, $B(1, -4)$, $C(6, 8)$**.**



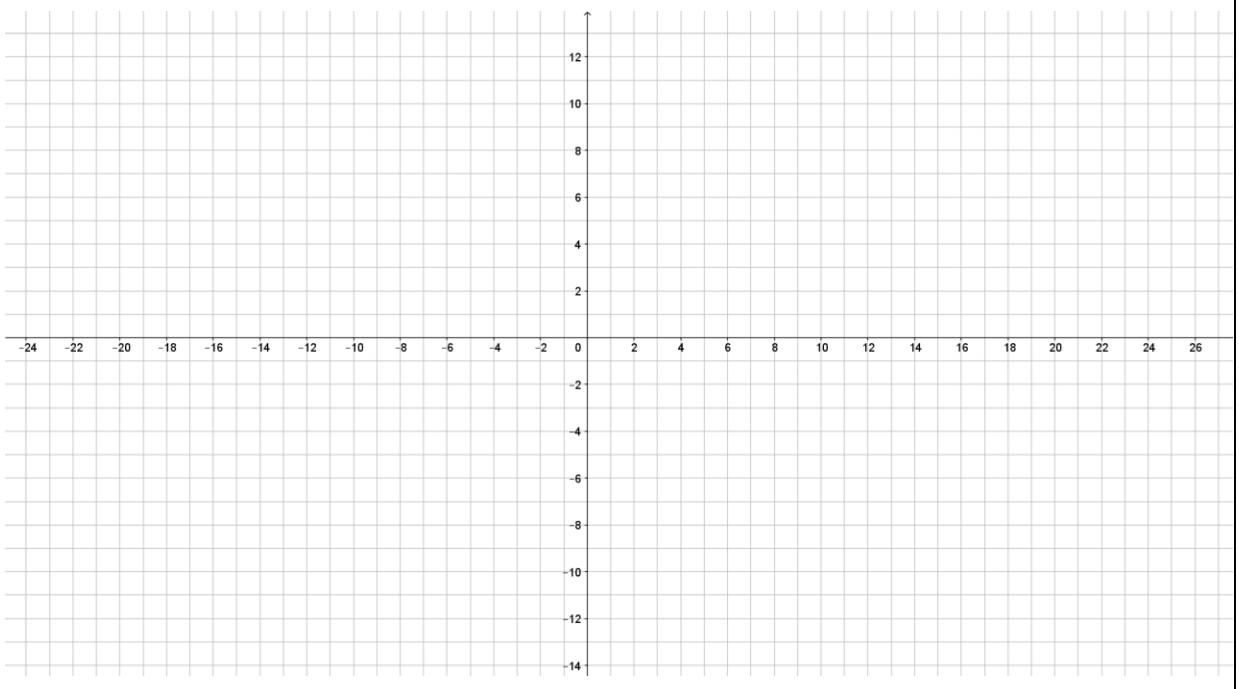
a) Find the perimeter of the triangle *ABC*. Write your answer in the simplest form.

[3p]

b) Find the area of the triangle *ABC*.

[2p]

c) On the diagram below, mark the points ABC and the point *D* in such a way that the quadrilateral with vertices at the points A, B, C, and D is a parallelogram. Consider all possible positions of the vertex D and write its coordinates. **[2p]**



d) Find the area of each of the parallelograms. **[1p]**

End of the exam.