2018年度日本政府（文部科学省）奨学金留学生選考試験

QUALIFYING EXAMINATION FOR APPLICANTS FOR JAPANESE GOVERNMENT (MEXT) SCHOLARSHIPS 2018

学科試験　問題

EXAMINATION QUESTIONS

(専修学校留学生)

SPECIALIZED TRAINING COLLEGE STUDENTS

数　　学

MATHEMATICS

注意☆試験時間は６０分。

PLEASE NOTE : THE TEST PERIOD IS **６０ MINUTES.**

(2018)

MATHEMATICS

Nationality		No.	
Name	(Please print full name, underlining family name)		

Marks	

Note that all the answers should be written on the answer sheet.

1. Fill in the following blanks with the correct answers.

(1) $\log_5 0.008 =$ ① , $(\sqrt[6]{16})^3 =$ ② .

(2) $\sin 75° + \sin 120° - \cos 150° + \cos 165° =$ ☐.

(3) $\dfrac{1}{3 \cdot 6} + \dfrac{1}{6 \cdot 9} + \dfrac{1}{9 \cdot 12} + \dfrac{1}{12 \cdot 15} =$ ☐.

(4) The number of integers x that satisfy the following inequalities $-x < x^2 < 6$ is ☐.

(5) Among four-digit integers where digits are all different numerals, the total possible number of integers that are greater than or equal to 5000 is ☐.

(6) When $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ and $|\vec{a}| = |\vec{b}| = |\vec{c}| = 1$, then the degree measure of the angle between $\vec{a}$ and $\vec{b}$ is ① ° and $|\vec{a} - \vec{b}| =$ ② .

(7) In the progression 3, 4, 6, 10, 18, ⋯⋯ , the numeral of the 8th term is ① , and the number of term that is 1026 is ② .

(8) Let $f(x) = x^2 - 4x + 1$.

(i) $f(-2) =$ ☐.

(ii) If $f(x) = 0$, $x =$ ① or $x =$ ② . (① < ②)

(iii) The area bounded by the parabola $y = f(x)$ and the x-axis is ☐.

(9) In a space with a coordinate system , there are three points A $(0,1,1)$, B $(-1,-1,2)$ and C $(2,3,1)$. The area of △ABC is ☐.

2. A quadrangle ABCD which is inscribed in a circle on a plane satisfies 2AB＝AC, BC＝$\sqrt{3}$, BD=DC and ∠BAC＝60° .

Fill in the following blanks with the correct numbers.

(1) The radius of the circumscribed circle of the quadrangle ABCD＝□.

(2) AC＝□.

(3) ∠BDC＝□°.

(4) The area of △BDC＝□ .

(5) The scalar product of two vectors $\overrightarrow{DC} \cdot \overrightarrow{CA}$＝□.

3. On the plane xy, the graph of the parabola $y = ax^2 + bx + c$ is shown in the figure below. Judge whether the following expressions are larger than or smaller than zero. Fill in the blanks with the correct marks; ＞ or ＜.

(1) a □ 0　　(2) $4ac - b^2$ □ 0

(3) $a + b + c$ □ 0　　(4) $4a - 2b + c$ □ 0

(5) $\frac{c}{a}$ □ 0　　(6) $\frac{b}{a}$ □ 0

(7) $b + 4a$ □ 0　　(8) $2a + b$ □ 0