2012 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 (MONBUKAGAKUSHO) SCHOLARSHIPS 2012

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.

(2012)

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) $(2x+1)^2-4(x^2-3)=$ [ ].

(2) $(-2x^2y)^3\div(xy^2z)^2\times(-yz)^2=$ [ ].

(3) One solution of the quadratic equation $x^2+px+12=0$ is 3, then $p=$ [①], and another solution is [②].

(4) When $x+y=3$ and $xy=1$, then $x^2+y^2=$ [①] and $x^5+y^5=$ [②].

(5) The largest is [①] among $\sqrt{2}$, $\sqrt[3]{3}$, and $\sqrt[4]{4}$, and the smallest is [②] among $\cos 45^\circ$, $\tan 30^\circ$, and $\sin 120^\circ$.

(6) There are six points on a circumference. Make as many triangles as possible using three points among them, then the number of the triangles that can be made is [ ].

(7) The 20th term in a progression: 1, 4, 7, 10, ⋯ is [①], and the sum from the 1st term to the 20th term is [②].

(8) The inradius of an equilateral triangle whose one side length is 2, is [ ].

(9) The equation for the tangent line at point (1,0) in the curve $y=3x^2-4x+1$ is, $y=$ [①], and the area surrounded by the curve, the tangent line and the y-axis is [②].

2. On the plane xy, there are three points: $A(3,4)$, $B(2,2)$, $C(6,0)$.
Fill in the following blanks with the correct answers.

(1) The coordinates of the center of a circle on which points, A, B, and C are located, are (① , ②), and the radius of this circle is ③ .

(2) The scalar product of two vectors $\overrightarrow{BA}\cdot\overrightarrow{BC}=$ ☐ .

(3) $\angle ABC=$ ☐ ° .

(4) The distance from point B to the straight line AC is ☐ .

(5) When point L is the intersection of bisector of $\angle ABC$ and side AC, then $AL:LC=1:$ ☐ .

(6) $\overrightarrow{BL}=$ ① $\overrightarrow{BA}$ + ② $\overrightarrow{BC}$.

3. On the plane xy, graphs of parabola $y=ax^2+bx+c$ and straight line $y=dx+e$ are shown in the figure below. Judge whether the following expressions are larger than, smaller than or equal to zero. Fill in the blanks with the correct marks: $>$, $<$, $=$.

(1) a ☐ 0 (2) b ☐ 0

(3) d ☐ 0 (4) b^2-4ac ☐ 0

(5) $a+b+c$ ☐ 0 (6) $a-b+c$ ☐ 0

(7) $4a+2b+c$ ☐ 0 (8) $c-e$ ☐ 0