

2016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 2016

学科試験 問題

EXAMINATION QUESTIONS

(専修学校留学生)

SPECIAL TRAINING COLLEGE STUDENTS

数 学

MATHEMATICS

注意☆試験時間は60分。

PLEASE NOTE : THE TEST PERIOD IS 60 MINUTES.

MATHEMATICS

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

Marks	

answer sheet

question	answer						
1	(1)						
	(2)						
	(3)	①		②			
	(4)						
	(5)						
	(6)	①		②			
	(7)	①		②			
	(8)						
	(9)	(i)	①		②		
(ii)		①		②			
(iii)							
(iv)							
2	(1)				(2)		
	(3)				(4)		
	(5)	①		②			
3	(1)	①		②		③	
	(2)	①		②		③	
	(3)	①		②		③	

MATHEMATICS

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Marks	

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

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

(1) The number of integers x that satisfy the following inequalities

$$x^2 - 5x + 1 < 0 \text{ is } \boxed{}.$$

(2) When $-1 < a < 2$, then $\sqrt{a^2 + 2a + 1} + \sqrt{a^2 - 4a + 4} = \boxed{}.$

(3) When $2^x - 2^{-x} = 4$, then $2^{2x} + 2^{-2x} = \boxed{\textcircled{1}}$, $2^{3x} - 2^{-3x} = \boxed{\textcircled{2}}.$

(4) When $\log_3(x-3) - \log_9(x-1) = 0$, then $x = \boxed{}.$

(5) When $AB = x + 2$, $BC = x$, $AC = x - 2$, $\angle C = 120^\circ$ with $\triangle ABC$, then $x = \boxed{}.$

(6) Four - digit numbers are made using the digits $\{0, 1, 2, 3, 4\}$ where each digit is different.

How many four - digit numbers are there? The answer is $\boxed{\textcircled{1}}$.

How many four - digit odd numbers are there? The answer is $\boxed{\textcircled{2}}$.

(7) $1^2 + 2^2 + 3^2 + 4^2 + 5^2 = \boxed{\textcircled{1}}.$

$$6^2 + 7^2 + 8^2 + 9^2 + 10^2 + 11^2 + 12^2 + 13^2 = \boxed{\textcircled{2}}.$$

(8) Let $\vec{a} = (-1, 2)$, $\vec{b} = (1, x)$. When $2\vec{a} + 3\vec{b}$ and $\vec{a} - 2\vec{b}$ are the parallel vectors, then $x = \boxed{}.$

(9) Let $f(x) = x^2 + 2x - 1$, $g(x) = x + 1$

(i) If $f(x) = g(x)$, $x = \boxed{\textcircled{1}}$ or $x = \boxed{\textcircled{2}}.$

(ii) The coordinate of the vertex point of the parabola $y = f(x)$ is

($\boxed{\textcircled{1}}$, $\boxed{\textcircled{2}}$).

(iii) The equation of the tangent to the parabola $y = f(x)$ at the point $(0, f(0))$ is

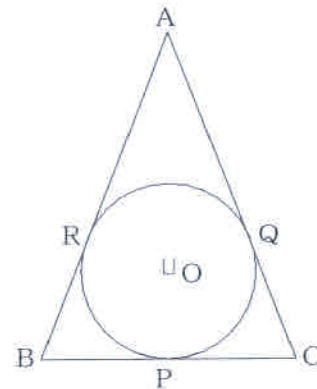
$$y = \boxed{}.$$

(iv) The area bounded by the parabola $y = f(x)$ and the line $y = g(x)$ is $\boxed{}.$

2. The circle O is an inscribed circle of $\triangle ABC$ and points P , Q and R are the points of tangency of sides BC , CA and AB respectively.

$$AB = AC = 13, BC = 10.$$

Fill in the following blanks with the correct numbers.



(1) $AR = \boxed{}$.

(2) $\sin \angle AOR = \boxed{}$.

(3) $\tan \angle AOR = \boxed{}$.

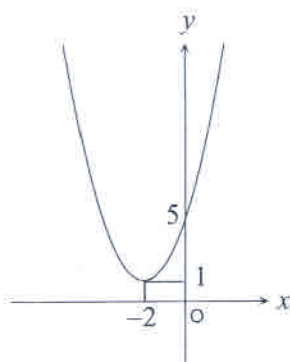
(4) The radius of the inscribed circle $O = \boxed{}$.

(5) The scalar product of two vectors $\vec{AB} \cdot \vec{AO} = \boxed{\textcircled{1}}$, $\vec{AB} \cdot \vec{BC} = \boxed{\textcircled{2}}$.

3. The graphs of function $y = ax^2 + bx + c$ on the plane xy are shown below.

Fill the blanks with the appropriate values of a , b and c for each graph.

(1)

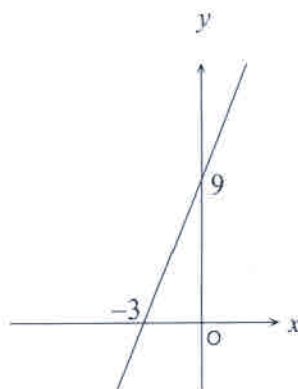


$$a = \boxed{\textcircled{1}}$$

$$b = \boxed{\textcircled{2}}$$

$$c = \boxed{\textcircled{3}}$$

(2)

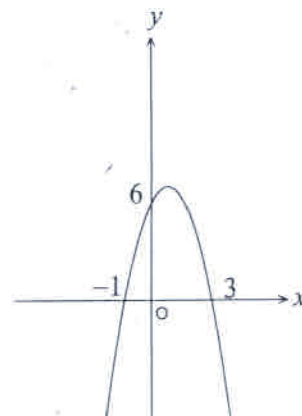


$$a = \boxed{\textcircled{1}}$$

$$b = \boxed{\textcircled{2}}$$

$$c = \boxed{\textcircled{3}}$$

(3)



$$a = \boxed{\textcircled{1}}$$

$$b = \boxed{\textcircled{2}}$$

$$c = \boxed{\textcircled{3}}$$