

(2014)

MATHEMATICS

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

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

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

(1) The number of the integer to satisfy the inequality $x^2 - 6x + 3 < 0$ is .

(2) $\sin 30^\circ + \cos 120^\circ + \tan 45^\circ =$.

(3) When $2^{3x-2} = 128$, then $x =$.

(4) The maximum and minimum of $y = x^2 - 2x + 3$ ($0 \leq x \leq 3$) are ①

and ②, respectively.

(5) When $AB = 2\sqrt{3}$, $AC = 3$, $\angle A = 30^\circ$ with $\triangle ABC$, then $BC =$ ① and $\angle C =$ ②°.

(6) The number of positive divisors with 108 is .

(7) When $x^2 - 2x + a$ is divisible by $x + 1$, then $a =$.

(8) Let $f(x) = 3x^2 - 2x + 1$. Then $f(2) =$ ①, $f'(1) =$ ②,

and $\int_0^2 f(x) dx =$ ③.

(9) There is a progression 1, 2, 4, a_4 , 11, 16, Then $a_4 =$.

(10) When two straight lines $3x - (a-3)y - 6 = 0$ and $(a+1)x + y - 1 = 0$ are vertical to each other, then the fixed number $a =$.

(11) When $a > 0$, then the minimum of $a + \frac{9}{a}$ is .

2. By assuming a circle $x^2 + y^2 - 4x + 6y + 8 = 0$, fill in the following blanks with the correct answers.

(1) The coordinates of the center P of this circle are (,) and the radius of this circle is .

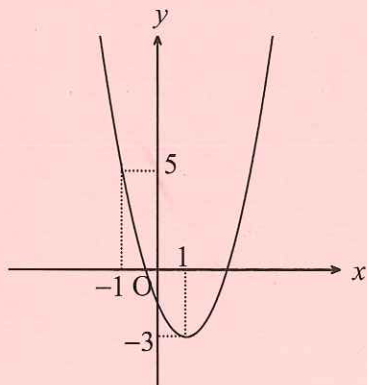
(2) The equation of the tangent at a point Q (3, -5) on the circumference is

$$x - \text{}y - \text{} = 0 . \quad \rightarrow \rightarrow$$

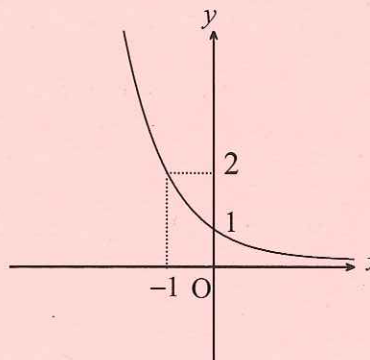
(3) Let there be a point R (1, -6). The scalar product of two vectors $\overrightarrow{QP} \cdot \overrightarrow{QR} = \text{}$ and $\tan \angle PRQ = \text{}$.

3. Choose the correct equation from ① to ⑫ to satisfy the following questions about the graphs (a) and (b), and fill in the blanks with the number.

(a)



(b)



(1) The equation that represents graph (a) is .

(2) The equation that represents a graph when graph (a) is moved symmetrically about the origin is .

(3) The equation that represents graph (b) is .

(4) The equation that represents a graph when graph (b) is shifted by -1 on the x-axis is .

(5) The equation that represents a graph when graph (b) is moved symmetrically about a straight line $y = x$ is .

① $y = 2x^2 + 4x - 1$

② $y = -2x^2 + 4x - 1$

③ $y = 2x^2 - 4x - 1$

④ $y = -2x^2 - 4x - 1$

⑤ $y = -2x^2 - 4x + 1$

⑥ $y = 2x^2 + 4x + 1$

⑦ $y = \log_{\frac{1}{2}} x$

⑧ $y = 2^{-x+1}$

⑨ $y = \left(\frac{1}{2}\right)^x$

⑩ $y = \log_2 x$

⑪ $y = 2^x$

⑫ $y = 2^{-x-1}$