

# THETA INDIVIDUAL TEST

## ANSWERS

FAMAT CONVENTION  
2002

①  $x^2 - 28 = 3x$   
 $x^2 - 3x - 28 = 0$   
 [A]  $(x-7)(x+4) = 0$   
 $x = 7$   ~~$x = -4$~~   
 so vertical  $4 = 21^\circ$

②  $\frac{1}{a} + \frac{1}{c} = \frac{1}{b}$   
 [E]  $bc + ab = ac$   
 $bc = a(c-b)$   
 $a = \frac{bc}{c-b}$

③  $\frac{A_{AXYZ}}{A_{AMNR}} = \frac{3^2}{5^2}$

[D]  $\frac{36}{A} = \frac{9}{25}$   
 $9A = 900$   
 $A = 100$   
 Area of  $\Delta MNR = 100$

④  $(n-2)180 = 3060$   
 [B]  $n-2 = 17$   
 $n = 19$

⑤  $S_{53} = \frac{53}{2}(2(-17) + 52(6))$   
 [B]  $= \frac{53}{2}(278)$   
 $S_{53} = 7367$

⑥  $3x^3 - 12x^2 + 5x - 20 = 0$   
 $3x^2(x-4) + 5(x-4) = 0$   
 [C]  $(3x^2 + 5)(x-4) = 0$   
 $3x^2 + 5 = 0$   $x-4 = 0$   
 not real  $x=4$

⑦  $-3 \leq x \leq 2$   
 [C]  $0 \leq x^2 < 9$   
 $2 \leq x^2 + 2 < 11$

⑧  $\sum x = y = 1$   
 $(1-3)^5 = (-2)^5$   
 [A]  $-32 = \text{sum of Coeff.}$

⑨  $9x^2 - 6x - 20 \geq 0$   
 $x = \frac{6 \pm \sqrt{36 + 720}}{18}$   
 [C]  $= \frac{6 \pm 6\sqrt{21}}{18}$   
 $= \frac{1 \pm \sqrt{21}}{3}$   
 $x \geq \frac{1+\sqrt{21}}{3}$   
 because  $x \leq \frac{1-\sqrt{21}}{3}$  not  $\geq -1$

⑩  $h^2 - 4(h-1) < 0$   
 $h^2 - 4h + 4 < 0$   
 $(h-2)^2 < 0$   
 [D] no real values  
 because  $x^2 \geq 0$

⑪  $ax + bx - cx = 0$   
 $x(a+b-c) = 0$   
 [A] since  $a+b \neq c$   
 $a+b-c \neq 0$  so  
 $x = 0$   $2x = 0$   
 $(a+b-c)^2 + (c-a-b)^2$   
 $1 + 1 = 2$

⑫  $(-bx) \left[ \frac{x}{b} - \frac{b}{x} \right] \left[ \frac{1}{b-x} \right]$   
 [B]  $\left( \frac{-bx}{1} \right) \left[ \frac{x^2 - b^2}{bx} \right] \left[ \frac{1}{b-x} \right]$   
 $= \frac{(x-b)(x+b)}{-1(x-b)} = x+b$

⑬  $\begin{vmatrix} x & 2 \\ x & 4 \end{vmatrix} - 1 \begin{vmatrix} 2 & 2 \\ 4 & 4 \end{vmatrix} + x \begin{vmatrix} 2 & 4 \\ 4 & x \end{vmatrix}$   
 $5(2x) - 24 + x(4x)$   
 [C]  $4x^2 + 10x - 24 = 0$   
 $2x^2 + 5x - 12 = 0$   
 $(2x-3)(x+4) = 0$   
 $x = \frac{3}{2}$   $x = -4$

⑭  $\sum a = k+1$   
 $a^2 + 3a - 4 = 0$   
 $(a+4)(a-1) = 0$   
 $a = -4$   $a = 1$   
 $k+1 = -4$   $k+1 = 1$   
 $k = -5$   $k = 0$

⑮  $y = \log_2 8 = 3$   
 [A]  $\log_8 2 = \frac{1}{3}$   
 $x = \left(\frac{1}{3}\right)^3 = \frac{1}{27}$   
 ~~$x = 3^{-3}$~~   
 $\log_3 3^{-3} = -3$

⑯  $\log 8(2.5) =$   
 $3 \log 2 + \log 2.5$   
 $3(.301) + (.398)$   
 $1.301$

⑰  $2x^2 - 7x + 3 = 0$   
 $(2x-1)(x-3) = 0$   
 $x = \frac{1}{2}$   $x = 3$

[B] Reciprocals are  $\frac{1}{3}, 2$   
 $(x-2)(3x-1) = 0$   
 $3x^2 - 7x + 2 = 0$

⑱  $2 \leq f(x) \leq 15$   
 $4 \leq 2f(x) \leq 30$   
 [C]  $1 \leq f(x) - 3 \leq 27$   
 $1 \leq g(x) \leq 27$

⑲  $f(2) = 12 \rightarrow (2, 12)$   
 $f(-1) = y \rightarrow (-1, y)$   
 [E]  $m = 3 = \frac{y-12}{-1-2}$   
 $-9 = y-12$   
 $3 = y$

⑳  $3x - 5y = 14$   
 $2x + 3y = -6$   
 [E]  $5x - 2y = 8$   
 $m_2 = 10x - 4y = 16$

㉑  $16^{x-1} = 64$   
 $(2^4)^{x-1} = 2^6$   
 [B]  $2^{4x-4} = 2^6$   
 $4x-4 = 6$   
 $x = \frac{10}{4} = 2.5$

㉒  $100000 = 203467.467$   
 $100x = 203,467$   
 [C]  $99,900x = 203,264$   
 $x = \frac{203264}{99900}$   
 $x = \frac{10624}{4995}$

㉓  $x = \frac{10624}{4995}$   
 [D]  $x = \log_2 8$   
 $x = 3$

㉔  $(2^{x+1})(3^{x-1})(5^4)$   
 $(2^{x+1})(3^{x-1})(2 \cdot 3^8)$   
 $2^{2x+2} \cdot 3^{x+2}$   
 $6^{x+2}$   
 [A]  $y = \frac{K\sqrt{x}}{P}$   
 $15 = \frac{K\sqrt{36}}{4} = \frac{5}{4}K$   
 $12 = K$   
 $y = \frac{12\sqrt{x}}{P}$   
 $y = \frac{12\sqrt{9}}{9} = \frac{36}{9}$   
 $y = 4$

㉕  $(4 - \frac{1}{2})(1 - \frac{1}{3}) \dots (1 - \frac{1}{10})$   
 [C]  $\left(\frac{7}{2}\right)\left(\frac{2}{3}\right)\left(\frac{3}{4}\right) \dots \left(\frac{9}{10}\right)$   
 $\frac{7}{10}$

㉖  $30 = 31x - x^2$   
 $x^2 - 31x + 30 = 0$   
 $(x-30)(x-1) = 0$   
 $x = 30$   $x = 1$

㉗  $(a-2b)^2 = 4^2$   
 $a^2 - 4ab + 4b^2 = 16$   
 $\downarrow$   
 $12$   
 $a^2 - 12 + 4b^2 = 16$   
 $a^2 + 4b^2 = 28$

㉘  $-2i(i+5)$   
 $-2i^2 + 10i$   
 $+2 + 10i$   
 [D]  $3 \times (8 \& 5)$   
 $3 \times [5(5-6)]$   
 $3 \times 19 = 9-57$