■ B

PICK UP

PICK UP ！ 三角関数の合成 $a\sin\theta+b\cos\theta\Rightarrow r\sin$

※ 「三角関数の合成」の原理

$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)\cdots$①とお

①の右辺は加法定理より， $r\sin(\theta+$

.

(1) $0<\theta<2\pi$ $\sin\left(\theta+\frac{1}{3}\pi\right)$ $\frac{1}{2}$

(2) $y=2\cos\left(3x+\frac{2}{3}\pi\right)$

2A. $f(\theta)=3\sin\theta+4\cos\theta$ $f(\theta)=r\sin$

$r=$, $\sin\theta=$, $\cos a=$

2B. $f(\theta)=5\sin\theta+12\cos\theta$ $f(\theta)=r\sin(\theta$

$r=$, $\sin\theta=$, $\cos a=$

$f(\theta)$

AB2

2

12

22

34

44

54

59

三角関数

PICK UP $a\sin\theta+b\cos\theta \Rightarrow r\sin(\theta+\alpha)$

$a\sin\theta+b\cos\theta=r\sin(\theta+\alpha)$ …

$$\begin{aligned} r\sin(\theta+\alpha) &= r(\sin\theta\cos\alpha+\cos\theta\sin\alpha)\\ &= r\sin\theta\cos\alpha+r\cos\theta\sin\alpha\\ &= (r\cos\alpha)\cdot\sin\theta+(r\sin\alpha)\cdot\cos\theta \end{aligned}$$

$\sin\theta$ $\cos\theta$

$a=r\cos\alpha,\ b=r\sin\alpha \Leftrightarrow \cos\alpha=\dfrac{a}{r},\ \sin\alpha=\dfrac{b}{r}$ …

r α $a\sin\theta+b\cos\theta$

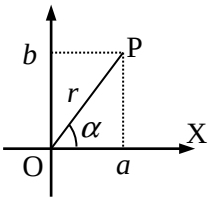
$r\sin(\theta+\alpha)$

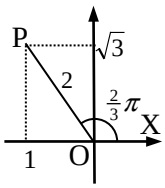
r α

O P(a, b)

x X r α

$r=\mathrm{OP}=\sqrt{a^2+b^2}$ $\alpha=\angle\mathrm{POX}$





[1] $a\sin\theta+b\cos\theta$ P(a, b)

[2] OP $\angle\mathrm{POX}$ $\mathrm{OP}\sin(\theta+\angle\mathrm{POX})$

: $-\sin\theta+\sqrt{3}\cos\theta$ P $(-1,\ \sqrt{3})$

($\mathrm{OP}=2$ $\angle\mathrm{POX}=\dfrac{2}{3}\pi$ $-\sin\theta+\sqrt{3}\cos\theta=2\sin\left(\theta+\dfrac{2}{3}\pi\right)$)

. $f(\theta)=\sqrt{3}\sin\theta+\cos\theta$ (0 θ π)

$\sqrt{3}\sin\theta+\cos\theta=$ □ $\sin\left(\theta+\dfrac{\square}{\square}\pi\right)$

$f(\theta)$ □ □

□

$f(\theta)=\sqrt{3}\sin\theta+\cos\theta=2\sin\left(\theta+\frac{1}{6}\pi\right)$

$r\sin\theta$ r x ( )

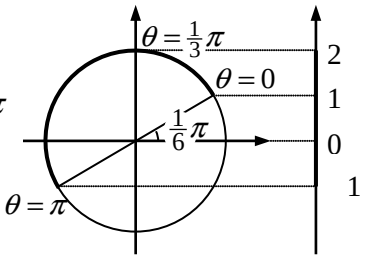
θ y $f(\theta)=2\sin\left(\theta+\frac{1}{6}\pi\right)$

$f(\theta)$ 2 $\theta+\frac{1}{6}\pi$

y 0 θ π

$f(\theta)$ y

2 ($\theta=\frac{1}{3}\pi$) 1 ($\theta=\pi$)



( ) 2 ( ) 1 ( ) 6 ( ) 2 ( ) 1

(1) $0 \quad \theta < 2\pi$ $\sin\left(\theta + \frac{1}{3}\pi\right) \quad \frac{1}{2}$ $\tan\theta \quad 1$

(2) $y = 2\cos\left(3x + \frac{2}{3}\pi\right)$ $y = 2\cos 3x$

x

(3) $\sin\frac{5}{12}\pi$

(4) 2 $y = 3x - 1$ $y = \frac{1}{2}x + 1$

(5) $0 \quad \theta < 2\pi$ $f(\theta) = \cos 2\theta - 2\sin\theta$ $\theta =$

$\theta =$

(6) $0 \quad \theta < 2\pi$ $\sin 2\theta - \cos\theta = 0$ $\theta =$

(7) $y = 4\sin x + 3\cos x \quad (0 \quad x \quad \pi)$ $\tan x =$

(8) $y = \sin\theta + \cos\theta + 2\sin\theta\cos\theta \quad (0 \quad \theta \quad \pi)$

POINT

(1) $\theta + \frac{1}{3}\pi = X$ $0 \quad \theta < 2\pi$ $\frac{1}{3}\pi \quad X < \frac{7}{3}\pi$

(2) $y = A\cos Bx$ $\frac{2\pi}{B}$ x C

$y = A\cos B(x - C)$

(3) $\sin(\alpha \pm \beta) = \sin\alpha \cdot \cos\beta \pm \cos\alpha \cdot \sin\beta$

(4) $y = 3x - 1$ x α $\tan\alpha = 3$

$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \quad \tan\alpha \cdot \tan\beta}$$

(5) 2 $\cos 2\theta = \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

(6) 2 $\sin 2\theta = 2\sin\theta \cdot \cos\theta$

(7) **PICK UP**

(8) 1 t

1A. (1) $\tan\theta = -\frac{3}{4}$ $(\pi < \theta < 2\pi)$

$\cos\theta =$ $\square$ $\sin\left(\theta + \frac{3}{4}\pi\right) =$ $\square$ $\sin 2\theta =$ $\square$

(2) 0 $\theta < 2\pi$ $\cos 2\theta > \sin\theta$

0 $\theta <$ $\square$ π $\square$ $\pi < \theta <$ $\square$ π $\square$ $\pi < \theta < 2\pi$

(3) $3\sin\theta - \sqrt{3}\cos\theta = 3$ θ 0 $\theta < 2\pi$

$\theta =$ $\square$ π $\square$ π $\square$ $\pi <$ $\square$ π

1B. $\square$ $\square$

(1) $\cos\theta = -\frac{5}{13}$ $(\pi < \theta < 2\pi)$

$\tan\theta =$ $\square$ $\sin\left(\theta - \frac{\pi}{4}\right) =$ $\square$ $\sin 2\theta =$ $\square$

(2) 0 $\theta < 2\pi$ $\cos\theta + \cos 2\theta < 0$ $\square < \theta <$ $\square$ $\square < \theta <$ $\square$

$\square <$ $\square$

(3) $\sqrt{3}\sin\theta - 3\cos\theta = -\sqrt{3}$ θ 0 $\theta < 2\pi$

$\theta =$ $\square$, $\square$ $\square <$ $\square$

⓪	0	$\frac{1}{6}\pi$	$\frac{1}{4}\pi$	$\frac{1}{3}\pi$	$\frac{1}{2}\pi$
	$\frac{2}{3}\pi$	$\frac{3}{4}\pi$	$\frac{5}{6}\pi$	π	$\frac{7}{6}\pi$
○	$\frac{5}{4}\pi$	⑧ $\frac{4}{3}\pi$	ⓒ $\frac{3}{2}\pi$	ⓓ $\frac{5}{3}\pi$	ⓔ $\frac{7}{4}\pi$
ⓕ	$\frac{11}{6}\pi$	ⓖ 2π			

2A. $f(\theta) = 3\sin\theta + 4\cos\theta$ $f(\theta) = r\sin(\theta + \alpha)$ ($r > 0$)

$r =$ $\sin\alpha =$ $\cos\alpha =$ $0 \quad \theta \quad \pi$ $f(\theta)$

$-$ $f(\theta)$ θ θ_0

$\sin\theta_0 =$ $\cos\theta_0 =$

2B. $f(\theta) = 5\sin\theta + 12\cos\theta$ $f(\theta) = r\sin(\theta + \alpha)$ ($r > 0$)

$r =$ $\sin\alpha =$ $\cos\alpha =$ $0 \quad \theta \quad \frac{1}{2}\pi$

$f(\theta)$ $f(\theta)$ θ

θ_0 $\tan\theta_0 =$

3A. $t = \sin\theta + \cos\theta$ $(0 \quad \theta \quad \pi)$ … 2

$t^2 = \square + \square \sin\theta\cos\theta$ $\sin 2\theta = t^2 - \square$

$t = \sqrt{\square} \sin\left(\theta + \frac{\square}{\square}\pi\right)$ ($0 \quad \frac{\square}{\square}\pi < 2\pi$) θ

$0 \quad \theta \quad \pi$ t $\square$ t $\sqrt{\square}$

$f(\theta) = 2\sin 2\theta + 2(\sin\theta + \cos\theta) - 2$ … t

$\square t^2 + \square t - \square$ $0 \quad \theta \quad \pi$ $f(\theta)$

$f\left(\frac{\square}{\square}\pi\right) = \square\sqrt{\square}$

3B. $0 \quad \theta \quad \pi$

(1) $x = \sin\theta - \cos\theta$ $x = \sqrt{\square}\sin\left(\theta - \frac{\square}{\square}\pi\right)$ (

$0 \quad \frac{\square}{\square}\pi < 2\pi$) $\theta \quad 0 \quad \theta \quad \pi$

x $\square$ x $\sqrt{\square}$

(2) $y = 2(\sin\theta - 1)(\cos\theta + 1)$ y (1) x $y = \square x^2 + \square x - \square$

y $\square$ θ $\square$ $\square$

($\square$ $\square$)

⓪	0	$\frac{1}{6}\pi$	$\frac{1}{4}\pi$	$\frac{1}{3}\pi$	$\frac{1}{2}\pi$
	$\frac{2}{3}\pi$	$\frac{3}{4}\pi$	$\frac{5}{6}\pi$	π	

4A. $f(x)=4\cos^2 x+a\sin x\cos x+b$ $(0 \quad x<2\pi)$ $f\left(\frac{\pi}{6}\right)=4$ $f\left(\frac{2\pi}{3}\right)=-4$

□ □ □

(1) $a=\square\sqrt{\square}$ $b=\square$

(2) $f(x)=\square\left(\sqrt{\square}\sin 2x+\cos 2x\right)=\square\sin\left(2x+\square\right)$ $\left(\square>0\right)$

$f(x)$ x

□, □

⓪	0	$\frac{1}{6}\pi$	$\frac{1}{4}\pi$	$\frac{1}{3}\pi$	$\frac{1}{2}\pi$
	$\frac{2}{3}\pi$	$\frac{3}{4}\pi$	$\frac{5}{6}\pi$	π	$\frac{7}{6}\pi$
①	$\frac{5}{4}\pi$	② $\frac{4}{3}\pi$	③ $\frac{3}{2}\pi$	④ $\frac{5}{3}\pi$	⑤ $\frac{7}{4}\pi$
⑥	$\frac{11}{6}\pi$				

4B. $f(x)=a\sin x\cos x+b\cos^2 x$ $(0 \quad x \quad \frac{1}{2}\pi)$ $f\left(\frac{\pi}{4}\right)=0$

(1) $f\left(\frac{\pi}{4}\right)=0$ $b=\square a$ $f(x)$ a

$f(x)=\frac{a}{\square}\left(\sin 2x-\cos 2x-\square\right)$

(2) $f(x)$ $f\left(\frac{\pi}{12}\right)=-(1+\sqrt{3})$

$f(x)=\square\sin 2x-\square\cos 2x-\square$

(3) $0 \quad x \quad \frac{1}{2}\pi$ (2) $f(x)$ $\square\sqrt{\square}-\square$

□

5A. (1) $f(x)=\sin\left(3x-\frac{1}{4}\pi\right)$ $f(x)$ $\square\pi$

$y=f(x)$ $y=\sin\square x$ x $\frac{\square}{\square}\pi$

(2) $f(x)=\sin 2x$ 0 $x<2\pi$ $y=f(x)$ $y=\cos x$

$\square$ x

2 $x=\frac{\square}{\square}\pi$ $x=\frac{\square}{\square}\pi$ ($\frac{\square}{\square}>\frac{\square}{\square}$)

(3) $f(x)=\sin 5x$ 0 x π $f(x)=\cos x$ x $\square$

5B. (1) $y=2\sin 3x$ $\frac{\square}{\square}\pi$

$y=2\cos 3x$ $y=2\sin 3x$ x $\frac{\square}{\square}\pi$

$y=2\cos 3x=2\sin\left(3x-\frac{\square}{\square}\pi\right)$

($\frac{\square}{\square}\pi<\frac{\square}{\square}\pi$ 0 $\frac{\square}{\square}\pi<2\pi$)

(2) 0 x 2π $y=2\cos 3x$ $y=2$ x $\square$ $y=-2$

x $\square$ $y=\sin x$ $y=2\cos 3x$

$\sin x=2\cos 3x$ 0 x 2π $\square$

6A. $y=\sqrt{3}\sin\theta+3\cos\theta+2\sqrt{3}\cos\left(\theta+\frac{1}{3}\pi\right)$ (0 $\theta<2\pi$)

(1) $\sqrt{3}\sin\theta+3\cos\theta=\square\sqrt{\square}\sin\left(\theta+\frac{\square}{\square}\pi\right)$

(2) $y=\square\sqrt{\square}\sin\left(\theta+\frac{\square}{\square}\pi\right)$ y $\theta=\frac{\square}{\square}\pi$

6B. $y=3\sin\theta-3\cos\theta+\sqrt{6}\cos\left(\theta-\frac{1}{4}\pi\right)$ (0 θ π)

(1) $3\sin\theta-3\cos\theta=\square\sqrt{\square}\sin\left(\theta-\frac{\square}{\square}\pi\right)$

(2) $y=\square\sqrt{\square}\sin\left(\theta-\frac{\square}{\square}\pi\right)$ y $\square\sqrt{\square}$

$\square+\sqrt{\square}$

7A. a 0 $x < 2\pi$ $\cos 2x + \cos x = a\cos x$ …

(1) $a = 0$ $x =$ □, □, □

(□, □, □)

ⓐ	0	$\frac{1}{6}\pi$	$\frac{1}{4}\pi$	$\frac{1}{3}\pi$
	$\frac{1}{2}\pi$	$\frac{2}{3}\pi$	$\frac{3}{4}\pi$	$\frac{5}{6}\pi$
	π	$\frac{7}{6}\pi$	ⓞ $\frac{5}{4}\pi$	ⓑ $\frac{4}{3}\pi$
ⓒ	$\frac{3}{2}\pi$	ⓓ $\frac{5}{3}\pi$	ⓔ $\frac{7}{4}\pi$	ⓕ $\frac{11}{6}\pi$

(2) 4 □ $< a <$ □

$a =$ □, □ □

$a <$ □, □ $< a$ □

7B. 0 $\theta < 2\pi$ $f(\theta) = 2\sin 2\theta + a(\sin\theta - \cos\theta) - 1$ $x = \sin\theta - \cos\theta$

$f(\theta)$ x $f(\theta) = -$ □ $x^2 + ax +$ □

$x = \sqrt{\square}\sin\left(\theta - \frac{\square}{\square}\pi\right)$ x $-\sqrt{\square}$ x $\sqrt{\square}$

$f(\theta) = 0$ 4 $|a| < \frac{\square\sqrt{\square}}{\square}$

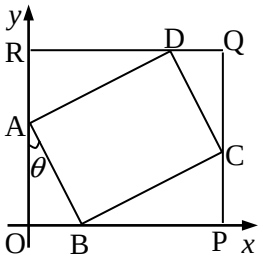
$f(\theta) = 0$ $|a| = \frac{\square\sqrt{\square}}{\square}$ □ $|a| > \frac{\square\sqrt{\square}}{\square}$

□

8A. AB = 3　BC = 4　　ABCD　　1

A　y　　B　x　　$\angle \mathrm{OAB} = \theta$

OPQR



(1)　Q　　$\left(\square\sin\theta+\square\cos\theta,\ \square\sin\theta+\square\cos\theta\right)$

(2)　θ　　PQ　　$\square$　　A　B

$$\mathrm{A}\left(0,\ \frac{\square}{\square}\right)\quad \mathrm{B}\left(\frac{\square}{\square},\ 0\right)$$

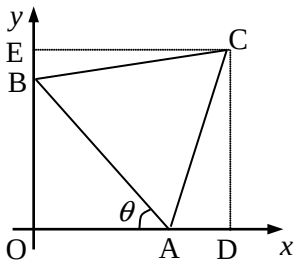
(3)　OPQR　　S　　$S=\square\sin\theta\cos\theta+\square$

S　$\theta=\dfrac{\square}{\square}\pi$　　$\dfrac{\square}{\square}$

8B. 1　　1　　1

A　x　　B　y　　$\angle \mathrm{OAB} = \theta$

C　x　y　　D　E



(1)　$\angle \mathrm{CAD}=\dfrac{\square}{\square}\pi-\theta$

$$\mathrm{CD}=\sin\left(\frac{\square}{\square}\pi-\theta\right)=\frac{\square}{\square}\sin\theta+\frac{\sqrt{\square}}{\square}\cos\theta$$

(2)　C　　$\left(\dfrac{\sqrt{\square}}{\square}\sin\theta+\dfrac{\square}{\square}\cos\theta,\ \dfrac{\square}{\square}\sin\theta+\dfrac{\sqrt{\square}}{\square}\cos\theta\right)$

(3)　ODCE　　S　　$a=\square$　　$b=\dfrac{\sqrt{\square}}{\square}$　　$S=a\sin\theta\cos\theta+b$

S　$\theta=\dfrac{\square}{\square}\pi$　　$\dfrac{\square+\sqrt{\square}}{\square}$

センター試験
数学ⅡB

実践問題演習

2011

第１回

実践問題演習

1　O　　A(a, b)　　C

$3x-4y=0$　　l

(1)　C

A　　l　　m

$$y=-\frac{\square}{\square}(x-a)+b$$

l　m　　B

$$\left(\frac{\square}{25}\left(\square a+\square b\right),\ \frac{\square}{25}\left(\square a+\square b\right)\right)$$

C　　r　　A　　l　　AB

$$r=\frac{1}{\square}\left|\square a-\square b\right| \quad \cdots$$

(2) C y $\mathrm{C}(3,\ 3)$ $a>0$ $b>0$

C

C y C r a

$b=\square a$

C C C

$$\left(x-\frac{\square}{\square}\right)^2+\left(y-\square\right)^2=\frac{\square}{\square} \quad \cdots$$

$$\left(x-\square\right)^2+\left(y-\square\right)^2=\square \quad \cdots$$

(3) P Q

PQ O O PQ $\square$ $\square$

1

1:1 1:1 1:2

1:2 2:1 2:1

2 m n

$\log_2 m^4 + \log_3 n^3$ 4 …

$m=1$ $n=3$ $\log_2 m^4 + \log_3 n^3 =$ m n

$m=2$ $n=9$ $\log_2 m^4 + \log_3 n^3 =$ m n

m n

$\log_2 m + \frac{\square}{\square} \log_3 n$ …

n $\log_3 n$

$\log_2 m$ $\log_2 m$ $m =$

$m =$ $<$

$m =$ $\log_3 n$ n^3

$m =$ n n

$m =$ m n

$m =$ m n

m n

p $f(x) = 2x^3 - 3px$

(1) $f(x)$ $f(x)$

$f'(x) = \square x^{\square} - 3p$ $f(x)$ $x = a$

$\square a^{\square} - 3p = \square$ $x = a$ $f'(x)$

p $\square$ $f(x)$

$\square$

$p = 0$ $p > 0$ p 0 $p < 0$ p 0

(2) $f(x)$ $x = \dfrac{p}{2}$ $y = f(x)$ C C

$\left(\dfrac{p}{2}, f\left(\dfrac{p}{2} \right) \right)$ A $f(x)$ $x = \dfrac{p}{2}$ $p = \square$

$f(x)$ $x = \square$ $x = \square$

C A 0 l l
l C x b l $(b, f(b))$ C
l b

$$y = \left(\square\, b^2 - \square\right)(x - b) + f(b)$$

l A

$$\square\, b^3 - \square\, b^2 + 1 = 0$$

$b =$ $\frac{\square}{\square}$ l 0

l

$$y = \frac{\square}{\square}x + \frac{\square}{\square}$$

A D l D
x 0 S D

$$y = \square\, x^2 - \square\, x$$

$$S = \frac{\square}{\square}$$

$\{a_n\}$ 8 $\{a_n\}$ 13 6

(1) $a_2 =$ $a_3 =$ $\{a_n\}$

$\{a_n\}$ n $n +$ $\{a_n\}$

$a_n =$ n $+$ $n +$ …

(2) $\{b_n\}$ $\frac{3}{14}$

$b_{n+1} = \frac{a_n}{a_{n+1} - 1} b_n \quad (n = 1, 2, 3 \cdots)$ …

$b_2 =$ $\{b_n\}$ n

S_n

n

$b_{n+1} = \frac{\square n + \square}{\square n + \square} b_n$ …

$c_n = (\square n + \square) b_n$ …

c_n c_{n+1} n

$(\square n + \square) c_{n+1} = (\square n + \square) c_n$

$d_n = (\square n + \square) c_n$ …

n $d_{n+1} = d_n$

$d_1 = \square$ n $d_n = \square$

$\{b_n\}$

$$b_n = \frac{\square}{(\square n + \square)(\square n + \square)}$$

$$b_n = \frac{\square}{\square n + \square} - \frac{\square}{\square n + \square}$$

$\{b_n\}$ n S_n

$$S_n = \frac{\square n}{\square n + \square}$$

OABC DEFG

O$(0, 0, 0)$ A$(\sqrt{2}, 0, 0)$ B$(\sqrt{2}, \sqrt{2}, 0)$ C$(0, \sqrt{2}, 0)$

D$(0, 0, \sqrt{2})$ E$(\sqrt{2}, 0, \sqrt{2})$ F$(\sqrt{2}, \sqrt{2}, \sqrt{2})$ G$(0, \sqrt{2}, \sqrt{2})$

OD 1 2 P OA 2 1 Q BF

R FG S P Q 4 PQRS

(1) PQRS $\overrightarrow{QP}$

$$\overrightarrow{QP} = \left(\frac{\square\sqrt{\square}}{\square}, \square, \frac{\sqrt{\square}}{\square} \right)$$

PQRS $\overrightarrow{QP} = \square$ $\square$

1

$\overrightarrow{RQ}$ $\overrightarrow{QR}$ $\overrightarrow{SR}$ $\overrightarrow{RS}$

R$(\sqrt{2}, \sqrt{2}, a)$ S$(b, \sqrt{2}, \sqrt{2})$ $\overrightarrow{QP} = \square$

$a = \dfrac{\square\sqrt{\square}}{\square}$ $b = \dfrac{\sqrt{\square}}{\square}$ R BF $\square$:1

$\overrightarrow{QP}$ $\overrightarrow{QR}$

$\overrightarrow{QP} \cdot \overrightarrow{QR} = \square$ $\left|\overrightarrow{QP}\right| = \dfrac{\sqrt{\square}}{\square}$ $\left|\overrightarrow{QR}\right| = \dfrac{\square\sqrt{\square}}{\square}$

PQRS $\dfrac{\square\sqrt{\square}}{\square}$

(2) PQRS α O α k

α k H $\left|\overrightarrow{\mathrm{OH}}\right|$ OQRS

$\mathrm{H}(l, m, n)$ $\overrightarrow{\mathrm{OH}}$ $\overrightarrow{\mathrm{QP}}$ $\overrightarrow{\mathrm{QR}}$

$\overrightarrow{\mathrm{OH}} \cdot \overrightarrow{\mathrm{QP}} = \overrightarrow{\mathrm{OH}} \cdot \overrightarrow{\mathrm{QR}} =$ $\square$ $n = \square\, l$ $m = \dfrac{\square}{\square}\, l$

$\overrightarrow{\mathrm{OH}}$ $\overrightarrow{\mathrm{HQ}}$ $l = \dfrac{\square\sqrt{\square}}{\square}$ $\left|\overrightarrow{\mathrm{OH}}\right|$

$\left|\overrightarrow{\mathrm{OH}}\right| = \dfrac{\square\sqrt{\square}}{\square}$

$\left|\overrightarrow{\mathrm{OH}}\right|$ QRS OQRS

OQRS $\dfrac{\square\sqrt{\square}}{\square}$