六、解答题(每小题 10 分,共 20 分)

25. 解:(1) $\frac{2}{3}$ (2 分)

(2) 当 $0 \leqslant x < \frac{2}{3}$ 时,如图①,过点 Q 作 $QH \perp AB$ 于 H.

由题意得 $QH = \sqrt{3}x$, $AP = 2x$.

$\therefore y = S_{\square PQMN} = AP \cdot QH = 2x \cdot \sqrt{3}x = 2\sqrt{3}x^2$. (4 分)

$\therefore y = 2\sqrt{3}x^2$.

当 $\frac{2}{3} \leqslant x < 1$ 时,如图②,设 QM 与 AD 交于点 G.

$\therefore y = S_{梯形PQGA} = \frac{1}{2}(QG + AP) \cdot QH$

$= \frac{1}{2}(2 - x + 2x) \cdot \sqrt{3}x = \frac{\sqrt{3}}{2}x^2 + \sqrt{3}x$. (6 分)

$\therefore y = \frac{\sqrt{3}}{2}x^2 + \sqrt{3}x$.

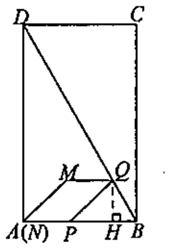
当 $1 \leqslant x \leqslant 2$ 时,如图③,

$y = S_{梯形PQGN} = \frac{1}{2}(QG + PN) \cdot GN$

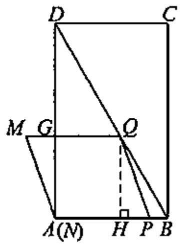
$= \frac{1}{2}(2 - x + 2)[\sqrt{3}x - 2\sqrt{3}(x - 1)]$

$= \frac{\sqrt{3}}{2}x^2 - 3\sqrt{3}x + 4\sqrt{3}$. (8 分)

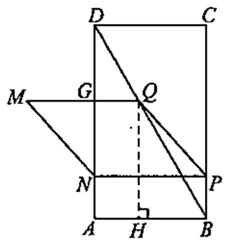
$\therefore y = \frac{\sqrt{3}}{2}x^2 - 3\sqrt{3}x + 4\sqrt{3}$.



图①

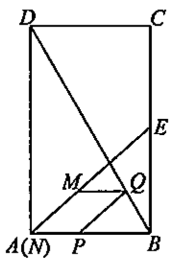


图②

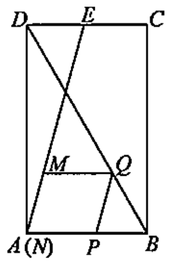


图③

(3) $\frac{2}{5}$ 或 $\frac{4}{7}$. (如图④,如图⑤) (10 分)



图④



图⑤

(第 25 题)

评分说明:1. 第(2)题,写自变量取值范围用"<"或"≤"均不扣分;

2. 第(2)题,结果正确,不画图或画图错误均不扣分.

26. 解:(1) $(-1, 4)$ (1 分)

3 (3 分)

(2) OE 长与 a 值无关.

理由:如图①,$\because y = ax^2 + 2ax - 3a$,

$\therefore C(0, -3a)$, $D(-1, -4a)$.

$\therefore$ 直线 CD 的解析式为 $y = ax - 3a$. (4 分)

当 $y = 0$ 时,$x = 3$.

$\therefore OE = 3$.

$\therefore OE$ 的长与 a 值无关. (5 分)

(3) 当 $\beta = 45°$ 时,在 Rt$\triangle OCE$ 中,$OC = OE$.

$\because OE = 3$, $OC = -3a$,

$\therefore -3a = 3$.

$\therefore a = -1$. (6 分)

当 $\beta = 60°$ 时,在 Rt$\triangle OCE$ 中,$OC = \sqrt{3}OE$.

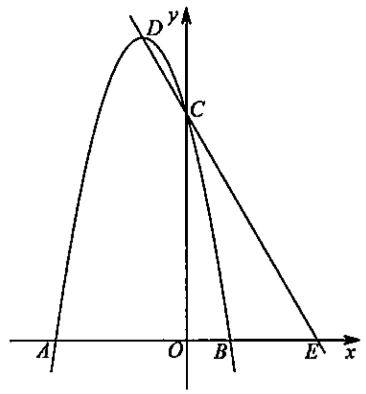
$\because OE = 3$, $OC = -3a$,

$\therefore -3a = 3\sqrt{3}$.

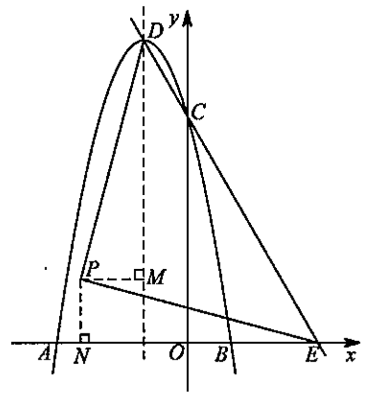
$\therefore a = -\sqrt{3}$. (7 分)

$\therefore$ 当 $45° \leqslant \beta \leqslant 60°$ 时,$-\sqrt{3} \leqslant a \leqslant -1$. (8 分)

(4) $n = -m - 1 (m < 1)$. (如图②) (10 分)



图①



图②

(第 26 题)

评分说明:1. 第(2)题,证明正确,但不先写结论不扣分;

2. 第(4)题,解析式正确给 1 分,自变量取值范围正确给 1 分.