-- ~~AP~~ BC Multiple Choice 1997

* NC means "No Calculator"

NC 21. Which of the following is equal to the area of the region inside the polar curve $r = 2\cos\theta$ and outside the polar curve $r = \cos\theta$?

(A) $3\int_0^{\frac{\pi}{2}} \cos^2\theta\, d\theta$ (B) $3\int_0^{\pi} \cos^2\theta\, d\theta$ (C) $\frac{3}{2}\int_0^{\frac{\pi}{2}} \cos^2\theta\, d\theta$ (D) $3\int_0^{\frac{\pi}{2}} \cos\theta\, d\theta$ (E) $3\int_0^{\pi} \cos\theta\, d\theta$

From 1999 Acorn Book

NC 23. The area of one loop of the graph of the polar equation $r = 2\sin(3\theta)$ is given by which of the following expressions?

(A) $4\int_0^{\frac{\pi}{3}} \sin^2(3\theta)\, d\theta$

(B) $2\int_0^{\frac{\pi}{3}} \sin(3\theta)\, d\theta$

(C) $2\int_0^{\frac{\pi}{3}} \sin^2(3\theta)\, d\theta$

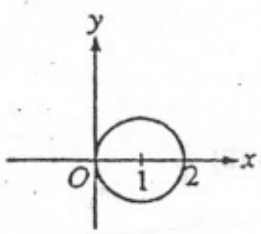
(D) $2\int_0^{\frac{2\pi}{3}} \sin^2(3\theta)\, d\theta$

(E) $2\int_0^{\frac{2\pi}{3}} \sin(3\theta)\, d\theta$

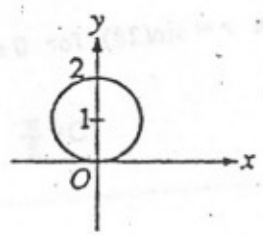
From 1993 BC (1998 → ruled no more strictly pre-cal)

NC 5. Which of the following represents the graph of the polar curve $r = 2\sec\theta$?

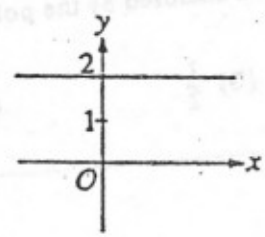
(A)



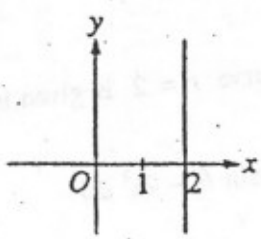
(B)



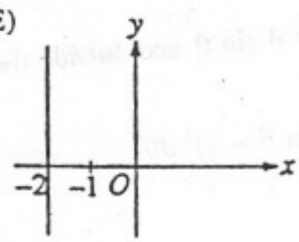
(C)



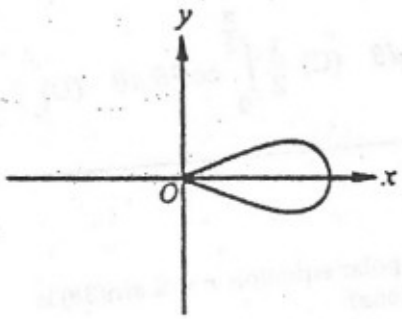
(D)



(E)



From 1988 BC



NC 23. Which of the following gives the area of the region enclosed by the loop of the graph of the polar curve $r = 4\cos(3\theta)$ shown in the figure above?

(A) $16\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \cos(3\theta)\, d\theta$ (B) $8\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \cos(3\theta)\, d\theta$ (C) $8\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \cos^2(3\theta)\, d\theta$

(D) $16\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \cos^2(3\theta)\, d\theta$ (E) $8\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \cos^2(3\theta)\, d\theta$

From 1985 BC

NC **The area of the region enclosed by the polar curve $r = \sin(2\theta)$ for $0 \le \theta \le \frac{\pi}{2}$ is**

(A) 0 **(B) $\frac{1}{2}$** (C) 1 **(D) $\frac{\pi}{8}$** **(E) $\frac{\pi}{4}$**

From 1998 BC

NC 19. The area of the region inside the polar curve $r = 4\sin\theta$ and outside the polar curve $r = 2$ is given by

(A) $\frac{1}{2}\int_0^{\pi} (4\sin\theta - 2)^2\, d\theta$ (B) $\frac{1}{2}\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} (4\sin\theta - 2)^2\, d\theta$ (C) $\frac{1}{2}\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (4\sin\theta - 2)^2\, d\theta$

(D) $\frac{1}{2}\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} (16\sin^2\theta - 4)\, d\theta$ (E) $\frac{1}{2}\int_0^{\pi} (16\sin^2\theta - 4)\, d\theta$

Answers to Polars

1997
21. A

1999
23. C

1993
5. D

1988
23. E

1985
24. D

1998
19. D