F.5 Mathematics

MC Exercise

4B10 Trigonometric Functions

1. If θ lies in quadrant II, which of the following must be true?

I. $\cos\theta + \tan\theta > 0$

II. $\sin\theta\cos\theta > 0$

III. $\sin\theta - \tan\theta > 0$

A. I only

B. III only

C. II and III only

D. None of the above

2. If $180° < \alpha < 270° < \beta < 360°$, which of the following must be true?

I. $\sin\beta > \tan\alpha$

II. $\cos\beta > \sin\alpha$

III. $\tan\beta > \cos\alpha$

A. II only

B. I and II only

C. I and III only

D. II and III only

3. If α is a straight angle and β is an acute angle, which of the following must be true?

I. $(\alpha - \beta)$ lies in quadrant I or quadrant III.

II. $\tan(\alpha - \beta) < 0$

III. $\cos(\alpha + \beta) < 0$

A. I only

B. II only

C. III only

D. II and III only

4. If $\sin\theta = -k$ and θ lies in quadrant IV, then $\tan\theta =$

A. $-\dfrac{k}{\sqrt{1-k^2}}$.

B. $-\dfrac{\sqrt{1-k^2}}{k}$.

C. $-\dfrac{\sqrt{1+k^2}}{k}$.

D. $\sqrt{\dfrac{1-k^2}{1+k^2}}$.

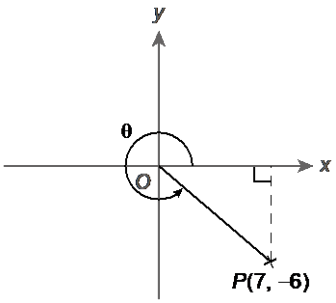
5. In the figure, $\dfrac{1}{17\sin\theta\cos\theta} - \tan\theta =$

A. $-\dfrac{41}{42}$.

B. $-\dfrac{31}{42}$.

C. $\dfrac{31}{42}$.

D. $\dfrac{41}{42}$.



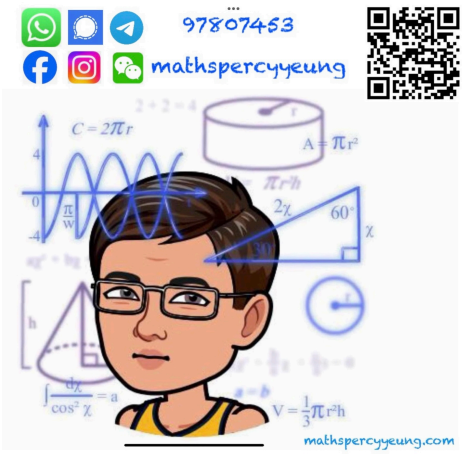
6. If $\cos^2\theta = \dfrac{5}{16}$ and θ is an obtuse angle, then $\tan^2\theta - 4\sin^2\theta =$

A. $-\dfrac{44}{5}$.

B. $-\dfrac{11}{20}$.

C. $\dfrac{99}{20}$.

D. $\dfrac{66}{5}$.



7. $\dfrac{\tan(180°+\theta)}{\sin(\theta+360°)\cos(90°-\theta)} =$

A. $\tan\theta$.

B. $\dfrac{1}{\tan\theta}$.

C. $\dfrac{1}{\sin\theta\cos\theta}$.

D. $-\dfrac{1}{\sin\theta\cos\theta}$.

8. $\dfrac{\cos(90°+\theta)+2\sin(180°-\theta)+3\cos(270°+\theta)}{\sin(\theta-360°)} =$

A. -4. B. -2.

C. 2. D. 4.

9. $\tan 225°\sin(-\theta)+2\sin 150°\cos(270°-\theta)$

$+\cos^2 330°\sin(360°+\theta) =$

A. $-\dfrac{5}{4}\sin\theta$. B. $-\sin\theta$.

C. $\dfrac{3}{4}\sin\theta$. D. $\dfrac{11}{4}\sin\theta$.

10. Given that

$\sin(270°-\theta)+\cos(270°+\theta)=\dfrac{\sqrt{6}}{2}$,

then $\sin\theta\cos\theta =$

A. $-\dfrac{1}{2}$. B. $-\dfrac{1}{4}$.

C. $\dfrac{1}{4}$. D. $\dfrac{1}{2}$.

11. If α, β and γ are the interior angles of a triangle, then $\cos\left(\dfrac{\alpha+\beta}{2}\right) =$

A. $\cos\dfrac{\gamma}{2}$. B. $-\cos\dfrac{\gamma}{2}$.

C. $\sin\dfrac{\gamma}{2}$. D. $-\sin\dfrac{\gamma}{2}$.

12. In ΔABC, $AB:BC:AC=7:24:25$. Find $\cos(\angle A-\angle B):\sin\angle C$.

A. $1:1$ B. $7:24$

C. $24:25$ D. $24:7$

13. If $0°<\theta<90°$, which of the following must be true?

I. $\sin\theta+\sin(180°-\theta)>0$

II. $\cos\theta-\cos(90°+\theta)>0$

III. $\tan(90°-\theta)\tan(180°+\theta)>0$

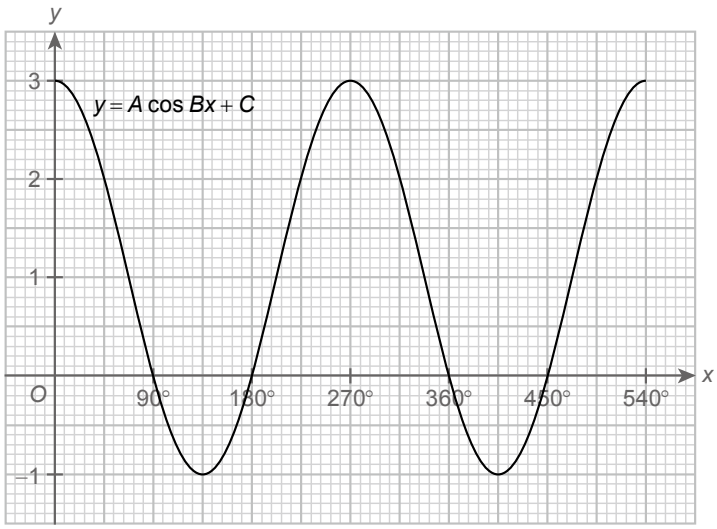
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

14. Let A, B and C be constants. The figure shows the graph of $y=A\cos Bx+C$. Find the period of $y=A\cos Bx+C$.



A. 90°

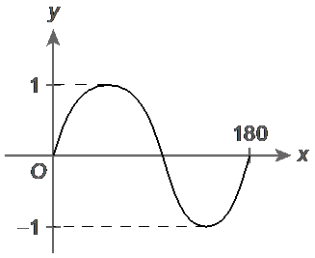
B. 180°

C. 270°

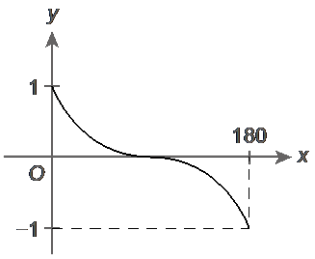
D. 540°

15. Which of the following may represent the graph of $y = \sin x°$ for $0 \le x \le 180$?

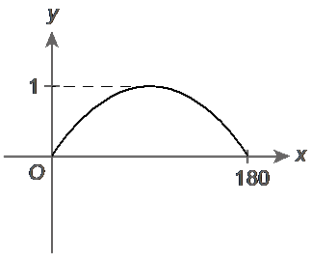
A.



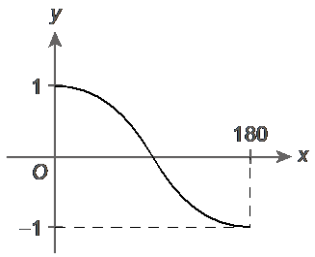
B.



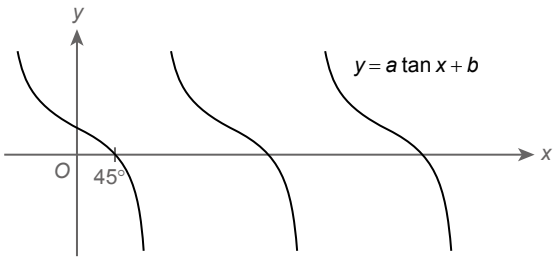
C.



D.



16. Let a and b be constants. If the following is the graph of $y = a\tan x + b$, which of the following are the possible values of a and b?



A. $a = -1$ and $b = -1$

B. $a = -1$ and $b = 1$

C. $a = 1$ and $b = -1$

D. $a = 1$ and $b = 1$

17. For $0° \le x \le 360°$, the least value of $\dfrac{10}{3 - \cos x}$ is

A. $\dfrac{5}{2}$.

B. $\dfrac{10}{3}$.

C. 5.

D. 10.

18. For $0° \le x \le 360°$, the greatest value of $\log_3(36\cos x + 45)$ is

A. $\log_3 45$.

B. 2.

C. 3.

D. 4.

19. For $0° \le x \le 90°$, the least value of $\dfrac{2\sin x + 6}{\sin x + 4}$ is

A. $\dfrac{4}{5}$.

B. $\dfrac{4}{3}$.

C. $\dfrac{3}{2}$.

D. $\dfrac{8}{5}$.

20. If $\sin x = \dfrac{\tan 60°}{2}$, where $0° \le x \le 360°$, then $x =$

A. 60°.

B. 120°.

C. 60° or 120°.

D. 60° or 150°.

21. If $\tan x = \dfrac{1}{\tan 335°}$, where $0° \le x \le 360°$, then $x =$

A. 25° or 115°.

B. 25° or 335°.

C. 115° or 295°.

D. 155° or 295°.

22. Find the inclination of a straight line $L: 8x+13y+3=0$, correct to 3 significant figures.

A. 31.6° B. 111°

C. 122° D. 148°

23. Solve the equation $3\tan\left(\frac{x}{2}-50°\right)+\sqrt{3}=0$, where $0° \le x \le 360°$.

A. $x=40°$

B. $x=340°$

C. $x=150°$ or $330°$

D. No solutions

24. How many distinct solutions are there for the equation $\sin x(2\sin x-1)=0$ where $0° \le x \le 360°$?

A. 2 B. 3

C. 4 D. 5

25. How many distinct solutions are there for the equation $\sin x+\tan x=0$ where $0° < x < 360°$?

A. 1 B. 2

C. 3 D. 4

26. If $\cos x+1=2\sin^2 x$, where $0° \le x \le 180°$, then $x=$

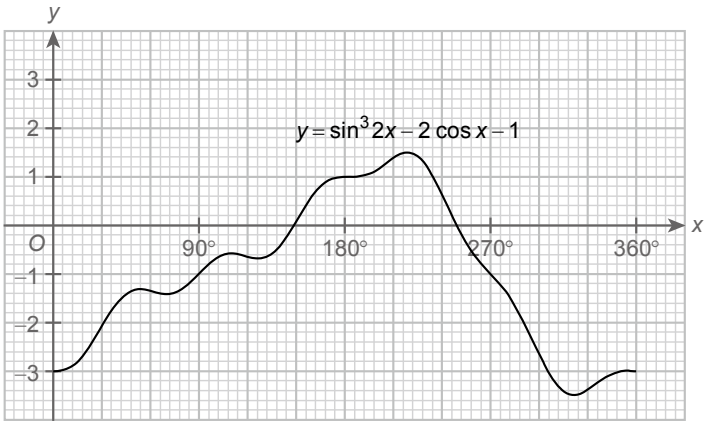
A. 0° or 120°.

B. 0° or 150°.

C. 30° or 180°.

D. 60° or 180°.

27. The figure shows the graph of $y=\sin^3 2x-2\cos x-1$, where $0° \le x \le 360°$. Solve the equation $5\sin^3 2x-10\cos x+4=0$ graphically. (Corr. to the nearest 6°)



A. $x=36°$ or $288°$

B. $x=90°$ or $270°$

C. $x=96°$ or $264°$

D. $x=156°$ or $240°$

28. It is given that $0° < \theta < 180°$, $2x^2+3x\cos\theta+6\sin\theta=0$ is an equation in x such that the sum of the reciprocals of its two roots is $\frac{1}{2}$. Find θ.

A. 45° B. 120°

C. 135° D. 150°