



# MATHS

BOOKS - INDEPENDENTLY PUBLISHED

MATHS (ENGLISH)

TRIGONOMETRIC FUNCTIONS

Example

1. Express  $\sin 320^\circ$  in terms of  $\theta_R$ .



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2. Express  $\cot 200^\circ$  in terms of  $\theta_R$ .



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3. Express  $\cos 130^\circ$  in terms of  $\theta_R$ .



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4. If both the angles are acute and

$$\sin(3x + 20^\circ) = \cos(2x - 40^\circ), \text{ find } x$$



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5. In each of the following, convert the degrees to radians or the radians to degrees.

(if no unit of measurement is indicated, radians are assumed.)

Q.  $30^\circ$



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**6.** In each of the following, convert the degrees to radians or the radians to degrees.

(if no unit of measurement is indicated, radians are assumed.)

Q.  $270^\circ$



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**7.** In each of the following, convert the degrees to radians or the radians to degrees.

(if no unit of measurement is indicated,

radians are assumed.)

$$Q. \frac{\pi}{4}$$



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**8.** In each of the following, convert the degrees to radians or the radians to degrees.

(if no unit of measurement is indicated, radians are assumed.)

$$Q. \frac{17\pi}{3}$$



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**9.** In each of the following, convert the degrees to radians or the radians to degrees.

(if no unit of measurement is indicated, radians are assumed.)

Q. 24



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**10.** Find the area of the sector and length of the arc subtended by a central angle of  $\frac{2\pi}{3}$  radians in a circle whose radius is 6 inches.



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**11.** In a circle of radius 8 inches, find the area of the sector whose arc length is  $6\pi$  inches.



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**12.** Find the length of the radius of a circle in which a central angle of  $60^\circ$  subtends an arc of length  $8\pi$  inches.



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**13.** Determine the amplitude, period, and phase shift of  $y = 2 \sin 2x$  and sketch at least one period of the graph.



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**14.** Determine the amplitude, period, and phase shift of  $y = \frac{1}{2} \cos\left(\frac{1}{2}x - \frac{\pi}{3}\right)$  and sketch at least one period of the graph.



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**15.** Determine the amplitude, period, and phase shift to  $y = -2\sin(\pi x + 3\pi)$  and sketch at least one period of the graph.



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**16.** Given  $\cos \theta = -\frac{2}{3}$  and  $\frac{\pi}{2} < \theta < \pi$ , find  $\sin 2\theta$ .



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17. If  $\cos 23^\circ = z$ , find the value of  $\cos 46^\circ$  in terms of  $z$ .



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18. If  $\sin x = A$ , find  $\cos 2x$  in terms of  $A$ .



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19. Solve  $2 \sin x + \cos 2x + 2 \sin^2 x - 1$  for  $0 \leq x \leq 2\pi$ .



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20. Find values of  $x$  on the interval  $[0, \pi]$  for which  $\cos x \leq \sin 2x$ .



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21. Evaluate the radian measure of  $\tan^{-1} \frac{8}{9}$ .



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22. Evaluate the degree measure of

$$\sin^{-1} 0.8759$$



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23. Evaluate the degree measure of

$$\sec^{-1} 3.4735.$$



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24. Evaluate  $\cos(\cos^{-1} 0.72)$



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25. Evaluate  $\sin^{-1}(\sin 265^\circ)$ .



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26. Evaluate  $\sin\left(\cos^{-1}\frac{3}{5}\right)$ .



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27. Evaluate  $\cot^{-1}(-5.2418)$ .



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## Mcqs Exercise

1. Express  $\cos 320^\circ$  as a function of an angle between  $0^\circ$  and  $90^\circ$

I.  $\cos 40^\circ$

II.  $\sin 50^\circ$

III.  $\cos 50^\circ$

A. I only

B. II only

C. III only

D. I and II

**Answer: D**



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2. If point  $P(-5, 12)$  lies on the terminal side of  $\angle\theta$  in standard position,  $\sin\theta =$

A.  $-\frac{12}{13}$

B.  $\frac{-5}{12}$

C.  $\frac{-5}{13}$

D.  $\frac{12}{13}$

**Answer: D**



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3. If  $\sec \theta = -\frac{5}{4}$  and  $\sin \theta > 0$ , then  $\tan \theta =$

A.  $\frac{4}{3}$

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

C.  $-\frac{3}{4}$



D.  $-\frac{4}{3}$

**Answer: C**



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4. If  $x$  is an angle in quadrant III and  $\tan(x - 30^\circ) = \cot x$ , find  $x$

A.  $240^\circ$

B.  $225^\circ$

C.  $210^\circ$

D.  $60^\circ$

**Answer: A**



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5. If  $90^\circ < \alpha < 180^\circ$  and  $270^\circ < \beta < 360^\circ$ ,

then which of the following cannot be true?

A.  $\sin \alpha = \sin \beta$

B.  $\tan \alpha = \sin \beta$

C.  $\tan \alpha = \tan \beta$

$$D. \sin \alpha = \cos \beta$$

**Answer: A**



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**6.** Expressed as a function of an acute angle,

$$\cos 310^\circ =$$

A.  $-\sin 50^\circ$

B.  $-\sin 40^\circ$

C.  $-\cos 50^\circ$

D.  $\cos 50^\circ$

**Answer: D**



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7. An angle of 30 radians is equal to how many degrees?

A.  $\frac{\pi}{30}$

B.  $\frac{\pi}{6}$

C.  $\frac{30}{\pi}$

D.  $\frac{5,400}{\pi}$

**Answer: D**



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**8.** If a sector of a circle has an arc length of  $2\pi$  inches and an area of  $6\pi$  square inches, what is the length of the radius of the circle?

A. 1

B. 2

C. 3

D. 6

**Answer: D**



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**9.** If a circle has a circumference of 16 inches, the area of a sector with a central angle of 4.7 radians is

A. 10

B. 12

C. 15

D. 25

**Answer: C**



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**10.** A central angle of  $40^\circ$  in a circle of radius 1 inch intercepts an arc whose length is  $s$ . find  $s$ .

A. 0.7

B. 1.4

C. 2

D. 3

**Answer: A**



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**11.** the pendulum on a clock swings through an angle  $25^\circ$ , and the tip sweeps out an arc of 12 inches. How long is the pendulum?



A. 1.67 inches

B. 13.8 inches

C. 27.5 inches

D. 43.2 inches

**Answer: C**



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**12.** In the figure below, part of the graph of  $y = \sin 2x$  is shown. What are the coordinates

of point P?



A.  $\left(\frac{\pi}{2}, 1\right)$

B.  $(\pi, 1)$

C.  $\left(\frac{\pi}{4}, 1\right)$

D.  $\left(\frac{\pi}{2}, 2\right)$

**Answer: C**



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13. The figure below could be a portion of the graph whose equation is



A.  $y - 1 = \sin x \cdot \cos x$

B.  $y \sec x = 1$

C.  $2y + 1 = \sin 2x$

D.  $1 - 2y = \cos 2x$

**Answer: D**



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14. As  $\theta$  increases from  $\frac{\pi}{4}$  to  $\frac{5\pi}{4}$ , the value of  $4\cos\frac{1}{2}\theta$

- A. increases, and then decreases
- B. decreases, and then increases
- C. decreases throughout
- D. increases throughout

**Answer: C**



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15. The function  $f(x) = \sqrt{3} \cos x + \sin x$  has an amplitude of

A. 1.37

B. 1.73

C. 2

D. 2.73

**Answer: C**



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16. For what value of P is the period of the

function  $y = \frac{1}{3} \cos Px$  equal to  $\frac{2\pi}{3}$ ?

A.  $\frac{1}{3}$

B.  $\frac{2}{3}$

C. 2

D. 3

**Answer: D**



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17. If  $0 \leq x \leq \frac{\pi}{2}$ , what is the maximum value of the function  $f(x) = \sin \frac{1}{3}x$ ?

A. 0

B.  $\frac{1}{3}$

C.  $\frac{1}{2}$

D.  $\frac{\sqrt{3}}{2}$

**Answer: C**



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18. If the graph in the figure below has an equation of the form  $y = \sin(Mx + N)$ , what is the value of  $N$ ?



A.  $-\pi$

B.  $-1$

C.  $-\frac{1}{2}$

D.  $\frac{\pi}{2}$

**Answer: D**



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19. If  $\sin x = \frac{5}{13}$  and  $\cos x = -\frac{12}{13}$ , find the value of  $\sin 2x$ .

A.  $-\frac{120}{169}$

B.  $-\frac{60}{169}$

C.  $\frac{60}{169}$

D.  $\frac{120}{169}$

**Answer: A**



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20. If  $\tan A = \cot B$  and angles  $A$  and  $B$  are acute, then

A.  $A = B$

B.  $A = 90^\circ + B$

C.  $B = 90^\circ + A$

D.  $A + B = 90^\circ$

**Answer: D**



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21. If  $\cos x = \frac{\sqrt{3}}{2}$ , find  $\cos 2x$ .

A.  $-0.87$

B.  $-0.25$

C.  $0$

D.  $0.5$

**Answer: D**



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22. If  $\sin 37^\circ = z$ , express  $\sin 74^\circ$  in terms of  $z$ .

A.  $2z\sqrt{1 - z^2}$

B.  $2z^2 + 1$

C.  $2z$

D.  $2z^2 - 1$

**Answer: A**



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23. If  $\sin x = -0.6427$ , what is  $\csc x$ ?

A.  $-1.64$

B.  $-1.56$

C.  $0.64$

D.  $1.56$

**Answer: B**



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24. For what value(s) of  $x$ ,  $0 < x < \frac{\pi}{2}$ , is  $\sin x < \cos x$ ?

A.  $x < 0.79$

B.  $x < 0.52$

C.  $0.52 < x < 0.79$

D.  $x > 0.52$

**Answer: A**



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25. What is the range of the function

$$f(x) = 5 - 6 \sin(\pi x + 1)?$$

A. [-6,6]

B. [-5,5]

C. [-1,1]

D. [-1,11]

**Answer: D**



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26. Find the number of degrees is  $\sin^{-1} \frac{\sqrt{2}}{2}$

A.  $-45$

B.  $-22.5$

C.  $0$

D.  $45$

**Answer: D**



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27. Find the number of radians in

$$\cos^{-1}(-0.5624)$$

A.  $-0.97$

B.  $0.97$

C.  $1.77$

D.  $2.17$

**Answer: D**



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28. Evaluate  $\tan^{-1}(\tan 128^\circ)$

A.  $-128^\circ$

B.  $-52^\circ$

C.  $52^\circ$

D.  $128^\circ$

**Answer: B**



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29. Which of the following is (are) true?

I.  $\sin^{-1} 1 + \sin^{-1}(-1) = 0$

II.  $\cos^{-1} 1 + \cos^{-1}(-1) = 0$

III.  $\cos^{-1} x = \cos^{-1}(-x)$  for all  $x$  in the domain of  $\cos^{-1}$

A. Only I

B. only II

C. only III

D. only I and II

**Answer: A**



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30. Which of the following is a solution of

$$\cos 3x = \frac{1}{2}?$$

A.  $60^\circ$

B.  $\frac{5\pi}{3}$

C.  $\cos^{-1}\left(\frac{1}{6}\right)$

D.  $\frac{1}{3}\cos^{-1}\left(\frac{1}{2}\right)$

**Answer: D**



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