DAV PUBLIC SCHOOL, CHANDRASEKHARPUR

SUBJECT- MATHEMATICS   CLASS XII

CHAPTER-INVERSE TRIGONOMETRY FUNCTION

DINAKRUSHNA DAS

WORKSHEET BASIC

A: Multiple choice (only one option is correct)

1. $\cos(\tan^{-1} x) =$

    (a) $\sqrt{1 + x^2}$　　　　　　(b) $\dfrac{1}{\sqrt{1 + x^2}}$　(c) $1 + x^2$　　　　　(d) None of these

2. $\tan\left[\sec^{-1} \sqrt{1 + x^2}\right] =$

    (a) $\dfrac{1}{x}$　　　　　(b) x　　　　　(c) $\dfrac{1}{\sqrt{1 + x^2}}$　　　　　(d) $\dfrac{x}{\sqrt{1 + x^2}}$

3. $\sec^{-1}[\sec(-30^o)] =$

    (a) -60°　　　　　(b) -30°　　　　　(c) 30°　　　　　(d) 150°

4. $\tan^{-1}\left[\dfrac{\cos x}{1 + \sin x}\right] =$

    (a) $\dfrac{\pi}{4} - \dfrac{x}{2}$　　　　　(b) $\dfrac{\pi}{4} + \dfrac{x}{2}$　　　　　(c) $\dfrac{x}{2}$　　　　　(d) $\dfrac{\pi}{4} - x$

5. $\tan^{-1} \dfrac{1}{\sqrt{x^2 - 1}} =$

    (a) $\dfrac{\pi}{2} + \operatorname{cosec}^{-1} x$　　　　　(b) $\dfrac{\pi}{2} + \sec^{-1} x$　　　　　(c) $\operatorname{cosec}^{-1} x$　　　　　(d) $\sec^{-1} x$

6. The principal value of $\sin^{-1}\left(-\dfrac{1}{2}\right)$ is

    (a) $\dfrac{\pi}{3}$　　　　　(b) $\dfrac{\pi}{6}$　　　　　(c) $-\dfrac{\pi}{3}$　　　　　(d) $-\dfrac{\pi}{6}$

7. $\sec^2(\tan^{-1} 2) + \operatorname{cosec}^2(\cot^{-1} 3) =$

    (a) 5　　　　　(b) 13　　　　　(c) 15　　　　　(d) 6

8. $\sin^{-1}\left[x\sqrt{1 - x} - \sqrt{x}\sqrt{1 - x^2}\right] =$

    (a) $\sin^{-1} x + \sin^{-1} \sqrt{x}$　　　(b) $\sin^{-1} x - \sin^{-1} \sqrt{x}$　(c) $\sin^{-1} \sqrt{x} - \sin^{-1} x$　　　(d) None of these

9. If $\tan^{-1} \dfrac{1 - x}{1 + x} = \dfrac{1}{2} \tan^{-1} x$, then $x =$

    (a) 1　　　　　(b) $\sqrt{3}$　　　　　(c) $\dfrac{1}{\sqrt{3}}$　　　(d) None of these

10. The value of $\cos^{-1}\left(\cos \dfrac{7\pi}{6}\right) =$

    (a) $\dfrac{7\pi}{6}$　　　　　(b) $\dfrac{5\pi}{6}$　　　　　(c) $\dfrac{\pi}{6}$　　　　　(d) None of these

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B: Fill in the blanks

11. The value of $\sin \cot^{-1} \tan \cos^{-1} x$ is equal to ----------------

12. $\sin^{-1} \dfrac{\sqrt{x}}{\sqrt{x+a}}$ is equal to --------------

13. If $\sin\left(\sin^{-1} \dfrac{1}{5} + \cos^{-1} x \right) = 1$,then x is equal to -----------------

14. If $\sin^{-1} x = \theta + \beta$ and $\sin^{-1} y = \theta - \beta$, then $1 + xy$ = ----------------

15. If $\sin^{-1} \dfrac{1}{3} + \sin^{-1} \dfrac{2}{3} = \sin^{-1} x$, then x is equal to ------------------------

16. $\tan(\cos^{-1} x)$ is equal to -----------------

17. The domain of $\sin^{-1} x$ is   --------------

18. The principal value of $\sin^{-1}\left(-\dfrac{\sqrt{3}}{2} \right)$ is -----------------

19. $\cot\left[\cos^{-1}\left(\dfrac{7}{25} \right) \right] =$ ------------------------

20. $\sin\left[\dfrac{\pi}{2} - \sin^{-1}\left(-\dfrac{\sqrt{3}}{2} \right) \right] =$ ------------------

C: Answer the following

21. Find the value of $\sin[\cot^{-1}(\cos \tan^{-1} x)]$

22. If $\sin(\cot^{-1}(x + 1) = \cos(\tan^{-1} x)$, then find x

23. Find the value of $\cos^{-1} \dfrac{4}{5} + \tan^{-1} \dfrac{3}{5}$

24. Find the value of $2 \tan^{-1} \dfrac{1}{3} + \tan^{-1} \dfrac{1}{2}$

25. Find the value of $\tan\left(90^{o} - \cot^{-1} \dfrac{1}{3} \right)$

26. Find the value of $\tan\left[\cos^{-1} \dfrac{4}{5} + \tan^{-1} \dfrac{2}{3} \right] =$

27. Find the value of $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$

28. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \dfrac{\pi}{2}$, then find the value of $xy + yz + zx$

29. If $\tan^{-1} \dfrac{x-1}{x+2} + \tan^{-1} \dfrac{x+1}{x+2} = \dfrac{\pi}{4}$, then find x

30. Find the value of $\cos^{-1} \sqrt{1-x} + \sin^{-1} \sqrt{1-x}$

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WORK SHEET STANDARD

A: Answer the following

1. Find the value of $\tan^{-1}\dfrac{2}{3} + \tan^{-1}\dfrac{3}{4}$

2. Find the value of $\tan^{-1} 3 + \tan^{-1} 4$ is equal to

3. Find the value of $\sin^{-1}\dfrac{4}{5} + \sin^{-1}\dfrac{12}{13}$ is equal to

4. Find the value no $\cos^{-1}\dfrac{3}{5} - \cos^{-1}\dfrac{5}{13}$ is equal to

5. If $\cos^{-1}\dfrac{x}{2} + \cos^{-1}\dfrac{y}{3} = \dfrac{\pi}{6}$, then find the value of $\dfrac{x^2}{4} - \dfrac{xy}{2\sqrt{3}} + \dfrac{y^2}{9}$ is

6. If $\sin^{-1}\dfrac{x}{3} + \sin^{-1}\dfrac{y}{4} = \dfrac{\pi}{6}$, then find the value of $\dfrac{x^2}{9} + \dfrac{xy}{4\sqrt{3}} + \dfrac{y^2}{16}$ is

7. If $\cos^{-1}\left(\dfrac{3 + 5\cos x}{5 + 3\cos x}\right) = 2tan^{-1}(k)$ then find the value of k

8. If $a < b < c$, then find the value of $\cot^{-1}\left(\dfrac{ab+1}{a-b}\right) + \cot^{-1}\left(\dfrac{bc+1}{b-c}\right) + \cot^{-1}\left(\dfrac{ca+1}{c-a}\right)$

9. Simplify $\tan^{-1}(x + \sqrt{1+x^2})$

10. Simplify $\tan^{-1}(\sqrt{1+x^2} - x)$ is equal to

B: Answer the following

11. If minimum value of $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$ is $\dfrac{\pi^2}{k}$, then value of k is -----------------

12. The greatest and the least value of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3$ are ------------ and -----------

13. If $x^2 + y^2 + z^2 = r^2$ then the value of $\tan^{-1}\left(\dfrac{xy}{zr}\right) + \tan^{-1}\left(\dfrac{yz}{xr}\right) + \tan\left(\dfrac{zx}{yr}\right)$ is -----------

14. The value of $\tan^{-1} 2 + \tan^{-1} 3 + \tan^{-1} 4 = $ -----------------

15. If $x \in \left(\dfrac{1}{\sqrt{2}}, 1\right)$, then the value of $\sin^{-1}(2x\sqrt{1-x^2})$ is equal to -----------------

16. If $x \in \left(\dfrac{1}{\sqrt{3}}, \sqrt{3}\right)$, then value of $\tan^{-1}\left(\dfrac{3x - x^3}{1-3x^2}\right)$ is ---------------------

17. If $\sin^{-1} a + \sin^{-1} b + \sin^{-1} c = \pi,$ then the value of $(a\sqrt{(1-a^2)}+b\sqrt{(1-b^2)}+c\sqrt{(1-c^2)})$ will be -------

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18. Number of solution of $\sin^{-1} x + \sin^{-1} 2x = \dfrac{\pi}{3}$ is--------------

19. If $\cos^{-1} \dfrac{x}{a} + \cos^{-1} \dfrac{y}{b} = \dfrac{5\pi}{12}$ and $\sin^{-1} \dfrac{x}{a} - \sin^{-1} \dfrac{y}{b} = \dfrac{\pi}{12}$, then the value of $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2}$ is------------

20. The value of $4\tan^{-1}\dfrac{1}{5} - \tan^{-1}\dfrac{1}{70} + \tan^{-1}\dfrac{1}{99}$ is ---------------

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WORKSHEET HOTS

1. The value of $\tan^{-1}\dfrac{1}{\sqrt{2}} - \tan^{-1}\dfrac{\sqrt{5-2\sqrt{6}}}{1+\sqrt{6}}$

2. Find the Equation of the image of the line x + y = $\sin^{-1}(a^6 + 1) + \cos^{-1}(a^4 + 1) - \tan^{-1}(a^2 + 1)$, $a \in R$ about x axis :

3. If $a\sin^{-1}x - b\cos^{-1}x = c$, then find the value of $a\sin^{-1}x + b\cos^{-1}x$ (wherever exists) :

4. Find The range of $f(x) = \cot^{-1}(-x) - \tan^{-1}x + \sec^{-1}x$:

5. Find The value of $\sin^{-1}(\cos 2) - \cos^{-1}(\sin 2) + \tan^{-1}(\cot 4) - \cot^{-1}(\tan 4) + \sec^{-1}(\cosec 6) - \cosec^{-1}(\sec 6)$:

6. If $(\sin^{-1}x)^3 + (\sin^{-1}y)^3 + (\sin^{-1}z)^3 = \dfrac{(3\pi)^3}{8}$, then find the value of $(2x - 3y + 4z)$:

7. Find The maximum value of the function f(x) = $(\sin^{-1}(\sin x))^2 - \sin^{-1}(\sin x)$:

8. If $\sin^{-1}(e^x) + \cos^{-1}(x^2) = \dfrac{\pi}{2}$, then find the number of solutions of this equation :

9. If x and y are positive integer satisfying $\tan^{-1}\left(\dfrac{1}{x}\right) + \tan^{-1}\left(\dfrac{1}{y}\right) = \tan^{-1}\left(\dfrac{1}{7}\right)$ then find the number of ordered pairs of (x, y).

10. If $\cos^{-1}x - \cos^{-1}\dfrac{y}{2} = \alpha$, then find the value of $4x^2 - 4xy\cos\alpha + y^2$

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WORKSHEET BASIC   (ANSWER KEYS)

1. B
2. B
3. C
4. A
5. C
6. D
7. C
8. B
9. C
10. B
11. X
12. $\tan^{-1}\sqrt{\dfrac{x}{a}}$
13. 1/5
14. $\sin^2\theta + \cos^2\beta$
15. 0
16. $\dfrac{x}{1+x^2}$
17. [−1, 1]
18. $\dfrac{-\pi}{3}$
19. 24/7
20. ½
21. $\sqrt{\dfrac{x^2+1}{x^2+2}}$
22. $-\dfrac{1}{2}$
23. $\tan^{-1}\dfrac{27}{11}$
24. $\tan^{-1}2$
25. 1/3
26. 17/6
27. π
28. 1
29. $\pm\sqrt{\dfrac{5}{2}}$
30. $\pi/2$

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WORKSHEET SATANDARD (ANSWER KEYS)

1) $\tan^{-1}\dfrac{17}{6}$

2) $\pi - \tan^{-1}\dfrac{7}{11}$

3) $\pi - \cos^{-1}\left(\dfrac{33}{65}\right)$

4) $-\cos^{-1}\left(\dfrac{63}{65}\right)$

5) $\dfrac{1}{4}$

6) $\dfrac{1}{4}$

7) $2\tan^{-1}\left(\dfrac{1}{2}\tan\ \dfrac{x}{2}\right)$

8) 2π

9) $\dfrac{\pi}{4} - \dfrac{1}{2}\tan^{-1}\dfrac{x}{2}$

10) $\dfrac{\pi}{4} - \dfrac{1}{2}\tan^{-1}\dfrac{x}{2}$

11) 8

12) $\dfrac{7\pi^3}{8}, \dfrac{\pi^3}{32}$

13) $\dfrac{\pi}{2}$

14) $\pi + \tan^{-1}\dfrac{3}{5}$

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15) $\pi - 2 \sin^{-1} x$

16) $\pi - 3 \tan^{-1} x$

17) $2abc$

18) 1

19) $\dfrac{5}{4}$

20) $\dfrac{\pi}{4}$

WORKSHEET HOTS (ANSWER KEYS)

ANSWER KEYS

1. $\dfrac{\pi}{6}$

2. $x - y = \dfrac{\pi}{4}$

3. $\dfrac{\pi ab + c(a-b)}{a+b}$

4. $\left[\dfrac{\pi}{2}, \pi\right) \cup \left(\pi, \dfrac{3\pi}{2}\right]$

5. $5\pi - 16$

6. 3

7. $\dfrac{\pi}{4}(\pi + 2)$

8. 1

9. 6

10. $4 \sin^2 \alpha$