TRIGONOMETRY

Q) If $\frac{\cos^2\theta - 3\cos\theta + 2}{\sin^2\theta} = 1$, where $0 < \theta < \frac{\pi}{2}$, then which of the following statements is/are correct?

यदि $\frac{\cos^2\theta - 3\cos\theta + 2}{\sin^2\theta} = 1$, जहां $0 < \theta < \frac{\pi}{2}$, तो निम्नलिखित में से कौन सा/से कथन सही है/हैं ?

1. There are two values of θ satisfying the above equations.
उपरोक्त समीकरणों को संतुष्ट करने वाले θ के दो मान हैं।

2. $\theta = 60°$ is satisfied the above equation. Select the correct answer using the code given below.
$\theta = 60°$ उपरोक्त समीकरण से संतुष्ट है।

$$\cos^2\theta - 3\cos\theta + 2 = \sin^2\theta$$

$$\cos^2\theta - 3\cos\theta + 2 = 1 - \cos^2\theta$$

$$2\cos^2\theta - 3\cos\theta + 1 = 0$$

$$2\cos^2\theta - 2\cos\theta - \cos\theta + 1 = 0$$

$$2\cos\theta(\cos\theta - 1) - 1(\cos\theta - 1) = 0$$

$$(\cos\theta - 1)(2\cos\theta - 1) = 0$$

$\cos\theta = 1$ $\quad$ $\cos\theta = 1/2$

$\theta = 0°$ $\quad$ $\theta = 60°$

$\sin^2\theta + \cos^2\theta = 1$
$\sin^2\theta = 1 - \cos^2\theta$

Select the correct answer using the code given below.
नीचे दिए गए कूट का प्रयोग कर सही उत्तर चुनिए।

a) 1 only / केवल 1

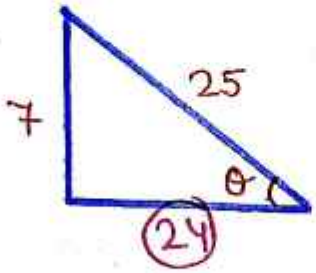
b) 2 only / केवल 2

c) Both 1 and 2 / दोनो 1 और 2

d) Neither 1 nor 2 / न तो 1 और न ही 2

Q) If $\sin\theta = \frac{7}{25}$, then the value of $\cos\theta$ and $\tan\theta$ respectively are .... (Where θ - in - first - Quadrant)

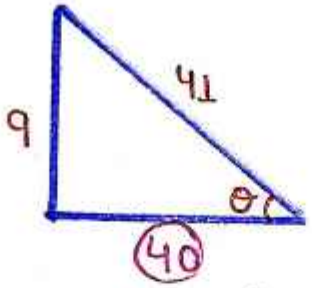
यदि $\sin\theta = \frac{7}{25}$ है, तो $\cos\theta$ और $\tan\theta$ के मान क्रमशः .... हैं। (जहां θ प्रथम चतुर्थांश में है)



$\cos\theta = \frac{24}{25}$, $\tan\theta = \frac{7}{24}$

Q) If $\sin\theta = \left(\frac{9}{41}\right)$, $0° < \theta < 90°$ then what is the value of $\cot\theta$?

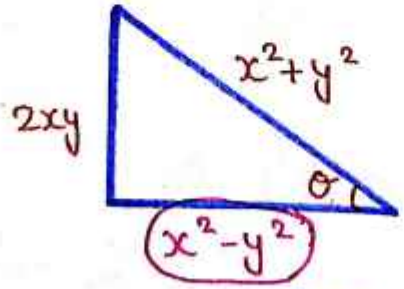
यदि $\sin\theta = \left(\frac{9}{41}\right)$, $0° < \theta < 90°$ तो $\cot\theta$ का मान क्या होगा?



$\cot\theta = \frac{40}{9}$

Q) If $\sin\theta = \frac{2xy}{x^2+y^2}$, then find the value of $\tan\theta$

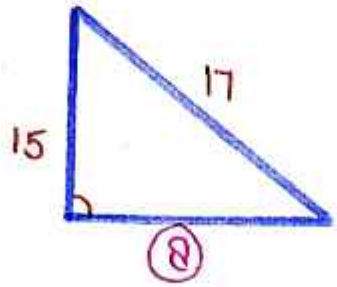
यदि $\sin\theta = \frac{2xy}{x^2+y^2}$ तो $\tan\theta$ का मान है।



$\tan\theta = \frac{2xy}{x^2-y^2}$

Q) If given that $\sin\theta = \frac{15}{17}$, find the value of $\frac{15\cot\theta + 17\sin\theta}{8\tan\theta + 16\sec\theta}$, where $0° < \theta < 90°$ is.

यदि $\sin\theta = \frac{15}{17}$ दिया गया है, $\frac{15\cot\theta + 17\sin\theta}{8\tan\theta + 16\sec\theta}$ का मान ज्ञात कीजिए। जहाँ $0° < \theta < 90°$ है।



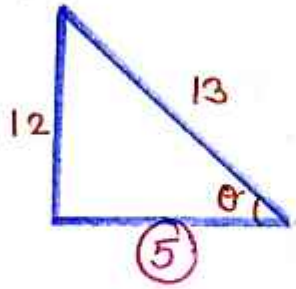
$$\frac{\cancel{15} \times \frac{8}{\cancel{15}} + \cancel{17} \times \frac{15}{\cancel{17}}}{\cancel{8} \times \frac{15}{\cancel{8}} + \overset{2}{\cancel{16}} \times \frac{17}{\cancel{8}}}$$

$$\frac{8+15}{15+34} = \frac{23}{49}$$

Q) If $\sin\theta = \frac{12}{13}$, $0 < \theta < 90°$, then $\frac{\sin^2\theta - \cos^2\theta}{2\sin\theta \cdot \cos\theta} \times \frac{1}{\tan^2\theta} = \ldots\ldots$

यदि $\sin\theta = \frac{12}{13}$, $0 < \theta < 90°$ है तो $\frac{\sin^2\theta - \cos^2\theta}{2\sin\theta \cdot \cos\theta} \times \frac{1}{\tan^2\theta} = \ldots\ldots$

$\frac{1}{\tan^2\theta} \rightarrow \cot^2\theta$



$$\frac{\frac{144}{169} - \frac{25}{169}}{2 \times \frac{12}{13} \times \frac{5}{13}} \times \frac{25}{144}$$

$$\frac{\frac{119}{\cancel{169}}}{\frac{120}{\cancel{169}}} \times \frac{25}{144}$$

$$\frac{119}{120} \times \frac{25}{144}$$

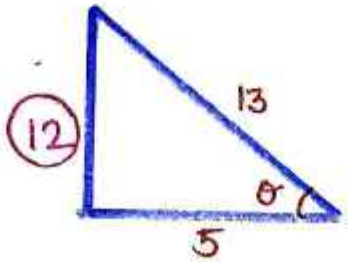
$$\frac{595}{3456}$$

Q) If $\sec\theta = \frac{13}{5}$ and $\frac{3\pi}{2} < \theta < 2\pi$ then find $\cot\theta$?

यदि $\sec\theta = \frac{13}{5}$ और $\frac{3\pi}{2} < \theta < 2\pi$ तो $\cot\theta$ का मान ज्ञात कीजिये?

$270 < \theta < 360$

IVth Quadrant.



$$\cot\theta = \frac{5}{12}$$

IVth Quadrant $\Rightarrow -\frac{5}{12}$

Q) If $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$, θ is an acute angle, then the value of $\frac{24\sin^2\theta - 15\sec^2\theta}{6\,\mathrm{cosec}^2\theta - 7\cot^2\theta}$ is:

यदि $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$ है, θ न्यून कोण है, तो $\frac{24\sin^2\theta - 15\sec^2\theta}{6\,\mathrm{cosec}^2\theta - 7\cot^2\theta}$ का मान ज्ञात करें।

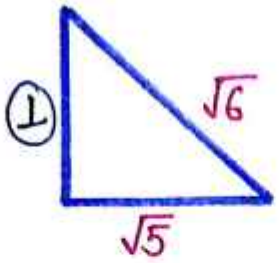
$$\sin^2\theta = 5\tan^2\theta - 5\sin^2\theta$$

$$6\sin^2\theta = 5\tan^2\theta$$

$$6\cancel{\sin^2\theta} = 5 \times \frac{\cancel{\sin^2\theta}}{\cos^2\theta}$$

$$\boxed{\cos^2\theta = \frac{5}{6}}$$

$$\boxed{\cos\theta = \frac{\sqrt{5}}{\sqrt{6}}}$$



$$\frac{{}^{4}\cancel{24} \times \frac{1}{\cancel{6}} - {}^{3}\cancel{15} \times \frac{6}{\cancel{5}}}{6 \times \frac{6}{1} - 7 \times \frac{5}{1}}$$

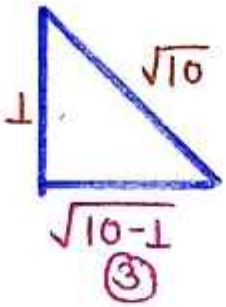
$$\frac{4-18}{36-35} = \frac{-14}{1}$$

Q) If $\sin\theta = \frac{1}{\sqrt{10}}$ where $0 < \theta < \frac{\pi}{2}$ then $\frac{(6\tan\theta)(1+\tan\theta)^{-1}}{(1-\tan\theta)}$ is equal to?

यदि $\sin\theta = \frac{1}{\sqrt{10}}$ जहाँ $0 < \theta < \frac{\pi}{2}$ तो $\frac{(6\tan\theta)(1+\tan\theta)^{-1}}{(1-\tan\theta)}$ किसके बराबर है?

$$\frac{6\tan\theta}{(1-\tan\theta)(1+\tan\theta)}$$

$$\frac{6\tan\theta}{1-\tan^2\theta}$$



$$\frac{{}^{2}\cancel{6} \times \frac{1}{\cancel{3}}}{1 - \frac{1}{9}}$$

$$\frac{\cancel{2}}{\cancel{4}_{2}} \times 9 = \frac{9}{4} = 2.25$$

✱ PROPERTIES :-

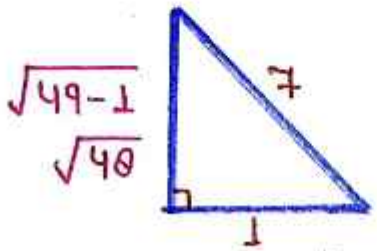
$$x = \sqrt{a\sqrt{a\sqrt{a\sqrt{a}}}} \quad \text{..... } \infty$$

$$\boxed{x = a}$$

Q) If $\cos\theta = \sqrt{\frac{1}{7}\sqrt{\frac{1}{7}\sqrt{\frac{1}{7}}}}$ ---- ∞ ($\theta \neq 0°$; θ is acute angle), then find $\tan\theta + \cot\theta = ?$

यदि $\cos\theta = \sqrt{\frac{1}{7}\sqrt{\frac{1}{7}\sqrt{\frac{1}{7}}}}$ ---- ∞ ($\theta \neq 0°$; θ न्यूनकोण है), तो $\tan\theta + \cot\theta$ ज्ञात कीजिए?

$$\cos\theta = \frac{1}{7}$$

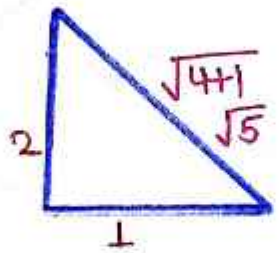


$$\frac{\sqrt{48}}{1} + \frac{1}{\sqrt{48}}$$

$$\frac{48+1}{\sqrt{48}} = \frac{49}{\sqrt{48}}$$

Q) If $\cot\theta = \frac{1}{2}$ & θ is acute angle, the value of $\frac{8\sin\theta + 5\cos\theta}{\sin^3\theta + 2\cos^3\theta + 3\cos\theta}$ is

यदि $\cot\theta = \frac{1}{2}$ और θ न्यूनकोण है, तो $\frac{8\sin\theta + 5\cos\theta}{\sin^3\theta + 2\cos^3\theta + 3\cos\theta}$ का मान है?



$$\frac{8 \times \frac{2}{\sqrt{5}} + 5 \times \frac{1}{\sqrt{5}}}{\left(\frac{2}{\sqrt{5}}\right)^3 + 2\left(\frac{1}{\sqrt{5}}\right)^3 + 3 \times \frac{1}{\sqrt{5}}}$$

$$\frac{\frac{1}{\sqrt{5}}(16+5)}{\frac{8}{5\sqrt{5}} + 2 \times \frac{1}{5\sqrt{5}} + \frac{3}{\sqrt{5}}}$$

$$(\sqrt{a})^3 = a\sqrt{a}$$

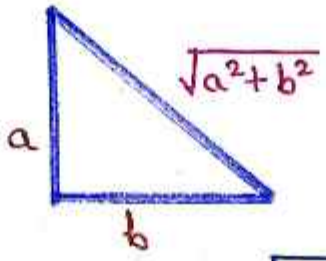
$$\frac{\frac{1}{\sqrt{5}}(21)}{\frac{1}{\sqrt{5}}\left(\frac{8}{5}+\frac{2}{5}+3\right)} = \frac{21}{\frac{10}{5}+3}$$

$$\frac{21}{5}$$

Q) If $\frac{\sin\theta}{a} = \frac{\cos\theta}{b}$, then find $\operatorname{cosec}\theta$?

यदि $\frac{\sin\theta}{a} = \frac{\cos\theta}{b}$, तो $\operatorname{cosec}\theta$ ज्ञात कीजिये ?

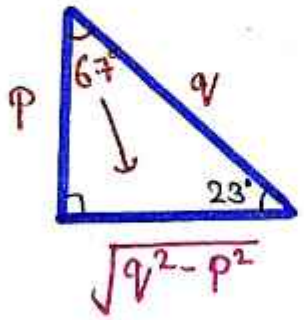
$$\frac{\sin\theta}{\cos\theta} = \frac{a}{b} \Rightarrow \boxed{\tan\theta = \frac{a}{b}}$$



$$\operatorname{cosec}\theta = \frac{\sqrt{a^2+b^2}}{a}$$

Q) If $\sin 23^\circ = \frac{p}{q}$ then $\sec 23^\circ - \sin 67^\circ = ?$

यदि $\sin 23^\circ = \frac{p}{q}$ तो $\sec 23^\circ - \sin 67^\circ = ?$

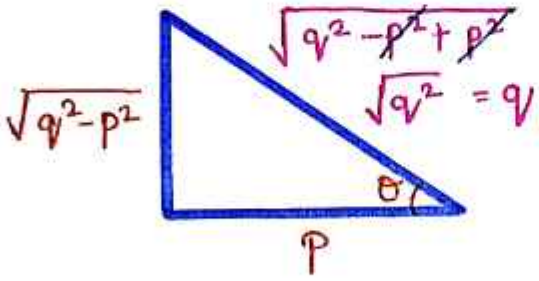


$$\frac{q}{\sqrt{q^2-p^2}} - \frac{\sqrt{q^2-p^2}}{q}$$

$$\frac{q^2-(q^2-p^2)}{q\sqrt{q^2-p^2}} = \frac{q^2-q^2+p^2}{q\sqrt{q^2-p^2}} = \frac{p^2}{q\sqrt{q^2-p^2}}$$

Q) If $\tan\theta = \frac{\sqrt{q^2-p^2}}{p}$, $0° < \theta < 90°$, then what is the value of $\sec\theta + \cos\theta + 2$?

यदि $\tan\theta = \frac{\sqrt{q^2-p^2}}{p}$, $0° < \theta < 90°$, तब $\sec\theta + \cos\theta + 2$ का मान क्या होगा?



$$\frac{q}{p} + \frac{p}{q} + 2$$

$$\frac{q^2+p^2}{pq} + 2$$

$$\frac{q^2+p^2+2pq}{pq} = \frac{(q+p)^2}{pq}$$

TRIGONOMETRIC IDENTITIES

1) $\sin^2\theta + \cos^2\theta = 1$

$\cos^2\theta = 1 - \sin^2\theta$

$\sin^2\theta = 1 - \cos^2\theta$

2) $\sec^2\theta - \tan^2\theta = 1$

↳ $\sec^2\theta = 1 + \tan^2\theta$

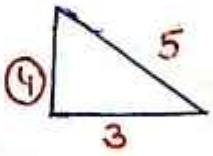
↳ $\tan^2\theta = \sec^2\theta - 1$

↳ $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

↳ $\sec\theta + \tan\theta = \frac{1}{\sec\theta - \tan\theta}$

Ex:-

$$\sec\theta + \tan\theta = 3$$
$$+\quad \sec\theta - \tan\theta = \frac{1}{3}$$
$$2\sec\theta = 3 + \frac{1}{3}$$
$$2\sec\theta = \frac{10}{3} \cdot 5$$
$$\boxed{\sec\theta = \frac{5}{3}}$$



3) $\boxed{\text{Cosec}^2\theta - \cot^2\theta = 1}$

↳ $\text{Cosec}^2\theta = 1 + \cot^2\theta$

↳ $\cot^2\theta = \text{Cosec}^2\theta - 1$

↳ $\boxed{(\text{Cosec}\,\theta - \cot\theta) = \frac{1}{\text{Cosec}\,\theta + \cot\theta}}$

Q) If $\sec\theta - \text{Cosec}\,\theta = 0$, then what will be the value of $(\sec\theta + \text{Cosec}\,\theta)$?
यदि $\sec\theta - \text{Cosec}\,\theta = 0$ हो, तो $(\sec\theta + \text{Cosec}\,\theta)$ का मान कितना होगा?

$$\boxed{\sec\theta = \text{Cosec}\,\theta}$$
$$\theta = 45^\circ$$
$$(\sec\theta + \text{Cosec}\,\theta)$$
$$\sec 45^\circ + \text{Cosec}\,45^\circ$$
$$\sqrt{2} + \sqrt{2}$$
$$2\sqrt{2}$$

Q) If $p\sin\theta = \sqrt{3}$ and $p\cos\theta = 1$, then what will be the value of p?
यदि $p\sin\theta = \sqrt{3}$ तथा $p\cos\theta = 1$ हो, तो p का मान कितना होगा?

$$p^2\sin^2\theta = 3 \qquad p^2\cos^2\theta = 1$$
$$+$$
$$p^2\sin^2\theta + p^2\cos^2\theta = 4$$
$$p^2(\sin^2\theta + \cos^2\theta) = 4$$
$$p^2 \times 1 = 4$$
$$p = \sqrt{4} = 2$$

Q) If $5\tan\theta = 4$, then what will be the value of $\left(\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}\right)$

यदि $5\tan\theta = 4$ हो, तो $\left(\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}\right)$ का मान क्या होगा?

$\boxed{\tan\theta = \frac{4}{5}}$

$$\frac{\cancel{\cos\theta}\left[5\times\frac{\sin\theta}{\cos\theta} - 3\right]}{\cancel{\cos\theta}\left[5\times\frac{\sin\theta}{\cos\theta} + 3\right]}$$

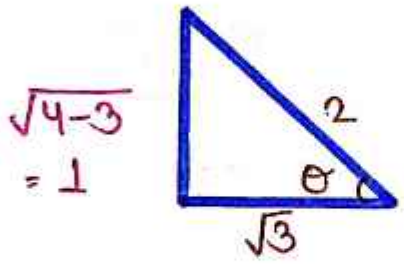
$$\frac{5\tan\theta - 3}{5\tan\theta + 3}$$

$$\frac{\cancel{5}\times\frac{4}{\cancel{5}} - 3}{\cancel{5}\times\frac{4}{\cancel{5}} + 3} = \frac{1}{7}$$

Q) If $\sec\theta + \tan\theta = \sqrt{3}$ then the positive value of $\sin\theta$ is -

यदि $\sec\theta + \tan\theta = \sqrt{3}$ तो $\sin\theta$ का धनात्मक मान है-

$$\sec\theta + \tan\theta = \sqrt{3}$$
$$\sec\theta - \tan\theta = \frac{1}{\sqrt{3}}$$
$$+$$
$$\cancel{2}\sec\theta = \sqrt{3} + \frac{1}{\sqrt{3}} \Rightarrow \frac{4}{\sqrt{3}}^{2}$$



$$\sin\theta = \frac{1}{2}$$

Q) If $\sec\theta + \tan\theta = 2$, then what will be the value of $\sec\theta$?

यदि $\sec\theta + \tan\theta = 2$ हो, तो $\sec\theta$ का मान क्या होगा?

$$\sec\theta + \tan\theta = 2$$
$$\sec\theta - \tan\theta = \frac{1}{2}$$
$$+$$
$$2\sec\theta = 2 + \frac{1}{2} = \frac{5}{2}$$

$$\sec\theta = \frac{5}{4}$$

Q) If $7\sin^2\theta + 3\cos^2\theta = 4\ (0° \le \theta \le 90°)$ then what will be the value of θ?

यदि $7\sin^2\theta + 3\cos^2\theta = 4\ (0° \le \theta \le 90°)$ हो, तो θ का मान कितना होगा?

By option $\frac{\pi}{6} = 30° = 7 \times \frac{1}{4} + 3 \times \frac{3}{4}$

$$\frac{7}{4} + \frac{9}{4} = \frac{16}{4} \quad (4)$$

Method

$$7\sin^2\theta + 3(1 - \sin^2\theta) = 4$$
$$7\sin^2\theta + 3 - 3\sin^2\theta = 4$$
$$4\sin^2\theta = 1$$
$$\sin^2\theta = \frac{1}{4}$$
$$\sin\theta = \sqrt{\frac{1}{4}} = \frac{1}{2}$$
$$\theta = 30° \to \frac{\pi}{6}$$

1. $\sin\theta = \frac{4}{5}$, find $\frac{\sin\theta+\cos\theta}{\tan\theta+\cot\theta}$

(a) $\frac{84}{125}$

(b) $\frac{25}{84}$

(c) $\frac{33}{125}$

(d) $\frac{64}{125}$

2. $\cos\theta = \frac{3}{5}$, find $\frac{2\sin\theta+3\cos\theta}{\tan\theta-\cot\theta}$

(a) $\frac{105}{35}$

(b) $\frac{109}{22}$

(c) $\frac{204}{35}$

(d) $\frac{203}{35}$

3. $\tan\theta = \frac{4}{3}$, find $\frac{1+2\sin\theta+3\cos\theta}{1+3\sin\theta-2\cos\theta}$

(a) $\frac{265}{34}$

(b) $\frac{34}{265}$

(c) $\frac{39}{24}$

(d) 2

4. If $\cot\theta = \frac{8}{15}$, then what is the value of $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$ where, θ is a positive acute angle?

यदि $\cot\theta = \frac{8}{15}$, तो $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$ where, θ का मान क्या है, जहाँ θ एक धनात्मक न्यून कोण है?

(a) $\frac{1}{5}$

(b) $\frac{2}{5}$

(c) $\frac{3}{5}$

(d) $\frac{4}{5}$

5. If $\cos A = \frac{5}{13}$, then what is the value of $\frac{\sin A-\cot A}{2\tan A}$?

यदि $\cos A = \frac{5}{13}$, तो $\frac{\sin A-\cot A}{2\tan A}$ का मान क्या है?

(a) $\frac{395}{3644}$ (b) $\frac{395}{3844}$

(c) $\frac{395}{3744}$ (d) $\frac{385}{3744}$

6. If θ lies in the first quadrant and $\cot\theta = \frac{63}{16}$, then what is the value of $(\sin\theta + \cos\theta)$?

यदि θ प्रथम चतुर्थांश में स्थित है तथा $\cot\theta = \frac{63}{16}$ है, तो $(\sin\theta + \cos\theta)$ का मान क्या है?

(a) 1
(b) $\frac{69}{65}$
(c) $\frac{79}{65}$
(d) 2

7. If $0 < \theta < 90°, \sin\theta = \frac{3}{5}$ and $x = \cot\theta$, then what is the value of $1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$?

यदि $0 < \theta < 90°, \sin\theta = \frac{3}{5}$ तथा $x = \cot\theta$ है, तो $1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$ का मान क्या है?

(a) 941
(b) 1000
(c) 1220
(d) 1365

8. If $\text{cosec}\,\theta = \frac{p}{q}$ and θ is acute, then what is the value of $\left(\sqrt{p^2 - q^2}\right)\tan\theta$?

यदि $\text{cosec}\,\theta = \frac{p}{q}$ तथा θ न्यूनकोण है, तो $\left(\sqrt{p^2 - q^2}\right)\tan\theta$ का मान क्या है?

(a) p
(b) q
(c) pq
(d) $\sqrt{p^2} + q^2$

9. If $\tan\theta = \frac{p}{q}$, then what is $\frac{p\sec\theta - q\text{cosec}\,\theta}{p\sec\theta + q\text{cosec}\,\theta}$ equal to?

यदि $\tan\theta = \frac{p}{q}$, तो $\frac{p\sec\theta - q\text{cosec}\,\theta}{p\sec\theta + q\text{cosec}\,\theta}$ किसके बराबर है?

(a) $\frac{p-q}{p+q}$
(b) $\frac{q^2-p^2}{q^2+p^2}$
(c) $\frac{p^2-q^2}{q^2+p^2}$
(d) 1

10. If $\sin 17^\circ = \frac{x}{y}$ then the value of $(\sec 17^\circ - \sin 73^\circ)$ is

यदि $\sin 17^\circ = \frac{x}{y}$ तो $(\sec 17^\circ - \sin 73^\circ)$ का मान है

(a) $\frac{y^2}{x\sqrt{y^2-x^2}}$

(b) $\frac{x^2}{y\sqrt{y^2-x^2}}$

(c) $\frac{x^2}{y\sqrt{x^2-y^2}}$

(d) $\frac{y^2}{x\sqrt{x^2-y^2}}$

11. If $\sin\theta = \frac{p^2-1}{p^2+1}$, then $\cos\theta$ is equal to:

यदि $\sin\theta = \frac{p^2-1}{p^2+1}$ है, तो $\cos\theta$ बराबर है :

(a) $\frac{2p}{1+p^2}$

(b) $\frac{p}{p^2-1}$

(c) $\frac{p}{1+p^2}$

(d) $\frac{2p}{p^2-1}$

12. If यदि $\sin\theta = \frac{a}{\sqrt{a^2+b^2}}, 0^\circ < \theta < 90^\circ$, then the value of $\sec\theta + \tan\theta$ is:

यदि $\sin\theta = \frac{a}{\sqrt{a^2+b^2}}, 0^\circ < \theta < 90^\circ$, तो $\sec\theta + \tan\theta$ का मान है:

(a) $\frac{\sqrt{a^2+b^2}+a}{b}$ (b) $\frac{\sqrt{a^2+b^2}+b}{2a}$

(c) $\frac{\sqrt{a^2+b^2}+a}{2b}$ (d) $\frac{\sqrt{a^2+b^2}+b}{a}$

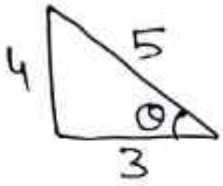
ANSWER SHEET

1	2	3	4	5	6	7	8	9	10	11	12
A	C	D	C	C	C	D	B	C	B	A	A

Worksheet solution

sol 1

$$\sin\theta = \frac{4}{5}$$

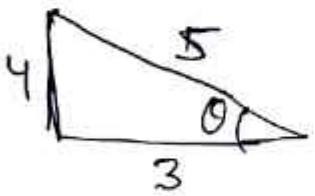


$$= \frac{\sin\theta + \cos\theta}{\tan\theta + \cot\theta}$$

$$= \frac{\frac{4}{5} + \frac{3}{5}}{\frac{4}{3} + \frac{3}{4}} = \frac{84}{125}$$

sol 2

$$\cos\theta = \frac{3}{5}$$



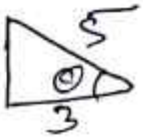
$$= \frac{2\sin\theta + 3\cos\theta}{\tan\theta - \cot\theta}$$

$$= \frac{2 \times \frac{4}{5} + 3 \times \frac{3}{5}}{\frac{4}{3} - \frac{3}{4}}$$

$$= \frac{204}{35}$$

sol 3

$$\tan\theta = \frac{4}{3}$$



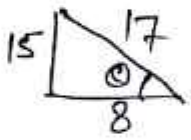
$$= \frac{1 + 2\sin\theta + 3\cos\theta}{1 + 3\sin\theta - 2\cos\theta}$$

$$= \frac{1 + 2 \times \frac{4}{5} + 3 \times \frac{3}{5}}{1 + 3 \times \frac{4}{5} - 2 \times \frac{3}{5}}$$

$$= \frac{22}{11} = 2$$

sol 4

$$\cot\theta = \frac{8}{15}$$

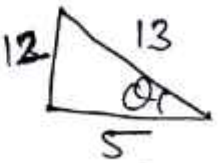


$$= \sqrt{\frac{1 - \cos\theta}{1 + \cos\theta}} = \sqrt{\frac{1 - \frac{8}{17}}{1 + \frac{8}{17}}}$$

$$= \sqrt{\frac{9}{25}} = \frac{3}{5}$$

sol 5

$$\cos A = \frac{5}{13}$$

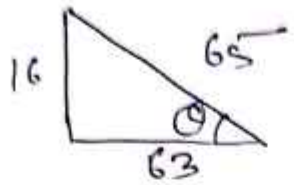


$$= \frac{\sin A - \cot A}{2 + \tan A} = \frac{\frac{12}{13} - \frac{5}{12}}{2 \times \frac{12}{5}}$$

$$= \frac{144 - 65}{13 \times 12 \times 2 \times \frac{12}{5}} = \frac{395}{3744}$$

Sol-6 $\cot\theta = \frac{63}{16}$

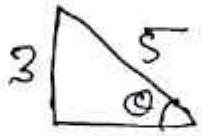
Pyathagarean tuiplet $(65, 63, 16)$



$= \sin\theta + \cos\theta$

$= \frac{16}{65} + \frac{63}{65} = \frac{79}{65}$

Sol-7 $\sin\theta = \frac{3}{5}$



$\therefore \cot\theta = x = \frac{4}{3}$

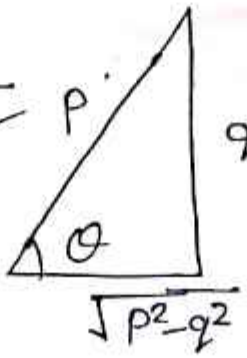
$= 1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$

$= 1 + 3\times\frac{4}{3} + 9\times\frac{16}{9} + 27\times\frac{64}{27} + 81\times\frac{256}{81} + 243\times\frac{1024}{243}$

$= 1 + 4 + 16 + 64 + 256 + 1024$

$= 1365$

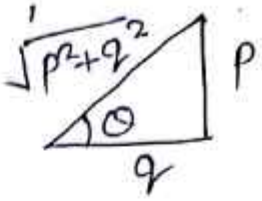
Sol-8 $\operatorname{Cosec}\theta = \frac{p}{q}$



$= (\sqrt{p^2-q^2}) \times \frac{q}{\sqrt{p^2-q^2}}$

$= q$

Sol-9 $\tan\theta = \frac{p}{q}$

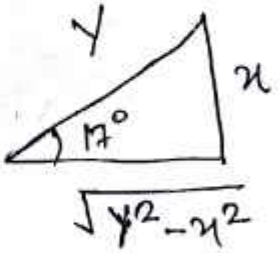


$= \frac{p\sec\theta - q\operatorname{cosec}\theta}{p\sec\theta + q\operatorname{cosec}\theta}$

$= \frac{p\left(\frac{\sqrt{p^2+q^2}}{q}\right) - q\left(\frac{\sqrt{p^2+q^2}}{p}\right)}{p\left(\frac{\sqrt{p^2+q^2}}{q}\right) + q\left(\frac{\sqrt{p^2+q^2}}{p}\right)}$

$= \frac{\frac{p}{q} - \frac{q}{p}}{\frac{p}{q} + \frac{q}{p}} = \frac{p^2-q^2}{p^2+q^2}$

Sol 10 $\sin 17^\circ = \frac{x}{y}$



$= \sec 17^\circ - \sin 73^\circ$

$= \sec 17^\circ - \sin(90^\circ - 17)$

$= \sec 17^\circ - \cos 17^\circ$

$= \frac{y}{\sqrt{y^2-x^2}} - \frac{\sqrt{y^2-x^2}}{x}$

$= \frac{x^2}{y\sqrt{y^2-x^2}}$

Sol-11 $\sin\theta = \dfrac{p^2-1}{p^2+1}$

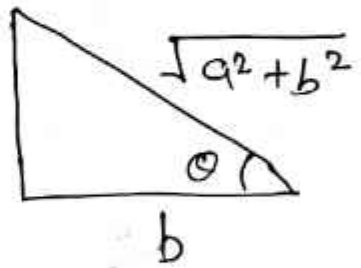
$$\therefore \cos\theta = \sqrt{1-\sin^2\theta}$$

$$= \sqrt{1-\frac{(p^2-1)^2}{(p^2-1)^2}} = \sqrt{\frac{(p^2+1)^2-(p^2-1)^2}{(p^2+1)^2}}$$

$$= \sqrt{\frac{4p^2}{(p^2+1)^2}} \quad \left[\because (a+b)^2-(a-b)^2 = 4ab\right]$$

$$= \frac{2p}{p^2+1}$$

Sol-12 $\sin\theta = \dfrac{a}{\sqrt{a^2+b^2}}$



$$\therefore \sec\theta + \tan\theta$$

$$= \frac{\sqrt{a^2+b^2}}{b} + \frac{a}{b}$$

$$= \frac{\sqrt{a^2+b^2}+a}{b}$$