



## MATHS

### BOOKS - CHETAN MATHS (TAMIL ENGLISH)

### TRIGONOMETRY

#### Master Key Question Set 6 Practice Set 6 1

1. If  $\sin \theta = \frac{7}{25}$  then find  $\cos \theta$  and  $\tan \theta$ .



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2. If  $\tan \theta = \frac{3}{4}$  then find the values of  $\sec \theta$  and  $\cos \theta$



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3. If  $\cot \theta = \frac{40}{9}$ , find the values of  $\cos \theta$  and  $\sin \theta$ .



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4. If  $5 \sec \theta - 12 \cos \theta = 0$ , find the values of  $\sec \theta$ ,  $\cos \theta$  and  $\sin \theta$ .



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5. If  $\tan \theta = 1$ , then  $\frac{\sin \theta + \cos \theta}{\sec \theta + \csc \theta} =$

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6. Prove that:

$$\frac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta.$$

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7. Prove that:  $\cos^2 \theta (1 + \tan^2 \theta) = 1$

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8. Prove that:

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



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9. Prove that:

$$(\sec \theta - \cos \theta)(\cot \theta + \tan \theta) = \tan \theta \sec \theta.$$



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10. Prove that:

$$\cot \theta + \tan \theta = \cos \theta \sec \theta.$$



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11. Prove that:

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



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12. Prove that:

$$\sin^4 \theta - \cos^4 \theta = 1 - 2 \cos^2 \theta.$$



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13.  $\tan \theta + \frac{1}{\tan \theta} = 2$  then prove that

$$\tan^2 \theta + \frac{1}{\tan^2 \theta} = 2$$



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14. Prove that:

$$\frac{\tan A}{(1 + \tan^2 A)^2} + \frac{\cot A}{(1 + \cot^2 A)^2} = \sin A \cos A.$$



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15. Prove that:

$$\sec^4 A (1 - \sin^4 A) - 2 \tan^2 A = 1.$$



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16. Prove that:

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



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## Master Key Question Set 6 Practice Set 6 2

1. Prove than:

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



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2. A person is standing at a distance of 80 m from a church looking at its top. The angle of elevation is of  $45^\circ$ . Find the height of the church.



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3. From the top of a lighthouse, an observer looking at a boat makes an angle of depression of  $60^\circ$ . If the height of the lighthouse is  $90m$ , then find how far is the boat from the lighthouse.

$$(\sqrt{3} = 1.73)$$



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4. Two buildings are facing each other on either side of a road of width 12m. From the top of the first building, which is 10m. High, the angle of elevation of the top of the second is  $60^\circ$ . What is the height of the second building?

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5. Two poles of heights 18 meter and 7 meter are erected on a ground. The length of the wire fastened at their tops is 22 meter. Find the angle made by the wire with the horizontal.

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6. A storm broke a tree and the treetop rested 20 m from the base of the tree, making an angle of  $60^\circ$  with the horizontal. Find the height of the tree.



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7. A kite is flying at a height of 60 m above the ground. The string attached to the kite is tied at the ground it makes an angle of  $60^\circ$ . Assuming that the string is straight, find the length of the string .  
( $\sqrt{3} = 1.732$ )



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## Problem Set 6

1. If  $\sin \theta = \frac{11}{61}$ , find the value of  $\cos \theta$  using trigonometric identity.



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2. If  $\tan \theta = 2$ , find the values of other trigonometric ratios.



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3. If  $\sec \theta = \frac{13}{12}$ , find the values of other trigonometric ratios.

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4. Prove each of the following identities :

$$(i) \sec \theta (1 - \sin \theta) (\sec \theta + \tan \theta) = 1$$

$$(ii) \sin \theta (1 + \tan \theta) + \cos \theta (1 + \cot \theta) = (\sec \theta + \operatorname{cosec} \theta)$$

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5. Prove the following:

$$(\sec \theta + \tan \theta) (1 - \sin \theta) = \cos \theta$$

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6. Prove the following:

$$\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \times \operatorname{cosec}^2 \theta$$

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7. Prove the following:

$$\cot^2 \theta - \tan^2 \theta = \operatorname{cosec}^2 \theta - \sec^2 \theta$$

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8. Prove the following identity:

$$\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$$

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9. Prove the following:

$$\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} = 2 \sec^2 \theta$$

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10. Prove the following:

$$\sec^6 x - \tan^6 x = 1 + 3 \sec^2 x \times \tan^2 x$$

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11. Prove the following:

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

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12. Prove the following:

$$\frac{\tan^3 \theta - 1}{\tan \theta - 1} = \sec^2 \theta + \tan \theta$$

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13. Prove the following:

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



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**14.** A boy standing at a distance of 48 meters from a building observes the top of the building and makes an angle of elevation of  $30^\circ$ . Find the height of the building .



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**15.** From the top of a lighthouse , an observer looks at a ship and finds the angle of depression to be  $30^\circ$ . If the height of the lighthouse is 100m, then find how far is that ship from the lighthouse.







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**16.** Two buildings are in front of each other on a road of width 15 meters. From the top of the first building, having a height of 12 meter, the angle of elevation of the top of the second building is  $30^\circ$ . What is the height of the second building?



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**17.** A ladder on the platform of a firebrigade van can be elevated at an angle of  $70^\circ$  to the maximum. The length of the ladder can be extended upto  $20m$ . If the platform is  $2m$  above the ground, find the maximum

height from the ground upto which the ladder can reach ( $\sin 70^\circ = 0.94$ )

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**18.** While landing at an airport, a pilot made an angle of depression of  $20^\circ$ . Average speed of the plane was  $200\text{km}/\text{h}$ . The plane reached the ground after 54 seconds. Find the height at which the plane was when it started landing.

( $\sin 20^\circ = 0.342$ )

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## Problem Set 6 Mcqs

1.  $\sin \theta \cdot \cos e\theta = \dots\dots$

A. 1

B. 0

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

D.  $\sqrt{2}$

**Answer: A**



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2.  $\cos e45^\circ = \dots\dots$

A.  $\frac{1}{\sqrt{2}}$

B.  $\sqrt{2}$

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

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

**Answer: B**



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**3.  $1 + \tan^2 \theta = ?$**

A.  $\cot^2 \theta$

B.  $\cos ec^2 \theta$

C.  $\sec^2 \theta$

D.  $\tan^2 \theta$

**Answer: C**



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4. When we see at a higher level, from the horizontal line, angle formed is..

A. Angle of Elevation

B. Angle of Depression

C. 0

D. Straight angle

**Answer: A**



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## Additional Mcqs

1. If  $\sin \theta = \frac{4}{5}$  and  $\cos \theta = \frac{3}{5}$ , then  $\tan \theta =$

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

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

C.  $\frac{12}{25}$

D. can not be calculated

**Answer: A**



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2. If  $\cos \theta = \frac{61}{60}$ ,  $\sec \theta = \frac{61}{11}$  then  $\cot \theta =$

A.  $\frac{61^2}{600}$

B.  $\frac{60}{11}$

C.  $\frac{11}{60}$

D. can not be calculated

**Answer: C**



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3. If  $\sin \theta = \frac{24}{25}$  Find the value of  $\cos \theta$ ;  $\tan \theta$ ;  $\cot \theta$ ;  $\sec \theta$  and  $\operatorname{cosec} \theta$  using trigonometric identities

A.  $\frac{\sqrt{24}}{5}$

B.  $\frac{25}{24}$

C.  $\frac{25}{7}$

D.  $\frac{7}{25}$

**Answer: D**



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4. If  $\tan \theta = 1$ , then  $\sec \theta = \dots\dots$

A. 1

B.  $\sqrt{2}$

C. 2

D. 0

**Answer: B**



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5. If  $\cot \theta = \frac{3}{2}$ , then  $\tan \sec \theta = \dots\dots$

A.  $\frac{\sqrt{13}}{3}$

B.  $\frac{9}{16}$

C.  $\frac{16}{9}$

D.  $\frac{5}{4}$

**Answer: A**



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6. If  $\cos ec\theta = \frac{2}{\sqrt{3}}$ , then theta = ....

A.  $0^\circ$

B.  $45^\circ$

C.  $30^\circ$

D.  $60^\circ$

**Answer: D**



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7. In the adjoining figure, if  $\angle B = 90^\circ$ ,  $\angle C = 30^\circ$ ,  $AC = 12$  m, then  $AB = \dots\dots\dots$

A.  $12\sqrt{3}$ m

B.  $6\sqrt{3}$  m

C. 12 m

D. 6 m

**Answer: D**



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8. If  $(\sec \theta - 1)(\sec \theta + 1) = \frac{1}{3}$ , then  $\cos \theta = \dots\dots\dots$

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

B.  $\frac{1}{\sqrt{2}}$

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

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

**Answer: C**



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9. If  $\sin \theta + \cos \theta = a$ , and  $\sin \theta = \cos \theta = b$ , then A)

$a^2 + b^2 = 1$     B)  $a^2 - b^2 = 1$     C)  $a^2 + b^2 = 2$     D)

$a^2 - b^2 = 2$

A.  $a^2 + b^2 = 1$

B.  $a^2 - b^2 = 1$

C.  $a^2 + b^2 = 2$

D.  $a^2 - b^2 = 2$

**Answer: C**



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10. If  $\sin \theta = 1$ , then find  $\cot \theta = \dots\dots$  A)0 B)1 C) $\sqrt{3}$  D)

$$\frac{1}{\sqrt{3}}$$

A. 0

B. 1

C.  $\sqrt{3}$

D.  $\frac{1}{\sqrt{3}}$

**Answer: A**



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**Problems For Practice**

1. If  $\tan \theta = 2$ , find the values of other trigonometric ratios.

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2. If  $\cot \theta = \frac{7}{24}$ , find the values of other trigonometric ratios using the identity.

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3.  $3 \sin \theta - 4 \cos \theta = 0$ , then find the values of all trigonometric ratios.

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4. If  $\sqrt{3}\tan\theta = 3\sin\theta$  then the value of  $(\sin^2\theta - \cos^2\theta)$  is



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5. Simplify :  $\sin\theta(\cos e\theta - \sin\theta)$



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6. Prove:

$$\cos^2\theta + \frac{1}{1 + \cot^2\theta} = 1$$



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7. Prove each of the following identities :

$$\frac{1}{(1 + \sin \theta)} + \frac{1}{(1 - \sin \theta)} = 2 \sec^2 \theta$$



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8. Prove:

$$(1 + \tan^2 \theta)(1 + \sin \theta)(1 - \sin \theta) = 1$$



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9. Prove:

$$(1 + \cot^2 \theta)(1 + \cos \theta)(1 - \cos \theta) = 1$$



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**10.** Prove the following trigonometric identities :

$$\cot^2 \theta - \frac{1}{\sin^2 \theta} = -1 \quad (\text{ii})$$

$$(1 + \tan^2 \theta)(1 + \sin \theta)(1 - \sin \theta) = 1$$

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**11.** Prove:

$$\sin^4 \theta - \cos^4 \theta = 1 - 2 \cos^2 \theta$$

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12. Prove:

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



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13. Prove:

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



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14. Prove:  $\frac{\tan^3 A + 1}{\tan A + 1} = \sec^2 A - \tan A$



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15. Prove:

$$\frac{\sin \theta + \tan \theta}{\cos \theta} = \tan \theta (1 + \sec \theta)$$



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16. Prove:

$$\cos ec^2 A - \cos^2 A = \frac{\sec^2 A - \sin^2 A}{\tan^2 A}$$



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17. Prove:

$$\left( \frac{1}{\cos \theta} + \frac{1}{\cot \theta} \right) \times (\sec \theta - \tan \theta) = 1$$



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18. Prove:

$$\frac{\cos^2 A + \tan^2 A - 1}{\sin^2 A} = \tan^2 A$$



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19. Prove that:

$$\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \frac{\cos A}{1 - \sin A}$$



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20. Prove:

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



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21. A person is standing at a distance of  $80m$  from the church looking at its top. The angle of elevation is  $45^\circ$ . The height of the church is.



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22. From the top of a lighthouse, an observer looking at a boat makes an angle of depression of  $60^\circ$ . If the height of the lighthouse is  $90m$ , then find how far is the boat from the lighthouse.

$$(\sqrt{3} = 1.73)$$



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23. A building is  $200\sqrt{3}$  meters high. Find the angle of elevation if its top is 200 m away from its foot.



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24. A straight highway leads to the foot of a tower of height 50 m. From the top of tower, the angles of depression of two cars standing on the highway are  $30^\circ$  and  $60^\circ$  respectively. What is the distance between the two cars and how far is each car from the tower?



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**25.** A ship of height 24 m is sighted from a lighthouse. From the top of the lighthouse the angle of depression to the top of the mast and base of the ship is  $30^\circ$  and  $45^\circ$  respectively. How far is the ship from the lighthouse? ( $\sqrt{3} = 1.73$ )



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**26.** From a point on the roof of a house, 11m high, it is observed that the angle of depression of the top and foot of a lamp post are  $30^\circ$  and  $60^\circ$  respectively. What is the height of the lamp post?



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## Assignment 6

1. If  $\sin \theta = \frac{4}{5}$ , then find  $\cos \theta$

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2. Evaluate  $\tan 40^\circ \times \tan 50^\circ$

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3. If  $\tan \theta = 1$ , then complete the following activity to find  $\cos \theta$ .

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4. A boy is at a distance of 60 m from a tree, makes an angle of elevation of  $60^\circ$  with the top of the tree. What is the height of the tree?

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5. Prove that  $\frac{\sin^2 A}{\cos A} + \cos A = \sec A$ .

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6. If  $x = r \cos \theta$  and  $y = r \sin \theta$ , then proof

$$x^2 + y^2 = r^2$$



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7. Using Pythagoras theorem, prove that  $1 +$

$$\cot^2 \theta = \operatorname{cosec}^2 \theta,$$



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8. Two poles of heights 18 meter and 7 meter are erected on a ground. The length of the wire fastened

at their tops in 22 meter. Find the angle made by the wire with the horizontal.

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9. Prove that

$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$

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10. In a right angled

$\Delta ABC$ ,  $\angle A = 90^\circ$  and  $\frac{5 \sin^2 B + 7 \cos^2 C + 4}{3 + 8 \tan^2 60^\circ} = \frac{7}{27}$

,If  $AC = 3$ , find the perimeters of  $\Delta ABC$ ,

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11. Prove :

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



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