

EduSahara™ Learning Center Assignment

Grade : Class X, CBSE

Chapter : Introduction to Trigonometry

Name : Complex Trigonometric Expressions Simplification

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

(i) $\cot 2\theta$ (ii) $\tan 2\theta$ (iii) $\sin 2\theta$ (iv) $\cos 2\theta$

2. $\frac{1 - \tan^2 70^\circ}{1 + \tan^2 70^\circ} =$

(i) $\sin 140^\circ$ (ii) $\tan 140^\circ$ (iii) $\cos 140^\circ$ (iv) $\cot 140^\circ$

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

(i) 1 (ii) $\operatorname{cosec}^2 \theta$ (iii) $\cot^2 \theta$ (iv) $\tan^2 \theta$ (v) $\sec^2 \theta$

4. If $\cot \theta = \frac{1}{2}$, find $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 - \cos \theta)(1 + \cos \theta)}$

(i) $\frac{1}{6}$ (ii) $\frac{1}{4}$ (iii) $\frac{3}{4}$ (iv) $(-\frac{1}{4})$ (v) $\frac{1}{2}$

5. If $\tan \theta = \frac{7}{9}$, find $\frac{(1 + \cos \theta)(1 - \cos \theta)}{(1 + \sin \theta)(1 - \sin \theta)}$

(i) $\frac{47}{81}$ (ii) $\frac{17}{27}$ (iii) $\frac{49}{81}$ (iv) $\frac{49}{79}$ (v) $\frac{49}{83}$

6. Find the value of $\frac{(1 + \sin \theta)}{(\cos \theta)} + \frac{(\cos \theta)}{(1 + \sin \theta)}$

(i) $2 \operatorname{cosec} \theta$ (ii) $2 \sec \theta$ (iii) $2 \cos \theta$ (iv) $2 \sin \theta$

7. Find the value of $5 \sec^2 \theta - 5 \tan^2 \theta$

(i) 8 (ii) 1 (iii) 5 (iv) 0 (v) 2

8. Find the value of $(1 + \tan \theta + \sec \theta)(1 + \cot \theta - \operatorname{cosec} \theta)$

(i) 2 (ii) (-1) (iii) 3 (iv) 1 (v) 5

9. Find the value of $(\operatorname{cosec} \theta - \cot \theta)^2$

$$(i) \frac{1 + \cos \theta}{1 - \cos \theta} \quad (ii) \frac{1 - \cos \theta}{1 + \cos \theta} \quad (iii) \frac{1 + \sin \theta}{1 - \sin \theta} \quad (iv) \frac{1 - \sin \theta}{1 + \sin \theta}$$

10. Which of the following are true?

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

$$b) \frac{1 + \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta} = 2 \sec \theta$$

$$c) \frac{\cos \theta}{\operatorname{cosec} \theta + 1} + \frac{\cos \theta}{\operatorname{cosec} \theta - 1} = 2 \tan \theta$$

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

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

(i) {a,b} (ii) {b,c,d} (iii) {a,e,d} (iv) {e,c} (v) {a,b,c}

11. Which of the following are true?

$$a) (\sin \theta + \cos \theta)^2 + (\sin \theta - \cos \theta)^2 = 2$$

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

$$c) \cos^3 \theta + \sin^3 \theta = (\sin \theta + \cos \theta)(1 - \sin \theta \cos \theta)$$

$$d) \frac{\cos \theta}{1 + \sin \theta} = \frac{1 - \sin \theta}{\cos \theta}$$

$$e) \frac{\sec \theta}{1 + \operatorname{cosec} \theta} = \frac{1 - \operatorname{cosec} \theta}{\sec \theta}$$

$$f) \cos^3 \theta - \sin^3 \theta = (\sin \theta + \cos \theta)(1 - \sin \theta \cos \theta)$$

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

- (i) {e,g,a} (ii) {e,c} (iii) {b,a} (iv) {a,c,d,g} (v) {f,b,d}
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12. If T , U and V are the interior angles of a triangle, then $\sin\left(\frac{T+U}{2}\right) =$

- (i) $\cos\left(\frac{T}{2}\right)$ (ii) $\sin V$ (iii) $\sin\left(\frac{V}{2}\right)$ (iv) $\sin\left(\frac{T}{2}\right)$ (v) $\cos\left(\frac{V}{2}\right)$
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13. If $p = \cos \theta + \sin \theta$, $q = \cos \theta \sin \theta$ then

- (i) $(p^2 + q^2) = 1$
 (ii) $(p^2 - q^2) = 1$
 (iii) $p^2 = (-2q + 1)$
 (iv) $(p^2 + q^2) = 0$
 (v) $p^2 = (2q + 1)$
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14. If $s = \cos \theta + \sin \theta$, $t = \cos \theta - \sin \theta$ then

- (i) $(s^2 - t^2) = 2$
 (ii) $(s^2 - t^2) = 1$
 (iii) $(s^2 + t^2) = 2$
 (iv) $(s^2 + t^2) = 0$
 (v) $(s^2 + t^2) = 1$
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15. If $q = a \sin \theta$, $r = a \cos \theta$, then which of the following are true?

- a) $\frac{q^2}{r^2} = \tan^2 \theta$
 b) $(q^2 + r^2) = a^2$
 c) $(q^2 - r^2) = a^2$
 d) $2qr = a^2 \sin 2\theta$

$$e) (q+r)^2 = a^2$$

(i) {e,b} (ii) {c,a,b} (iii) {c,a} (iv) {c,e,d} (v) {a,b,d}

16. If $a = r \cos \theta + s \sin \theta$ and $b = r \sin \theta - s \cos \theta$, then

$$(i) (a^2 - b^2) = (r^2 - s^2)$$

$$(ii) (r^2 + a^2) = (s^2 + b^2)$$

$$(iii) ab = rs$$

$$(iv) (a^2 + b^2) = (r^2 + s^2)$$

Assignment Key

- 1) (iv)
- 2) (iii)
- 3) (iv)
- 4) (ii)
- 5) (iii)
- 6) (ii)
- 7) (iii)
- 8) (i)
- 9) (ii)
- 10) (ii)
- 11) (iv)
- 12) (v)
- 13) (v)
- 14) (iii)
- 15) (v)
- 16) (iv)