

Class: Ten

Subject- Opt. Mathematics

Source: Photos of exercise are given below.

Work: complete all the discussed numbers.

Do your work neatly

Let us Memorize

Ratios of Multiple Angles

1. $\sin 2A = 2 \sin A \cdot \cos A$ $\quad = \frac{2 \tan A}{1 + \tan^2 A}$	3. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$	9. $\cos 3A = 4 \cos^3 A - 3 \cos A$
2. $\cos 2A = \cos^2 A - \sin^2 A$ $\quad = 2 \cos^2 A - 1$ $\quad = 1 - 2 \sin^2 A$ $\quad = \frac{1 - \tan^2 A}{1 + \tan^2 A}$	4. $\cot 2A = \frac{\cot^2 A - 1}{2 \cot A}$	10. $4 \sin^3 A = 3 \sin A - \sin 3A$
	5. $2 \sin^2 A = 1 - \cos 2A$	11. $4 \cos^3 A = \cos 3A + 3 \cos A$
	6. $2 \cos^2 A = 1 + \cos 2A$	12. $\tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$
	7. $\tan^2 A = \frac{1 - \cos 2A}{1 + \cos 2A}$	8. $\sin 3A = 3 \sin A - 4 \sin^3 A$


EXERCISE 1

READY

- (a) What is multiple angle? (b) Convert $\cos 2A$ in terms of $\cos A$.
 (c) Express $\tan 2A$ in terms of $\tan A$. (d) What is the relation between $\cos 2A$ and $\sin A$?
- (a) Write the relation between $\cos 3A$ and $\cos A$.
 (b) What is the relation between $\sin 3A$ and $\sin A$?
 (c) Write the relation between $\tan 3A$ and $\tan A$.
- (a) If $\sin A = \frac{1}{2}$, find the value of $\cos 2A$. (b) If $\cos A = \frac{1}{2}$, find the value of $\cos 2A$.
 (c) If $\tan A = \frac{1}{2}$, find the value of $\cos 2A$. (d) If $\sin A = \frac{1}{2}$, find the value of $\sin 3A$.

SOLVE

- If $\sin A = \frac{4}{5}$ and $\cos B = \frac{12}{13}$, find the value of:
 (a) $\sin 2A$ (b) $\cos 2B$ (c) $\tan 2A$ (d) $\sin 3A$ (e) $\cos 3B$ (f) $\tan 3A$
- If $\tan A = \frac{3}{4}$, find the value of:
 (a) $\tan 2A$ (b) $\sin 2A$ (c) $\cos 2A$ (d) $\tan 3A$ (e) $\sin 3A$ (f) $\cos 3A$
- Prove the following identities:
 (a) $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$
 (b) $\frac{\sin 5A}{\sin A} - \frac{\cos 5A}{\cos A} = 4 \cos 2A$
 (c) $\tan 2A + \sin 2A = \frac{4 \tan A}{1 - \tan^2 A}$
 (d) $\frac{\cos A - \sin A}{\cos A + \sin A} = \tan 2A$
 (e) $\frac{\sin 2A}{\sin A} - \frac{\cos 2A}{\cos A} = \sec A$
 (f) $\frac{\sin 8A}{\sin 4A} - \frac{\cos 8A}{\cos 4A} = \sec 4A$
- Prove that:
 (a) $\frac{1 - \sin 2A}{\cos 2A} = \sec 2A - \tan 2A$
 (b) $\frac{\cos 2A}{1 + \sin 2A} = \frac{1 - \tan A}{1 + \tan A}$
 (c) $\frac{1 + \cos 2A}{\sin 2A} = \cot A$
 (d) $\frac{1 + \sec 2A}{\tan 2A} = \cot A$
 (e) $\frac{\cot A - \tan A}{\cot A + \tan A} = \cos 2A$
 (f) $\operatorname{cosec} 2A + \cot 2A = \cot A$
 (g) $\frac{\sin 2A + \sin A}{1 + \cos A + \cos 2A} = \tan A$
 (h) $\frac{2 \sin 2A + \sin 4A}{2 \sin 2A - \sin 4A} = \cot^2 A$
 (i) $\frac{1 + \sin 2A - \cos 2A}{1 + \sin 2A + \cos 2A} = \tan A$
 (j) $\frac{\sin A - \sqrt{1 + \sin 2A}}{\cos A - \sqrt{1 + \sin 2A}} = \cot A$



Trigonometry 175

(k) $1 + \tan 4A \cdot \tan 2A = \sec 4A$

(m) $\frac{\sin 4A}{\cos 2A} \times \frac{1 - \cos 2A}{1 - \cos 4A} = \tan A$

(o) $\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A} = \frac{1}{2} (2 - \sin 2A)$

(q) $\operatorname{cosec} 2A + \cot 4A = \cot A - \operatorname{cosec} 4A$

(f) $\frac{\cos A - \sin A}{\cos A + \sin A} = \sec 2A - \tan 2A$

(n) $\cot 2A + \tan A = \operatorname{cosec} 2A$

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

(r) $\frac{1}{\tan A} - \frac{1}{\tan 2A} = \frac{1}{\sin 2A}$

5. Show that:

(a) $\frac{1 - \tan^2 (45^\circ - A)}{1 + \tan^2 (45^\circ - A)} = \sin 2A$

(c) $\cot (45^\circ - A) = \tan 2A + \sec 2A$

(e) $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ = 4$

(g) $\tan \left(\frac{\pi}{4} + \theta \right) - \tan \left(\frac{\pi}{4} - \theta \right) = 2 \tan 2\theta$

(i) $\tan \theta + \tan (60^\circ + \theta) + \tan (120^\circ + \theta) = 3 \tan 3\theta$

(b) $\frac{2 \tan (45^\circ - A)}{1 + \tan^2 (45^\circ - A)} = \cos 2A$

(d) $\frac{1}{\sin 10^\circ} - \frac{\sqrt{3}}{\cos 10^\circ} = 4$

(f) $\cos^3 20^\circ + \sin^3 10^\circ = \frac{3}{4} (\cos 20^\circ + \sin 10^\circ)$

(h) $\tan \left(\frac{\pi}{4} + \theta \right) + \tan \left(\frac{\pi}{4} - \theta \right) = 2 \sec 2\theta$

6. Prove the followings:

(a) $\cos^6 A + \sin^6 A = \frac{1}{4} (1 + 3\cos^2 2A)$

(c) $\cos^8 A + \sin^8 A = 1 - \sin^2 2A + \frac{1}{8} \sin^4 2A$

(e) $4 \sin A \cdot \cos^3 A - 4 \cos A \cdot \sin^3 A = \sin 4A$

(f) $4 \sin^3 A \cdot \cos 3A + 4 \cos^3 A \cdot \sin 3A = 3 \sin 4A$

(g) $\cos 4A = 8 \cos^4 A - 8 \cos^2 A + 1$

(i) $2 \cos 4A + 1 = (2 \cos A - 1)(2 \cos A + 1)(2 \cos 2A - 1)$

(j) $2 \cos 8A + 1 = (2 \cos A - 1)(2 \cos A + 1)(2 \cos 2A - 1)(2 \cos 4A - 1)$

(k) $2 \cos 16A + 1 = (2 \cos 2A - 1)(2 \cos 2A + 1)(2 \cos 4A - 1)(2 \cos 8A - 1)$

(l) $\sqrt{2 + \sqrt{2 + 2\cos 4\theta}} = 2 \cos \theta$

(n) $\cos^2 A + \sin^2 A \cos 2B = \cos^2 B + \sin^2 B \cos 2A$

(o) $\sin^2 A \cdot \cos 2B - \sin^2 B \cdot \cos 2A = \cos^2 B - \cos^2 A$

(p) $\frac{1}{\tan 3A + \tan A} - \frac{1}{\cot 3A + \cot A} = \cot 4A$

(r) $\frac{1}{\tan 6A - \tan 2A} - \frac{1}{\cot 6A - \cot 2A} = \cot 4A$

7. (a) If $\tan A = \frac{x}{y}$, prove that: $y \cdot \cos 2A + x \cdot \sin 2A = y$

(b) If $2 \tan A = 3 \tan B$, then prove that: $\tan (A - B) = \frac{\sin 2B}{5 - \cos 2B}$

8. If $\cos A = \frac{1}{2} \left(a + \frac{1}{a} \right)$, show that:

(a) $\cos 2A = \frac{1}{2} \left(a^2 + \frac{1}{a^2} \right)$

(b) $\cos 3A = \frac{1}{2} \left(a^3 + \frac{1}{a^3} \right)$

Subject- Social Studies

1. Summarize the major activities and achievements of Martin Luther King.

Subject- English

Unit 8 Human Trafficking Ex. Vocabulary in use 1 and 2 .

Subject- Science

1. Which gland is called master gland and why?
2. Why adrenal gland is called emergency gland?
3. What is goiter? How does it occur?
4. What happens in the hypo secretion of thyroxin hormone, growth hormone, insulin, parathermone and testosterone?

The End.