

E. Trigonometric identities

Remember :- $\sin^2 x + \cos^2 x = 1$; and $\tan x = \frac{\sin x}{\cos x}$

Exercise 5

1. Simplify the following using the above 2 identities:

(a) $2\sin^2 x^\circ + 2\cos^2 x^\circ$

(b) $5\cos^2 x^\circ + 5\sin^2 x^\circ$

(c) $\frac{3\sin x^\circ}{\cos x^\circ}$

(d) $\frac{5\sin x^\circ}{2\cos x^\circ}$

2. Write down a simple expression, identical to:

(a) $1 - \sin^2 x^\circ$

(b) $1 - \cos^2 x^\circ$

(c) $\tan x^\circ \cos x^\circ$

(d) $\frac{\sin x^\circ}{\cos x^\circ}$

3. Simplify:

(a) $\frac{1 - \cos^2 x^\circ}{\sin^2 x^\circ}$

(b) $\frac{1 - \sin^2 x^\circ}{2\cos^2 x^\circ}$

(c) $\frac{\sin^2 x^\circ}{\cos^2 x^\circ}$

(d) $\frac{1 - \sin^2 x^\circ}{\cos x^\circ}$

(e) $\frac{1 - \cos^2 x^\circ}{5\sin x^\circ}$

(f) $\tan^2 x^\circ(1 - \sin^2 x^\circ)$

4. Prove the following trigonometric identities:

(a) $3 - 3\sin^2 x^\circ = 3\cos^2 x^\circ$

(b) $5 - 5\cos^2 x^\circ = 5\sin^2 x^\circ$

(c) $\sqrt{1 - \cos^2 x^\circ} = \sin x^\circ$

(d) $\tan x^\circ \sqrt{1 - \sin^2 x^\circ} = \sin x^\circ$

(e) $\frac{1 - \cos^2 x^\circ}{1 - \sin^2 x^\circ} = \tan^2 x^\circ$

(f) $\frac{1 - \sin^2 x^\circ}{1 - \cos^2 x^\circ} = \frac{1}{\tan^2 x^\circ}$

Answers

Exercise 5

1. (a) 2 (b) 5 (c) $3\tan x$ (d) $\frac{5}{2}\tan x$

2. (a) $\cos^2 x^\circ$ (b) $\sin^2 x^\circ$ (c) $\sin x^\circ$ (d) $\tan x^\circ$

3. (a) 1 (b) $\frac{1}{2}$ (c) $\tan^2 x^\circ$ (d) $\cos x^\circ$ (e) $\frac{1}{5}\sin x^\circ$ (f) $\sin^2 x^\circ$

4. All proofs.