



MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

T-RATIOS OF SOME PARTICULAR ANGLES

Solved Examples

1. Evaluate :

$$(i) \sin 60^\circ \cdot \cos 30^\circ - \cos 60^\circ \cdot \sin 30^\circ$$

$$(ii) \tan 30^\circ \cdot \operatorname{cosec} 60^\circ + \tan 60^\circ \cdot \sec 30^\circ.$$



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2. Evaluate :

$$(i) \sin^2 30^\circ \cdot \cos^2 45^\circ + 4 \tan^2 30^\circ + \frac{1}{2} \sin^2 90^\circ + \frac{1}{8} \cot^2 60^\circ$$

$$(ii) \frac{\tan^2 60^\circ + 4 \sin^2 45^\circ + 3 \sec^2 30^\circ + 5 \cos^2 90^\circ}{\csc 30^\circ + \sec 60^\circ - \cot^2 30^\circ}$$

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3. Show that

$$(i) \cos 60^\circ \cdot \cos 30^\circ - \sin 60^\circ \cdot \sin 30^\circ = \cos 90^\circ$$

$$(ii) \cos 60^\circ = 1 - 2 \sin^2 30^\circ = 2 \cos^2 30^\circ - 1$$

$$(iii) \frac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \cdot \tan 30^\circ} = \tan 30^\circ$$

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4. Taking $\theta = 30^\circ$, verify each of the following

$$(i) \sin 2\theta = 2 \sin \theta \cos \theta$$

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

$$(iii) \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

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5. Taking $\theta = 30^\circ$, verify each of the following

(i) $\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$

(ii) $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$

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6. Taking $A = 60^\circ$ and $B = 30^\circ$, verify that :

$$\sin(A - B) = \sin A \cos B - \cos A \sin B.$$

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7. If

$$\sin(A + B) = 1 \text{ and } \cos(A - B) = \frac{\sqrt{3}}{2}, 0^\circ < A + B \leq 90^\circ, A > B$$

then find A and B .



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8. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; find A and B.

A. $A = 60^\circ$ and $B = 30^\circ$.

B. $A = 55^\circ$ and $B = 25^\circ$.

C. $A = 35^\circ$ and $B = 15^\circ$.

D. $A = 45^\circ$ and $B = 15^\circ$.

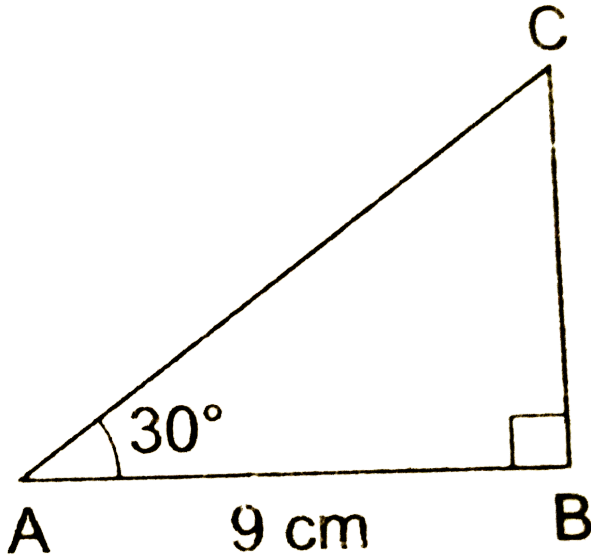
Answer: D

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9. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = 1$, $0^\circ < A + B < 90^\circ$ and $A > B$, find the values of A and B.

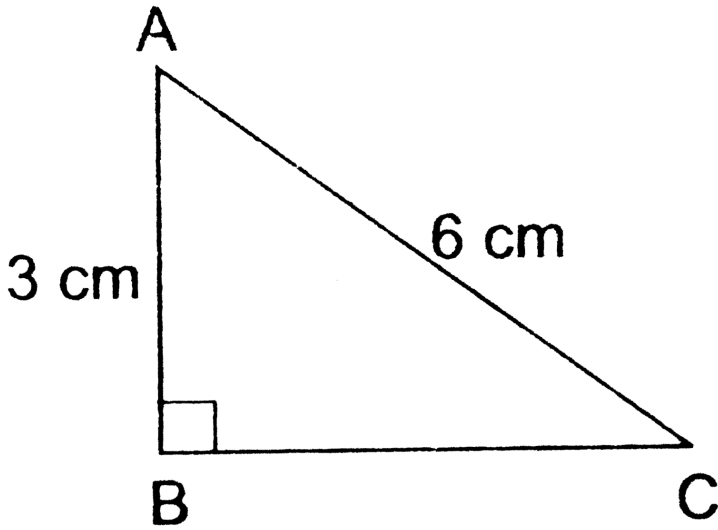
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10. In the adjoining figure, $\triangle ABC$ is right-angled at B . If $\angle A = 30^\circ$ and $AB = 9\text{ cm}$, find (i) BC and (ii) AC .



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11. In right $\triangle ABC$, $\angle B = 90^\circ$, $AB = 3\text{ cm}$ and $AC = 6\text{ cm}$. Find $\angle A$.



A. 30°

B. 45°

C. 70°

D. 60°

Answer: D



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12. If $6x = \sec \theta$ and $\frac{6}{x} = \tan \theta$, find the value of $9\left(x^2 - \frac{1}{x^2}\right)$.

A. 1

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

C. $\frac{1}{4}$

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

Answer: C



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Exercise 11

1. Find the value of $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$.



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2. Evaluate each of the following :

$$\cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ$$

A. 1

B. 0

C. -1

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

Answer: B

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3. Evaluate $\cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ$.

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$$4. \frac{\sin 30^\circ}{\cos 45^\circ} + \frac{\cot 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\tan 45^\circ} + \frac{\cos 30^\circ}{\sin 90^\circ} =$$



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$$5. \frac{5 \cos^2 60^\circ + 4 \sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$



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6. Evaluate each of the following :

$$2 \cos^2 60^\circ + 3 \sin^2 45^\circ - 3 \sin^2 30^\circ + 2 \cos^2 90^\circ$$



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$$7. \cot^2 30^\circ - 2 \cos^2 30^\circ - \frac{3}{4} \sec^2 45^\circ + \frac{1}{4} \csc^2 30^\circ$$



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8. Evaluate each of the following :

$$(\sin^2 30^\circ + 4 \cot^2 45^\circ - \sec^2 60^\circ) (\cos^2 45^\circ \sec^2 30^\circ)$$



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9. Evaluate each of the following :

$$\frac{4}{\cot^2 30^\circ} + \frac{1}{\sin^2 30^\circ} - 2 \cos^2 45^\circ - \sin^2 30^\circ$$



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10. Show that :

$$(i) \frac{1 - \sin 60^\circ}{\cos 60^\circ} = \frac{\tan 60^\circ - 1}{\tan 60^\circ + 1}$$

$$(ii) \frac{\cos 30^\circ + \sin 60^\circ}{1 + \sin 30^\circ + \cos 60^\circ} = \cos 30^\circ$$



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11. Verify each of the following :

$$(i) \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin 30^\circ$$

$$(ii) \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ = \cos 30^\circ$$

$$(iii) 2\sin 30^\circ \cos 30^\circ = \sin 60^\circ$$

$$(iv) 2\sin 45^\circ \cos 45^\circ = \sin 90^\circ$$

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12. If $A = 45^\circ$, verify that

$$(i) \sin 2A = 2 \sin A \cos A \quad (ii) \cos 2A = 2 \cos^2 A - 1 = 1 - 2 \sin^2 A$$

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13. If $A = 30^\circ$, verify that

$$(i) \sin 2A = \frac{2 \tan A}{1 + \tan^2 A}$$

$$(iii) \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

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

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14. If $A = 60^\circ$ and $B = 30^\circ$, verify that :

$$(i) \sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$(ii) \cos(A + B) = \cos A \cos B - \sin A \sin B$$

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15. If $A = 60^\circ$ and $B = 30^\circ$, verify that :

$$(i) \sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$(ii) \cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$(iii) \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

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16. If A and B are acute angles such that $\tan A = \frac{1}{3}$, $\tan B = \frac{1}{2}$ and

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}, \text{ Then find the value of } A + B.$$

A. 30°

B. 60°

C. 45°

D. 90°

Answer: C

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17. Using the formula, $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$, find the value of $\tan 60^\circ$, it being given that $\tan 30^\circ = \frac{1}{\sqrt{3}}$

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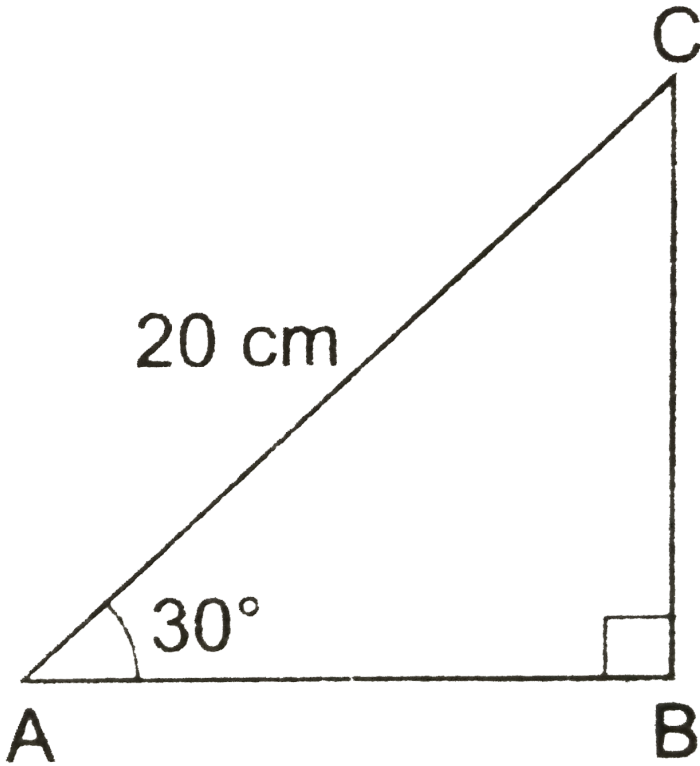
18. Using the formula $\cos A = \sqrt{\frac{1 + \cos 2A}{2}}$, find the value of $\cos 30^\circ$, it is given that $\cos 60^\circ = \frac{1}{2}$.

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19. Using the formula, $\sin A = \sqrt{\frac{1 - \cos 2A}{2}}$, find the value of $\sin 30^\circ$, it being given that $\cos 60^\circ = \frac{1}{2}$.

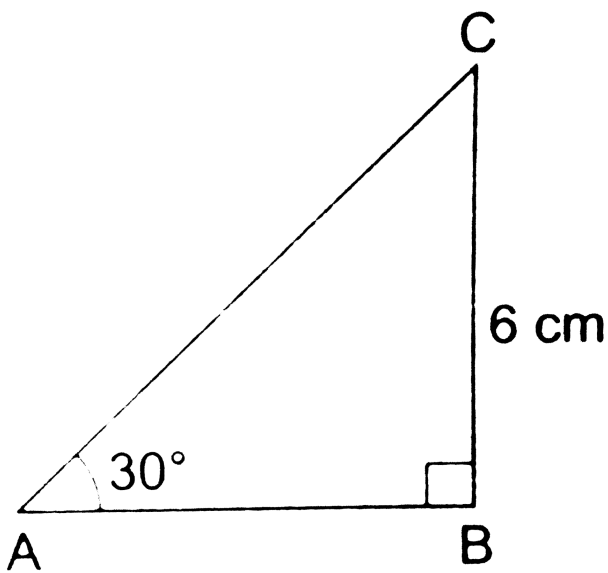
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20. In the adjoining figure, $\triangle ABC$ is a right-angled triangle in which $\angle B = 90^\circ$, $\angle A = 30^\circ$ and $AC = 20\text{cm}$. Find (i) BC , (ii) AB .



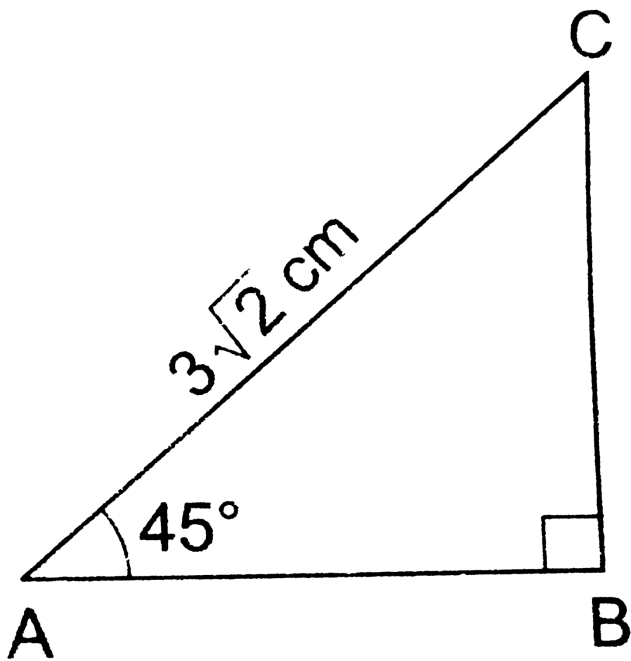
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21. In the adjoining figure, $\triangle ABC$ is right-angled at B and $\angle A = 30^\circ$. If $BC = 6\text{ cm}$, find (i) AB , (ii) AC .



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22. In the adjoining figure, $\triangle ABC$ is right-angled at B and $\angle A = 45^\circ$. If $AC = 3\sqrt{2}\text{cm}$, find (i) BC , (ii) AB .



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23. If $\sin(A + B) = 1$ and $\cos(A - B) = 1$, $0^\circ \leq (A + B) \leq 90^\circ$ and $A > B$ then find A and B .

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24. If $\sin(A - B) = \frac{1}{2}$ and $\cos(A + B) = \frac{1}{2}$, $0^\circ < (A + B) < 90^\circ$ and $A > B$ then find A and B .

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25. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; '0o B,' find A and B.

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26. If $3x = \operatorname{cosec} \theta$ and $\frac{3}{x} = \cot \theta$, find the value of $3\left(x^2 - \frac{1}{x^2}\right)$.

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

B. $\frac{1}{4}$

C. $\frac{1}{5}$

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

Answer: D



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27. If $\sin(A + B) = \sin A \cos B + \cos A \sin B$ and $\cos(A - B) = \cos A \cos B + \sin A \sin B$, find the values of (i) $\sin 75^\circ$ and (ii) $\cos 15^\circ$.



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