EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 05

Time: 30 minutes | Maximum marks: 25

Name: _____ Class: _____ Date: _____

1. There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
2. Each correct answer carries 1 mark. There is no negative marking.
3. The key sheet and worked solutions are at the end of this test.

1. If $\tan A = \frac{45}{28}$ and $\sin B = \frac{11}{61}$ (A, B acute), then $\sin(A+B) =$

A. $\frac{2175}{3233}$ **B.** $\frac{1185}{3233}$ **C.** $\frac{3008}{3233}$ **D.** $\frac{2392}{3233}$

2. If $\sin A = \frac{8}{17}$ and $\sin B = \frac{9}{41}$ (A, B acute), then $\cos(A-B) =$

A. $\frac{672}{697}$ **B.** $\frac{455}{697}$ **C.** $\frac{528}{697}$ **D.** $\frac{185}{697}$

3. $\operatorname{cosec} 105^\circ =$

A. $\sqrt{6}-\sqrt{2}$ **B.** $-(\sqrt{6}+\sqrt{2})$ **C.** $-(\sqrt{6}-\sqrt{2})$ **D.** $\sqrt{6}+\sqrt{2}$

4. $\tan 195^\circ =$

A. $-(2+\sqrt{3})$ **B.** $2-\sqrt{3}$ **C.** $2+\sqrt{3}$ **D.** $-(2-\sqrt{3})$

5. $\cos 194^\circ \cos 14^\circ + \sin 194^\circ \sin 14^\circ =$

A. $\frac{1}{2}$ **B.** 0 **C.** 1 **D.** -1

6. $\cos 133^\circ \cos 17^\circ - \sin 133^\circ \sin 17^\circ =$

A. $-\frac{1}{2}$ **B.** $\frac{\sqrt{3}}{2}$ **C.** $-\frac{\sqrt{3}}{2}$ **D.** $\frac{1}{2}$

7. $2\sin 4\theta \sin 8\theta =$

A. $\sin 4\theta + \sin 12\theta$ **B.** $\cos 4\theta - \cos 12\theta$

C. $\cos 4\theta + \cos 12\theta$ **D.** $-\cos 4\theta + \cos 12\theta$

8. $2\cos 4\theta \cos 7\theta =$

A. $\cos 3\theta - \cos 11\theta$ **B.** $-\sin 3\theta + \sin 11\theta$

C. $-\cos 3\theta + \cos 11\theta$ **D.** $\cos 3\theta + \cos 11\theta$

9. $\cos 75^\circ - \cos 15^\circ =$

A. $\frac{1}{\sqrt{2}}$ **B.** $-\frac{1}{\sqrt{2}}$ **C.** $-\sqrt{2}$ **D.** $-\frac{\sqrt{2}}{4}$

10. $\sin 11\theta + \sin 7\theta =$

A. $2\sin 9\theta \cos 2\theta$ **B.** $2\cos 9\theta \sin 2\theta$

C. $2\sin 2\theta \cos 9\theta$ **D.** $-2\sin 9\theta \cos 2\theta$

11. If $\cot A = \frac{1}{4}$ and $\cot B = 2$, then $\cot(A - B) =$

A. $\frac{9}{2}$ **B.** $\frac{6}{7}$ **C.** $\frac{2}{3}$ **D.** $-\frac{2}{7}$

12. If $\tan A = \frac{3}{2}$ and $\tan B = \frac{6}{7}$, then $\tan(A + B) =$

A. $-\frac{9}{4}$ **B.** $-\frac{33}{4}$ **C.** $\frac{33}{32}$ **D.** $\frac{33}{14}$

13. $\frac{\cot 21^\circ \cot 9^\circ - 1}{\cot 9^\circ + \cot 21^\circ} =$

A. $\sqrt{3}$ **B.** $-\frac{1}{\sqrt{3}}$ **C.** $-\sqrt{3}$ **D.** $\frac{1}{\sqrt{3}}$

14. $\cos^2 75^\circ - \sin^2 45^\circ =$

A. $-\frac{\sqrt{3}}{2}$ **B.** $\frac{\sqrt{3}}{4}$ **C.** $-\frac{\sqrt{3}}{8}$ **D.** $-\frac{\sqrt{3}}{4}$

15. $\tan 82^\circ \tan 8^\circ =$

A. 2 **B.** 0 **C.** 1 **D.** -1

16. $\cos(A + B + C) =$

A. $\cos A \cos B \cos C - \sin A \sin B \sin C$

B. $\cos A \cos B \cos C + \cos A \sin B \sin C + \sin A \cos B \sin C + \sin A \sin B \cos C$

C. $\sin A \sin B \sin C - \cos A \cos B \cos C$

D. $\cos A \cos B \cos C - \cos A \sin B \sin C - \sin A \cos B \sin C - \sin A \sin B \cos C$

17. $\cot 15^\circ =$

A. $2 + \sqrt{3}$ **B.** $-(2 + \sqrt{3})$ **C.** $2\sqrt{3} + 4$ **D.** $2 - \sqrt{3}$

18. If $\tan A = \frac{1}{3}$ and $\tan B = \frac{1}{2}$ (A, B acute), then $A + B =$

A. $\frac{3\pi}{4}$ **B.** $\frac{\pi}{3}$ **C.** $\frac{\pi}{4}$ **D.** $\frac{\pi}{6}$

19. $(1 + \tan 102^\circ)(1 + \tan 123^\circ) =$

A. 1 **B.** -2 **C.** 2 **D.** -1

20. $\tan 38^\circ + \tan 7^\circ + \tan 38^\circ \tan 7^\circ =$

A. -1 **B.** -2 **C.** 2 **D.** 1

21. If $A + B + C = \frac{\pi}{2}$, then $\cot A + \cot B + \cot C =$

A. 0 **B.** $\tan A \tan B \tan C$

C. 1 **D.** $\cot A \cot B \cot C$

22. If $A + B + C = \frac{\pi}{2}$, $\tan A = 6$ and $\tan B = \frac{8}{7}$, then $\tan C$ is

A. $\frac{41}{50}$ **B.** $-\frac{41}{50}$ **C.** $-\frac{50}{41}$ **D.** $\frac{50}{41}$

23. $\sin 35^\circ + \sin 275^\circ - \sin 205^\circ =$

A. $\sin 35^\circ$ **B.** $-\sin 35^\circ$

C. $\cos 35^\circ$ **D.** 0

24. $\tan 55^\circ - \tan 35^\circ =$

A. $2\tan 20^\circ$

B. $\tan 40^\circ$

C. $2\tan 35^\circ$

D. $\tan 20^\circ$

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25. $\tan 65^\circ - \tan 25^\circ =$

A. $2\tan 25^\circ$

B. $\tan 80^\circ$

C. $2\tan 40^\circ$

D. $\tan 40^\circ$

Key sheet

1. C	**2.** A	**3.** A	**4.** B	**5.** D
6. C	**7.** B	**8.** D	**9.** B	**10.** A
11. B	**12.** B	**13.** A	**14.** D	**15.** C
16. D	**17.** A	**18.** C	**19.** C	**20.** D
21. D	**22.** B	**23.** D	**24.** A	**25.** C

Solutions

1. If $\tan A = \frac{45}{28}$ and $\sin B = \frac{11}{61}$ (A, B acute), then $\sin(A+B) =$

$\tan A = \frac{45}{28} \Rightarrow \sin A = \frac{45}{53},\ \cos A = \frac{28}{53}$

$\cos B = \sqrt{1-\sin^2 B} = \frac{60}{61}$

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

$= (\frac{45}{53})(\frac{60}{61}) + (\frac{28}{53})(\frac{11}{61}) = \frac{3008}{3233}$

Ans: (C) $\frac{3008}{3233}$

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2. If $\sin A = \frac{8}{17}$ and $\sin B = \frac{9}{41}$ (A, B acute), then $\cos(A-B) =$

$\cos A = \sqrt{1-\sin^2 A} = \frac{15}{17}$

$\cos B = \sqrt{1-\sin^2 B} = \frac{40}{41}$

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

$= (\frac{15}{17})(\frac{40}{41}) + (\frac{8}{17})(\frac{9}{41}) = \frac{672}{697}$

Ans: (A) $\frac{672}{697}$

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3. $\operatorname{cosec} 105^\circ =$

$\sin 105^\circ = \sin(135^\circ - 30^\circ)$

$\operatorname{cosec} 105^\circ = \frac{1}{\sin 105^\circ} = \sqrt{6} - \sqrt{2}$

Ans: (A) $\sqrt{6} - \sqrt{2}$

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4. $\tan 195^\circ =$

$\tan 195^\circ = \tan(150^\circ + 45^\circ)$

$= 2 - \sqrt{3}$

Ans: (B) $2 - \sqrt{3}$

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5. $\cos 194^\circ \cos 14^\circ + \sin 194^\circ \sin 14^\circ =$

$\cos 194^\circ \cos 14^\circ + \sin 194^\circ \sin 14^\circ = \cos(194^\circ - 14^\circ)$

$= \cos 180^\circ = -1$

Ans: (D) -1

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6. $\cos 133^\circ \cos 17^\circ - \sin 133^\circ \sin 17^\circ =$

$\cos 133^\circ \cos 17^\circ - \sin 133^\circ \sin 17^\circ = \cos(133^\circ + 17^\circ)$

$= \cos 150^\circ = -\frac{\sqrt{3}}{2}$

Ans: (C) $-\frac{\sqrt{3}}{2}$

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7. $2 \sin 4\theta \sin 8\theta =$

$2 \sin A \sin B = \cos(A-B) - \cos(A+B)$

$2 \sin 4\theta \sin 8\theta = \cos 4\theta - \cos 12\theta$

Ans: (B) $\cos 4\theta - \cos 12\theta$

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8. $2\cos 4\theta\cos 7\theta =$

$2\cos A\cos B = \cos(A+B)+\cos(A-B)$

$2\cos 4\theta\cos 7\theta = \cos 3\theta + \cos 11\theta$

Ans: (D) $\cos 3\theta + \cos 11\theta$

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9. $\cos 75^\circ - \cos 15^\circ =$

$\cos 75^\circ - \cos 15^\circ = -2\sin 45^\circ \sin 30^\circ$

$= -\frac{1}{\sqrt{2}}$

Ans: (B) $-\frac{1}{\sqrt{2}}$

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10. $\sin 11\theta + \sin 7\theta =$

$\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$

$\sin 11\theta + \sin 7\theta = 2\sin 9\theta\cos 2\theta$

Ans: (A) $2\sin 9\theta\cos 2\theta$

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11. If $\cot A = \frac{1}{4}$ and $\cot B = 2$, then $\cot(A-B) =$

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

$= \frac{\frac{1}{4}\cdot 2+1}{2-\frac{1}{4}} = \frac{6}{7}$

Ans: (B) $\frac{6}{7}$

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12. If $\tan A = \frac{3}{2}$ and $\tan B = \frac{6}{7}$, then $\tan(A+B) =$

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

$= \frac{\frac{3}{2}+\frac{6}{7}}{1-\frac{3}{2}\cdot\frac{6}{7}} = -\frac{33}{4}$

Ans: (B) $-\frac{33}{4}$

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13. $\frac{\cot 21^\circ\cot 9^\circ-1}{\cot 9^\circ+\cot 21^\circ} =$

$\frac{\cot 21^\circ\cot 9^\circ-1}{\cot 9^\circ+\cot 21^\circ} = \cot(21^\circ+9^\circ) = \cot 30^\circ$

$= \sqrt{3}$

Ans: (A) $\sqrt{3}$

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14. $\cos^2 75^\circ - \sin^2 45^\circ =$

$\cos^2 75^\circ - \sin^2 45^\circ = \cos(75^\circ+45^\circ)\cos(75^\circ-45^\circ) = \cos 120^\circ\cos 30^\circ$

$= -\frac{\sqrt{3}}{4}$

Ans: (D) $-\frac{\sqrt{3}}{4}$

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15. $\tan 82^\circ\tan 8^\circ =$

$\tan(45^\circ+\theta) = \cot(45^\circ-\theta)$

$\tan 82^\circ\tan 8^\circ = \cot 8^\circ\tan 8^\circ = 1$

Ans: (C) 1

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16. $\cos(A+B+C) =$

$\cos(A+B+C) = \prod\cos A - \sum\cos A\sin B\sin C.$

Ans: (D) $\cos A\cos B\cos C - \cos A\sin B\sin C - \sin A\cos B\sin C - \sin A\sin B\cos C$

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17. $\cot 15^\circ =$

$\tan 15^\circ = \tan(45^\circ - 30^\circ)$

$\cot 15^\circ = \frac{1}{\tan 15^\circ} = 2 + \sqrt{3}$

Ans: (A) $2 + \sqrt{3}$

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18. If $\tan A = \frac{1}{3}$ and $\tan B = \frac{1}{2}$ (A, B acute), then $A + B =$

$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{1}{3} + \frac{1}{2}}{1 - \frac{1}{3} \cdot \frac{1}{2}}$

$= \frac{\frac{5}{6}}{\frac{5}{6}} = 1$

$\therefore A + B = \frac{\pi}{4}$

Ans: (C) $\frac{\pi}{4}$

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19. $(1 + \tan 102^\circ)(1 + \tan 123^\circ) =$

$102^\circ + 123^\circ = 225^\circ,\ \tan(102^\circ + 123^\circ) = 1$

$\Rightarrow \tan A + \tan B = 1 - \tan A \tan B$

$\therefore (1 + \tan 102^\circ)(1 + \tan 123^\circ) = 2$

Ans: (C) 2

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20. $\tan 38^\circ + \tan 7^\circ + \tan 38^\circ \tan 7^\circ =$

$38^\circ + 7^\circ = 45^\circ,\ \tan(38^\circ + 7^\circ) = 1$

$\Rightarrow \tan A + \tan B = 1 - \tan A \tan B$

$\therefore \tan 38^\circ + \tan 7^\circ + \tan 38^\circ \tan 7^\circ = 1$

Ans: (D) 1

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21. If $A + B + C = \frac{\pi}{2}$, then $\cot A + \cot B + \cot C =$

$\cot(A + B + C) = 0$ makes the numerator $\sum \cot A - \prod \cot A = 0$.

Ans: (D) $\cot A \cot B \cot C$

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22. If $A + B + C = \frac{\pi}{2}$, $\tan A = 6$ and $\tan B = \frac{8}{7}$, then $\tan C$ is

$A + B + C = \frac{\pi}{2} \Rightarrow \sum \tan A \tan B = 1$

$\frac{48}{7} + (6 + \frac{8}{7}) \tan C = 1$

$\tan C = -\frac{41}{50}$

Ans: (B) $-\frac{41}{50}$

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23. $\sin 35^\circ + \sin 275^\circ - \sin 205^\circ =$

$\sin 275^\circ - \sin 205^\circ = 2 \cos 240^\circ \sin 35^\circ = -\sin 35^\circ$

$\therefore$ value $= 0$

Ans: (D) 0

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24. $\tan 55^\circ - \tan 35^\circ =$

$35^\circ + 20^\circ = 55^\circ$ and $\tan 35^\circ \tan 55^\circ = 1$:

$\tan 55^\circ - \tan 35^\circ - \tan 20^\circ = \tan 20^\circ \Rightarrow \tan 55^\circ - \tan 35^\circ = 2 \tan 20^\circ$

Ans: (A) $2 \tan 20^\circ$

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25. $\tan 65^\circ - \tan 25^\circ =$

$25^\circ + 40^\circ = 65^\circ$ and $\tan 25^\circ \tan 65^\circ = 1$:

$\tan 65^\circ - \tan 25^\circ - \tan 40^\circ = \tan 40^\circ \Rightarrow \tan 65^\circ - \tan 25^\circ = 2\tan 40^\circ$

Ans: (C) $2\tan 40^\circ$