EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 01

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 $\cos A = \frac{40}{41}$ and $\cos B = \frac{8}{17}$ (A, B acute), then $\sin(A+B) =$

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

2. If $\cos A = \frac{11}{61}$ and $\tan B = \frac{8}{15}$ (A, B acute), then $\cos(A-B) =$

A. $\frac{645}{1037}$ **B.** $\frac{812}{1037}$ **C.** $-\frac{315}{1037}$ **D.** $\frac{988}{1037}$

3. $\operatorname{cosec} 195^\circ =$

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

4. $\cos 195^\circ =$

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

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

5. $\sin 5^\circ \cos 25^\circ + \cos 5^\circ \sin 25^\circ =$

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

6. $\sin 122^\circ \cos 28^\circ + \cos 122^\circ \sin 28^\circ =$

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

7. $2\sin 3\theta \sin 8\theta =$

A. $\sin 5\theta + \sin 11\theta$ **B.** $\cos 5\theta - \cos 11\theta$

C. $-\cos 5\theta + \cos 11\theta$ **D.** $\cos 5\theta + \cos 11\theta$

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

A. $-\cos 3\theta + \cos 5\theta$ **B.** $\cos 3\theta - \cos 5\theta$

C. $\cos 3\theta + \cos 5\theta$ **D.** $\sin 3\theta + \sin 5\theta$

9. $\sin 75^\circ + \sin 15^\circ =$

A. $\frac{\sqrt{6}}{2}$ **B.** $\sqrt{6}$ **C.** $\frac{\sqrt{6}}{4}$ **D.** $-\frac{\sqrt{6}}{2}$

10. $\sin 10\theta + \sin 4\theta =$

A. $2\sin 3\theta \cos 7\theta$ **B.** $-2\sin 7\theta \cos 3\theta$

C. $2\cos 7\theta \sin 3\theta$ **D.** $2\sin 7\theta \cos 3\theta$

11. If $\tan A = 2$ and $\tan B = 4$, then $\tan(A + B) =$

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

12. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{7}{8}$, then $\tan(A - B) =$

A. $\frac{22}{23}$ **B.** $-\frac{6}{23}$ **C.** $-\frac{2}{3}$ **D.** $-\frac{3}{8}$

13. $\frac{\tan 86^\circ + \tan 34^\circ}{1 - \tan 86^\circ \tan 34^\circ} =$

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

14. $\sin^2 90^\circ - \sin^2 60^\circ =$

A. $\frac{3}{4}$ **B.** $-\frac{3}{4}$ **C.** $-\frac{1}{4}$ **D.** $\frac{1}{4}$

15. $\frac{\cos 120^\circ + \sin 120^\circ}{\cos 120^\circ - \sin 120^\circ} =$

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

16. If $\tan A = \frac{1}{5}$, $\tan B = 2$ and $\tan C = 4$, then $\tan(A + B + C) =$

A. $-\frac{39}{41}$ **B.** $-\frac{31}{41}$ **C.** $\frac{23}{51}$ **D.** $-\frac{23}{41}$

17. $\cot 15^\circ - \tan 15^\circ =$

A. $-2\sqrt{3}$ **B.** $2\sqrt{3}$ **C.** $4\sqrt{3}$ **D.** $\frac{\sqrt{3}}{6}$

18. If $\tan A = \frac{1}{5}$ and $\tan B = \frac{2}{3}$ (A, B acute), then $A + B =$

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

19. $(1 + \tan 4^\circ)(1 + \tan 41^\circ) =$

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

20. $(1 + \cot 39^\circ)(1 + \cot 96^\circ) =$

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

21. If $A + B + C = \pi$, then $\tan A + \tan B + \tan C =$

A. $\tan A \tan B \tan C$ **B.** 1

C. $\cot A \cot B \cot C$ **D.** 0

22. If $A + B + C = \frac{\pi}{2}$, $\tan A = 5$ and $\tan B = 9$, then $\tan C$ is

A. $-\frac{7}{22}$ **B.** $\frac{22}{7}$ **C.** $-\frac{22}{7}$ **D.** $\frac{7}{22}$

23. $\sin 20^\circ + \sin 140^\circ - \sin 100^\circ =$

A. 0 **B.** $\sin 20^\circ$

C. $\cos 20^\circ$ **D.** $-\sin 20^\circ$

24. $\tan 63^\circ - \tan 27^\circ =$

A. $2\tan 36^\circ$ **B.** $2\tan 27^\circ$

C. $\tan 36^\circ$ **D.** $\tan 72^\circ$

25. $\tan 48^\circ - \tan 42^\circ =$

A. $2\tan 42^\circ$

B. $\tan 6^\circ$

C. $2\tan 6^\circ$

D. $\tan 12^\circ$

Key sheet

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

Solutions

1. If $\cos A = \frac{40}{41}$ and $\cos B = \frac{8}{17}$ (A, B acute), then $\sin(A+B) =$

$\sin A = \sqrt{1-\cos^2 A} = \frac{9}{41}$

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

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

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

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

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2. If $\cos A = \frac{11}{61}$ and $\tan B = \frac{8}{15}$ (A, B acute), then $\cos(A-B) =$

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

$\tan B = \frac{8}{15} \Rightarrow \sin B = \frac{8}{17},\ \cos B = \frac{15}{17}$

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

$= (\frac{11}{61})(\frac{15}{17}) + (\frac{60}{61})(\frac{8}{17}) = \frac{645}{1037}$

Ans: (A) $\frac{645}{1037}$

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3. $\operatorname{cosec} 195^\circ =$

$\sin 195^\circ = \sin(135^\circ + 60^\circ)$

$\operatorname{cosec} 195^\circ = \frac{1}{\sin 195^\circ} = -(\sqrt{6}+\sqrt{2})$

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

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4. $\cos 195^\circ =$

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

$= -\frac{\sqrt{3}+1}{2\sqrt{2}}$

Ans: (A) $-\frac{\sqrt{3}+1}{2\sqrt{2}}$

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5. $\sin 5^\circ \cos 25^\circ + \cos 5^\circ \sin 25^\circ =$

$\sin 5^\circ \cos 25^\circ + \cos 5^\circ \sin 25^\circ = \sin(5^\circ + 25^\circ)$

$= \sin 30^\circ = \frac{1}{2}$

Ans: (D) $\frac{1}{2}$

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6. $\sin 122^\circ \cos 28^\circ + \cos 122^\circ \sin 28^\circ =$

$\sin 122^\circ \cos 28^\circ + \cos 122^\circ \sin 28^\circ = \sin(122^\circ + 28^\circ)$

$= \sin 150^\circ = \frac{1}{2}$

Ans: (C) $\frac{1}{2}$

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7. $2\sin 3\theta \sin 8\theta =$

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

$2\sin 3\theta \sin 8\theta = \cos 5\theta - \cos 11\theta$

Ans: (B) $\cos 5\theta - \cos 11\theta$

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

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

$2\sin\theta\sin 4\theta = \cos 3\theta - \cos 5\theta$

Ans: (B) $\cos 3\theta - \cos 5\theta$

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9. $\sin 75^\circ + \sin 15^\circ =$

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

$= \frac{\sqrt{6}}{2}$

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

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10. $\sin 10\theta + \sin 4\theta =$

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

$\sin 10\theta + \sin 4\theta = 2\sin 7\theta\cos 3\theta$

Ans: (D) $2\sin 7\theta\cos 3\theta$

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11. If $\tan A = 2$ and $\tan B = 4$, then $\tan(A+B) =$

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

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

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

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12. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{7}{8}$, then $\tan(A-B) =$

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

$= \frac{\frac{1}{2}-\frac{7}{8}}{1+\frac{1}{2}\cdot\frac{7}{8}} = -\frac{6}{23}$

Ans: (B) $-\frac{6}{23}$

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13. $\frac{\tan 86^\circ+\tan 34^\circ}{1-\tan 86^\circ\tan 34^\circ} =$

$\frac{\tan 86^\circ+\tan 34^\circ}{1-\tan 86^\circ\tan 34^\circ} = \tan(86^\circ+34^\circ) = \tan 120^\circ$

$= -\sqrt{3}$

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

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14. $\sin^2 90^\circ - \sin^2 60^\circ =$

$\sin^2 90^\circ - \sin^2 60^\circ = \sin(90^\circ+60^\circ)\sin(90^\circ-60^\circ) = \sin 150^\circ\sin 30^\circ$

$= \frac{1}{4}$

Ans: (D) $\frac{1}{4}$

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15. $\frac{\cos 120^\circ+\sin 120^\circ}{\cos 120^\circ-\sin 120^\circ} =$

$\frac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta} = \frac{1+\tan\theta}{1-\tan\theta} = \tan(45^\circ+\theta)$

$\frac{\cos 120^\circ+\sin 120^\circ}{\cos 120^\circ-\sin 120^\circ} = \tan 165^\circ = -(2-\sqrt{3})$

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

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16. If $\tan A = \frac{1}{5}$, $\tan B = 2$ and $\tan C = 4$, then $\tan(A+B+C) =$

$\tan(A+B+C) = \frac{S_1 - S_3}{1 - S_2}$

$S_1 = \frac{31}{5},\ S_2 = \frac{46}{5},\ S_3 = \frac{8}{5}$

$\tan(A+B+C) = \frac{\frac{31}{5} - \frac{8}{5}}{1 - \frac{46}{5}} = -\frac{23}{41}$

Ans: (D) $-\frac{23}{41}$

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17. $\cot 15^\circ - \tan 15^\circ =$

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

$\therefore \cot 15^\circ - \tan 15^\circ = 2\sqrt{3}$

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

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18. If $\tan A = \frac{1}{5}$ and $\tan B = \frac{2}{3}$ (A, B acute), then $A + B =$

$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{1}{5} + \frac{2}{3}}{1 - \frac{1}{5} \cdot \frac{2}{3}}$

$= \frac{\frac{13}{15}}{\frac{13}{15}} = 1$

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

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

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19. $(1 + \tan 4^\circ)(1 + \tan 41^\circ) =$

$4^\circ + 41^\circ = 45^\circ,\ \tan(4^\circ + 41^\circ) = 1$

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

$\therefore (1 + \tan 4^\circ)(1 + \tan 41^\circ) = 2$

Ans: (C) 2

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20. $(1 + \cot 39^\circ)(1 + \cot 96^\circ) =$

$39^\circ + 96^\circ = 135^\circ,\ \cot(39^\circ + 96^\circ) = -1$

$\Rightarrow \cot A \cot B - 1 = -(\cot A + \cot B)$

$\therefore (1 + \cot 39^\circ)(1 + \cot 96^\circ) = 2$

Ans: (A) 2

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21. If $A + B + C = \pi$, then $\tan A + \tan B + \tan C =$

$\tan(A+B+C) = 0$ makes $S_1 - S_3 = 0$.

Ans: (A) $\tan A \tan B \tan C$

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22. If $A + B + C = \frac{\pi}{2}$, $\tan A = 5$ and $\tan B = 9$, then $\tan C$ is

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

$45 + (5 + 9)\tan C = 1$

$\tan C = -\frac{22}{7}$

Ans: (C) $-\frac{22}{7}$

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23. $\sin 20^\circ + \sin 140^\circ - \sin 100^\circ =$

$\sin 140^\circ - \sin 100^\circ = 2\cos 120^\circ \sin 20^\circ = -\sin 20^\circ$

$\therefore \text{value} = 0$

Ans: (A) 0

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24. $\tan 63^\circ - \tan 27^\circ =$

$27^\circ + 36^\circ = 63^\circ$ and $\tan 27^\circ \tan 63^\circ = 1$:

$\tan 63^\circ - \tan 27^\circ - \tan 36^\circ = \tan 36^\circ \Rightarrow \tan 63^\circ - \tan 27^\circ = 2\tan 36^\circ$

Ans: (A) $2\tan 36^\circ$

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25. $\tan 48^\circ - \tan 42^\circ =$

$42^\circ + 6^\circ = 48^\circ$ and $\tan 42^\circ \tan 48^\circ = 1$:

$\tan 48^\circ - \tan 42^\circ - \tan 6^\circ = \tan 6^\circ \Rightarrow \tan 48^\circ - \tan 42^\circ = 2\tan 6^\circ$

Ans: (C) $2\tan 6^\circ$
