EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 06

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 $\cos A = \frac{20}{29}$ and $\tan B = \frac{33}{56}$ (A, B acute), then $\sin(A - B) =$

A. $\frac{1836}{1885}$ **B.** $\frac{516}{1885}$ **C.** $\frac{427}{1885}$ **D.** $\frac{1813}{1885}$

2. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{24}{25}$ (A, B acute), then $\cos(A + B) =$

A. $\frac{117}{125}$ **B.** $\frac{4}{5}$ **C.** $\frac{3}{5}$ **D.** $\frac{44}{125}$

3. $\cot 255^\circ =$

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

4. $\tan 285^\circ =$

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

5. $\cos 178^\circ \cos 28^\circ + \sin 178^\circ \sin 28^\circ =$

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

6. $\cos 83^\circ \cos 37^\circ - \sin 83^\circ \sin 37^\circ =$

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

7. $2 \cos 9\theta \sin \theta =$

A. $\cos 8\theta - \cos 10\theta$ **B.** $\sin 8\theta - \sin 10\theta$

C. $\sin 8\theta + \sin 10\theta$ **D.** $-\sin 8\theta + \sin 10\theta$

8. $2 \cos 5\theta \cos 8\theta =$

A. $\cos 3\theta + \cos 13\theta$ **B.** $-\cos 3\theta + \cos 13\theta$

C. $\cos 3\theta - \cos 13\theta$ **D.** $-\sin 3\theta + \sin 13\theta$

9. $\sin 195^\circ + \sin 75^\circ =$

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

10. $\sin 9\theta + \sin 3\theta =$

A. $2 \sin 3\theta \cos 6\theta$ **B.** $-2 \sin 6\theta \cos 3\theta$

C. $2 \sin 6\theta \cos 3\theta$ **D.** $2 \cos 6\theta \sin 3\theta$

11. If $\tan A = 5$ and $\tan B = \frac{8}{9}$, then $\tan(A - B) =$

A. $\frac{37}{49}$ **B.** $\frac{53}{49}$ **C.** $\frac{37}{9}$ **D.** $-\frac{37}{31}$

12. If $\cot A = 6$ and $\cot B = \frac{6}{5}$, then $\cot(A + B) =$

A. $\frac{31}{36}$ **B.** $\frac{41}{36}$ **C.** $-\frac{31}{24}$ **D.** $-\frac{36}{31}$

13. $\frac{\tan 2^\circ + \tan 28^\circ}{1 - \tan 2^\circ \tan 28^\circ} =$

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

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

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

15. $\frac{\cos 60^\circ + \sin 60^\circ}{\cos 60^\circ - \sin 60^\circ} =$

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

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

A. $\frac{19}{17}$ **B.** $\frac{39}{34}$ **C.** $\frac{19}{28}$ **D.** $\frac{20}{17}$

17. $\operatorname{cosec} 15^\circ =$

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

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

18. If $\tan A = \frac{10}{9}$ and $\tan B = \frac{1}{19}$ (A, B acute), then $A - B =$

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

19. $(1 + \tan 19^\circ)(1 + \tan 26^\circ) =$

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

20. $(1 - \cot 28^\circ)(1 - \cot 17^\circ) =$

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

21. If $A + B + C = \frac{\pi}{2}$, $\tan A = 2$ and $\tan B = 1$, then $\tan C$ is

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

22. If $A + B + C = \frac{\pi}{2}$, $\tan A = \frac{8}{3}$ and $\tan B = \frac{5}{6}$, then $\tan C$ is

A. $\frac{63}{22}$ **B.** $\frac{22}{63}$ **C.** $-\frac{22}{63}$ **D.** $-\frac{63}{22}$

23. $\cos 5^\circ + \cos 245^\circ + \cos 235^\circ =$

A. $-\sin 5^\circ$ **B.** $\cos 5^\circ$

C. $\sin 5^\circ$ **D.** 0

24. $\tan 81^\circ - \tan 9^\circ =$

A. $\tan 72^\circ$ **B.** $2\tan 72^\circ$

C. $\tan 144^\circ$ **D.** $2\tan 9^\circ$

25. $\tan 68^\circ - \tan 22^\circ =$

A. $\tan 46^\circ$

B. $\tan 92^\circ$

C. $2\tan 46^\circ$

D. $2\tan 22^\circ$

Key sheet

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

Solutions

1. If $\cos A = \frac{20}{29}$ and $\tan B = \frac{33}{56}$ (A, B acute), then $\sin(A - B) =$

$\sin A = \sqrt{1 - \cos^2 A} = \frac{21}{29}$

$\tan B = \frac{33}{56} \Rightarrow \sin B = \frac{33}{65},\ \cos B = \frac{56}{65}$

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

$= (\frac{21}{29})(\frac{56}{65}) - (\frac{20}{29})(\frac{33}{65}) = \frac{516}{1885}$

Ans: (B) $\frac{516}{1885}$

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2. If $\sin A = \frac{3}{5}$ and $\cos B = \frac{24}{25}$ (A, B acute), then $\cos(A + B) =$

$\cos A = \sqrt{1 - \sin^2 A} = \frac{4}{5}$

$\sin B = \sqrt{1 - \cos^2 B} = \frac{7}{25}$

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

$= (\frac{4}{5})(\frac{24}{25}) - (\frac{3}{5})(\frac{7}{25}) = \frac{3}{5}$

Ans: (C) $\frac{3}{5}$

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3. $\cot 255^\circ =$

$\tan 255^\circ = \tan(210^\circ + 45^\circ)$

$\cot 255^\circ = \frac{1}{\tan 255^\circ} = 2 - \sqrt{3}$

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

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4. $\tan 285^\circ =$

$\tan 285^\circ = \tan(240^\circ + 45^\circ)$

$= -(2 + \sqrt{3})$

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

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5. $\cos 178^\circ \cos 28^\circ + \sin 178^\circ \sin 28^\circ =$

$\cos 178^\circ \cos 28^\circ + \sin 178^\circ \sin 28^\circ = \cos(178^\circ - 28^\circ)$

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

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

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6. $\cos 83^\circ \cos 37^\circ - \sin 83^\circ \sin 37^\circ =$

$\cos 83^\circ \cos 37^\circ - \sin 83^\circ \sin 37^\circ = \cos(83^\circ + 37^\circ)$

$= \cos 120^\circ = -\frac{1}{2}$

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

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7. $2 \cos 9\theta \sin \theta =$

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

$2 \cos 9\theta \sin \theta = -\sin 8\theta + \sin 10\theta$

Ans: (D) $-\sin 8\theta + \sin 10\theta$

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8. $2\cos 5\theta\cos 8\theta =$

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

$2\cos 5\theta\cos 8\theta = \cos 3\theta + \cos 13\theta$

Ans: (A) $\cos 3\theta + \cos 13\theta$

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9. $\sin 195^\circ + \sin 75^\circ =$

$\sin 195^\circ + \sin 75^\circ = 2\sin 135^\circ\cos 60^\circ$

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

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

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10. $\sin 9\theta + \sin 3\theta =$

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

$\sin 9\theta + \sin 3\theta = 2\sin 6\theta\cos 3\theta$

Ans: (C) $2\sin 6\theta\cos 3\theta$

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11. If $\tan A = 5$ and $\tan B = \frac{8}{9}$, then $\tan(A-B) =$

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

$= \frac{5-\frac{8}{9}}{1+5\cdot\frac{8}{9}} = \frac{37}{49}$

Ans: (A) $\frac{37}{49}$

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12. If $\cot A = 6$ and $\cot B = \frac{6}{5}$, then $\cot(A+B) =$

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

$= \frac{6\cdot\frac{6}{5}-1}{\frac{6}{5}+6} = \frac{31}{36}$

Ans: (A) $\frac{31}{36}$

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13. $\frac{\tan 2^\circ + \tan 28^\circ}{1-\tan 2^\circ\tan 28^\circ} =$

$\frac{\tan 2^\circ + \tan 28^\circ}{1-\tan 2^\circ\tan 28^\circ} = \tan(2^\circ+28^\circ) = \tan 30^\circ$

$= \frac{1}{\sqrt{3}}$

Ans: (B) $\frac{1}{\sqrt{3}}$

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

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

$= \frac{1}{4}$

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

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15. $\frac{\cos 60^\circ + \sin 60^\circ}{\cos 60^\circ - \sin 60^\circ} =$

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

$\frac{\cos 60^\circ+\sin 60^\circ}{\cos 60^\circ-\sin 60^\circ} = \tan 105^\circ = -(2+\sqrt{3})$

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

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

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

$S_1 = \frac{13}{15},\ S_2 = \frac{11}{45},\ S_3 = \frac{1}{45}$

$\tan(A+B+C) = \frac{\frac{13}{15} - \frac{1}{45}}{1 - \frac{11}{45}} = \frac{19}{17}$

Ans: (A) $\frac{19}{17}$

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17. $\operatorname{cosec} 15^\circ =$

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

$\operatorname{cosec} 15^\circ = \frac{1}{\sin 15^\circ} = \sqrt{6} + \sqrt{2}$

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

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18. If $\tan A = \frac{10}{9}$ and $\tan B = \frac{1}{19}$ (A, B acute), then $A - B =$

$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B} = \frac{\frac{10}{9} - \frac{1}{19}}{1 + \frac{10}{9} \cdot \frac{1}{19}}$

$= \frac{\frac{181}{171}}{\frac{181}{171}} = 1$

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

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

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19. $(1 + \tan 19^\circ)(1 + \tan 26^\circ) =$

$19^\circ + 26^\circ = 45^\circ,\ \tan(19^\circ + 26^\circ) = 1$

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

$\therefore (1 + \tan 19^\circ)(1 + \tan 26^\circ) = 2$

Ans: (D) 2

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20. $(1 - \cot 28^\circ)(1 - \cot 17^\circ) =$

$28^\circ + 17^\circ = 45^\circ,\ \cot(28^\circ + 17^\circ) = 1$

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

$\therefore (1 - \cot 28^\circ)(1 - \cot 17^\circ) = 2$

Ans: (B) 2

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21. If $A + B + C = \frac{\pi}{2}$, $\tan A = 2$ and $\tan B = 1$, then $\tan C$ is

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

$2 + (2 + 1)\tan C = 1$

$\tan C = -\frac{1}{3}$

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

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22. If $A + B + C = \frac{\pi}{2}$, $\tan A = \frac{8}{3}$ and $\tan B = \frac{5}{6}$, then $\tan C$ is

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

$\frac{20}{9} + (\frac{8}{3} + \frac{5}{6})\tan C = 1$

$\tan C = -\frac{22}{63}$

Ans: (C) $-\frac{22}{63}$

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23. $\cos 5^\circ + \cos 245^\circ + \cos 235^\circ =$

$\cos 245^\circ + \cos 235^\circ = 2\cos 240^\circ \cos 5^\circ = -\cos 5^\circ$

$\therefore$ value $= 0$

Ans: (D) 0

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24. $\tan 81^\circ - \tan 9^\circ =$

$9^\circ + 72^\circ = 81^\circ$ and $\tan 9^\circ \tan 81^\circ = 1$:

$\tan 81^\circ - \tan 9^\circ - \tan 72^\circ = \tan 72^\circ \Rightarrow \tan 81^\circ - \tan 9^\circ = 2\tan 72^\circ$

Ans: (B) $2\tan 72^\circ$

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25. $\tan 68^\circ - \tan 22^\circ =$

$22^\circ + 46^\circ = 68^\circ$ and $\tan 22^\circ \tan 68^\circ = 1$:

$\tan 68^\circ - \tan 22^\circ - \tan 46^\circ = \tan 46^\circ \Rightarrow \tan 68^\circ - \tan 22^\circ = 2\tan 46^\circ$

Ans: (C) $2\tan 46^\circ$
