EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 02

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 $\tan A = \frac{21}{20}$ and $\sin B = \frac{35}{37}$ (A, B acute), then $\sin(A - B) =$

A. $\frac{952}{1073}$ **B.** $\frac{975}{1073}$ **C.** $-\frac{448}{1073}$ **D.** $-\frac{495}{1073}$

2. If $\cos A = \frac{40}{41}$ and $\sin B = \frac{33}{65}$ (A, B acute), then $\cos(A + B) =$

A. $-\frac{816}{2665}$ **B.** $\frac{1943}{2665}$ **C.** $\frac{2537}{2665}$ **D.** $\frac{1824}{2665}$

3. $\cos 255^\circ =$

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

4. $\sin 255^\circ =$

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. $\cos 166^\circ \cos 31^\circ + \sin 166^\circ \sin 31^\circ =$

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

6. $\cos 173^\circ \cos 7^\circ - \sin 173^\circ \sin 7^\circ =$

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

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

A. $\sin 6\theta + \cos 2\theta$ **B.** $\cos 2\theta + \cos 6\theta$
C. $\sin 2\theta + \sin 6\theta$ **D.** $-\sin 2\theta + \sin 6\theta$

8. $2 \sin 9\theta \sin 4\theta =$

A. $\cos 5\theta + \cos 13\theta$ **B.** $-\sin 5\theta + \sin 13\theta$
C. $-\cos 5\theta + \cos 13\theta$ **D.** $\cos 5\theta - \cos 13\theta$

9. $\cos 195^\circ - \cos 105^\circ =$

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

10. $\sin 7\theta - \sin 5\theta =$

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

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

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

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

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12. If $\tan A = 2$ and $\tan B = 5$, then $\tan(A-B) =$

A. -3 **B.** $-\frac{3}{11}$ **C.** $\frac{7}{11}$ **D.** $\frac{1}{3}$

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13. $\frac{1+\tan 75^\circ}{1-\tan 75^\circ} =$

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

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14. $\cos^2 97\frac{1}{2}^\circ - \sin^2 52\frac{1}{2}^\circ =$

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

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15. $\tan 50^\circ \tan 40^\circ =$

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

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16. If $\tan A = \frac{1}{4}$, $\tan B = 6$ and $\tan C = 3$, then $\tan(A+B+C) =$

A. $-\frac{19}{77}$ **B.** $-\frac{37}{77}$ **C.** $-\frac{5}{7}$ **D.** $\frac{19}{85}$

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17. $\sin 15^\circ =$

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

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

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18. If $\tan A = \frac{11}{10}$ and $\tan B = \frac{1}{21}$ (A, B acute), then $A - B =$

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

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19. $(1-\cot 32^\circ)(1-\cot 13^\circ) =$

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

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20. $(1-\tan 33^\circ)(1-\tan 102^\circ) =$

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

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21. If $A+B+C = \pi$, $\tan A = 3$ and $\tan B = \frac{1}{2}$, then $\tan C$ is

A. -7 **B.** $-\frac{1}{7}$ **C.** $\frac{1}{7}$ **D.** 7

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22. If $A+B+C = \frac{\pi}{2}$, $\tan A = \frac{9}{5}$ and $\tan B = 6$, then $\tan C$ is

A. $\frac{49}{39}$ **B.** $-\frac{39}{49}$ **C.** $\frac{39}{49}$ **D.** $-\frac{49}{39}$

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23. $\cos 40^\circ + \cos 280^\circ + \cos 200^\circ =$

A. $-\sin 40^\circ$ **B.** 0

C. $\sin 40^\circ$ **D.** $\cos 40^\circ$

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24. $\tan 85^\circ - \tan 5^\circ =$

A. $2\tan 80^\circ$

B. $\tan 80^\circ$

C. $\tan 160^\circ$

D. $2\tan 5^\circ$

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25. $\tan 78^\circ - \tan 12^\circ =$

A. $2\tan 12^\circ$

B. $2\tan 66^\circ$

C. $\tan 66^\circ$

D. $\tan 132^\circ$

Key sheet

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

Solutions

1. If $\tan A = \frac{21}{20}$ and $\sin B = \frac{35}{37}$ (A, B acute), then $\sin(A - B) =$

$\tan A = \frac{21}{20} \Rightarrow \sin A = \frac{21}{29},\ \cos A = \frac{20}{29}$

$\cos B = \sqrt{1 - \sin^2 B} = \frac{12}{37}$

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

$= (\frac{21}{29})(\frac{12}{37}) - (\frac{20}{29})(\frac{35}{37}) = -\frac{448}{1073}$

Ans: (C) $-\frac{448}{1073}$

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2. If $\cos A = \frac{40}{41}$ and $\sin B = \frac{33}{65}$ (A, B acute), then $\cos(A + B) =$

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

$\cos B = \sqrt{1 - \sin^2 B} = \frac{56}{65}$

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

$= (\frac{40}{41})(\frac{56}{65}) - (\frac{9}{41})(\frac{33}{65}) = \frac{1943}{2665}$

Ans: (B) $\frac{1943}{2665}$

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3. $\cos 255^\circ =$

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

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

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

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4. $\sin 255^\circ =$

$\sin 255^\circ = \sin(225^\circ + 30^\circ)$

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

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

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5. $\cos 166^\circ \cos 31^\circ + \sin 166^\circ \sin 31^\circ =$

$\cos 166^\circ \cos 31^\circ + \sin 166^\circ \sin 31^\circ = \cos(166^\circ - 31^\circ)$

$= \cos 135^\circ = -\frac{1}{\sqrt{2}}$

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

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6. $\cos 173^\circ \cos 7^\circ - \sin 173^\circ \sin 7^\circ =$

$\cos 173^\circ \cos 7^\circ - \sin 173^\circ \sin 7^\circ = \cos(173^\circ + 7^\circ)$

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

Ans: (A) -1

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

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

$2 \sin 4\theta \cos 2\theta = \sin 2\theta + \sin 6\theta$

Ans: (C) $\sin 2\theta + \sin 6\theta$

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8. $2\sin 9\theta \sin 4\theta =$

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

$2\sin 9\theta \sin 4\theta = \cos 5\theta - \cos 13\theta$

Ans: (D) $\cos 5\theta - \cos 13\theta$

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9. $\cos 195^\circ - \cos 105^\circ =$

$\cos 195^\circ - \cos 105^\circ = -2\sin 150^\circ \sin 45^\circ$

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

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

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10. $\sin 7\theta - \sin 5\theta =$

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

$\sin 7\theta - \sin 5\theta = 2\cos 6\theta \sin\theta$

Ans: (B) $2\cos 6\theta \sin\theta$

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

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

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

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

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12. If $\tan A = 2$ and $\tan B = 5$, then $\tan(A-B) =$

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

$= \frac{2-5}{1+2\cdot 5} = -\frac{3}{11}$

Ans: (B) $-\frac{3}{11}$

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13. $\frac{1+\tan 75^\circ}{1-\tan 75^\circ} =$

$\frac{1+\tan 75^\circ}{1-\tan 75^\circ} = \tan(45^\circ + 75^\circ) = \tan 120^\circ$

$= -\sqrt{3}$

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

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14. $\cos^2 97\frac{1}{2}^\circ - \sin^2 52\frac{1}{2}^\circ =$

$\cos^2 97\frac{1}{2}^\circ - \sin^2 52\frac{1}{2}^\circ = \cos(97\frac{1}{2}^\circ + 52\frac{1}{2}^\circ)\cos(97\frac{1}{2}^\circ - 52\frac{1}{2}^\circ) = \cos 150^\circ \cos 45^\circ$

$= -\frac{\sqrt{6}}{4}$

Ans: (B) $-\frac{\sqrt{6}}{4}$

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15. $\tan 50^\circ \tan 40^\circ =$

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

$\tan 50^\circ \tan 40^\circ = \cot 40^\circ \tan 40^\circ = 1$

Ans: (C) 1

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16. If $\tan A = \frac{1}{4}$, $\tan B = 6$ and $\tan C = 3$, then $\tan(A+B+C) =$

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

$S_1 = \frac{37}{4},\ S_2 = \frac{81}{4},\ S_3 = \frac{9}{2}$

$\tan(A+B+C) = \frac{\frac{37}{4} - \frac{9}{2}}{1 - \frac{81}{4}} = -\frac{19}{77}$

Ans: (A) $-\frac{19}{77}$

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17. $\sin 15^\circ =$

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

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

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

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18. If $\tan A = \frac{11}{10}$ and $\tan B = \frac{1}{21}$ (A, B acute), then $A - B =$

$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B} = \frac{\frac{11}{10} - \frac{1}{21}}{1 + \frac{11}{10} \cdot \frac{1}{21}}$

$= \frac{\frac{221}{210}}{\frac{221}{210}} = 1$

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

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

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19. $(1 - \cot 32^\circ)(1 - \cot 13^\circ) =$

$32^\circ + 13^\circ = 45^\circ,\ \cot(32^\circ + 13^\circ) = 1$

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

$\therefore (1 - \cot 32^\circ)(1 - \cot 13^\circ) = 2$

Ans: (C) 2

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20. $(1 - \tan 33^\circ)(1 - \tan 102^\circ) =$

$33^\circ + 102^\circ = 135^\circ,\ \tan(33^\circ + 102^\circ) = -1$

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

$\therefore (1 - \tan 33^\circ)(1 - \tan 102^\circ) = 2$

Ans: (C) 2

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21. If $A + B + C = \pi$, $\tan A = 3$ and $\tan B = \frac{1}{2}$, then $\tan C$ is

$A + B + C = \pi \Rightarrow \sum \tan A = \prod \tan A$

$3 + \frac{1}{2} + \tan C = \frac{3}{2} \tan C$

$\tan C = 7$

Ans: (D) 7

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22. If $A + B + C = \frac{\pi}{2}$, $\tan A = \frac{9}{5}$ and $\tan B = 6$, then $\tan C$ is

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

$\frac{54}{5} + (\frac{9}{5} + 6) \tan C = 1$

$\tan C = -\frac{49}{39}$

Ans: (D) $-\frac{49}{39}$

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23. $\cos 40^\circ + \cos 280^\circ + \cos 200^\circ =$

$\cos 280^\circ + \cos 200^\circ = 2\cos 240^\circ \cos 40^\circ = -\cos 40^\circ$

$\therefore$ value $= 0$

Ans: (B) 0

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24. $\tan 85^\circ - \tan 5^\circ =$

$5^\circ + 80^\circ = 85^\circ$ and $\tan 5^\circ \tan 85^\circ = 1$:

$\tan 85^\circ - \tan 5^\circ - \tan 80^\circ = \tan 80^\circ \Rightarrow \tan 85^\circ - \tan 5^\circ = 2\tan 80^\circ$

Ans: (A) $2\tan 80^\circ$

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25. $\tan 78^\circ - \tan 12^\circ =$

$12^\circ + 66^\circ = 78^\circ$ and $\tan 12^\circ \tan 78^\circ = 1$:

$\tan 78^\circ - \tan 12^\circ - \tan 66^\circ = \tan 66^\circ \Rightarrow \tan 78^\circ - \tan 12^\circ = 2\tan 66^\circ$

Ans: (B) $2\tan 66^\circ$
