EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 03

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 $\sin A = \frac{60}{61}$ and $\cos B = \frac{45}{53}$ (A, B acute), then $\sin(A+B) =$

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

2. If $\tan A = \frac{45}{28}$ and $\cos B = \frac{12}{13}$ (A, B acute), then $\cos(A-B) =$

A. $\frac{561}{689}$ **B.** $\frac{680}{689}$ **C.** $\frac{111}{689}$ **D.** $\frac{400}{689}$

3. $\sec 195^\circ =$

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

4. $\tan 165^\circ =$

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

5. $\sin 102^\circ \cos 42^\circ - \cos 102^\circ \sin 42^\circ =$

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

6. $\sin 34^\circ \cos 4^\circ - \cos 34^\circ \sin 4^\circ =$

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

7. $2\cos 8\theta \sin 9\theta =$

A. $\sin\theta + \sin 17\theta$ **B.** $\cos\theta - \cos 17\theta$

C. $-\sin\theta - \sin 17\theta$ **D.** $-\sin\theta + \sin 17\theta$

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

A. $-\sin 6\theta - \sin 10\theta$ **B.** $\cos 6\theta - \cos 10\theta$

C. $-\sin 6\theta + \sin 10\theta$ **D.** $\sin 6\theta + \sin 10\theta$

9. $\cos 105^\circ - \cos 15^\circ =$

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

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

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

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

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

A. $-\frac{13}{10}$ **B.** $\frac{17}{13}$ **C.** -1 **D.** $-\frac{13}{7}$

12. If $\cot A = \frac{9}{7}$ and $\cot B = \frac{1}{9}$, then $\cot(A - B) =$

A. $\frac{27}{37}$ **B.** $\frac{44}{27}$ **C.** $-\frac{36}{37}$ **D.** $\frac{9}{11}$

13. $\frac{\cot 40^\circ \cot 20^\circ - 1}{\cot 20^\circ + \cot 40^\circ} =$

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

14. $\cos^2 15^\circ - \cos^2 135^\circ =$

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

15. $\tan 88^\circ \tan 2^\circ =$

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

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

A. $\frac{3}{4}$ **B.** $\frac{3}{2}$ **C.** $\frac{8}{5}$ **D.** $\frac{31}{20}$

17. $\operatorname{cosec} 75^\circ =$

A. $\sqrt{6} - \sqrt{2}$ **B.** $-\frac{\sqrt{3}+1}{2\sqrt{2}}$

C. $\frac{\sqrt{3}+1}{2\sqrt{2}}$ **D.** $-(\sqrt{6} - \sqrt{2})$

18. If $\tan A = \frac{7}{12}$ and $\tan B = \frac{5}{19}$ (A, B acute), then $A + B =$

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

19. $(1 + \tan 6^\circ)(1 + \tan 39^\circ) =$

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

20. $(1 + \tan 32^\circ)(1 + \tan 13^\circ) =$

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

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

A. -1 **B.** 0

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

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

A. $-\frac{21}{13}$ **B.** $\frac{13}{21}$ **C.** $\frac{21}{13}$ **D.** $-\frac{13}{21}$

23. $\sin 105^\circ - \sin 135^\circ =$

A. $-\sin 15^\circ$ **B.** $\sin 15^\circ$

C. $-\cos 15^\circ$ **D.** $\cos 15^\circ$

24. $\tan 66^\circ - \tan 24^\circ =$

A. $\tan 42^\circ$ **B.** $2\tan 24^\circ$

C. $\tan 84^\circ$ **D.** $2\tan 42^\circ$

25. $\tan 61^\circ - \tan 29^\circ =$

A. $2\tan 29^\circ$

B. $2\tan 32^\circ$

C. $\tan 64^\circ$

D. $\tan 32^\circ$

Key sheet

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

Solutions

1. If $\sin A = \frac{60}{61}$ and $\cos B = \frac{45}{53}$ (A, B acute), then $\sin(A+B) =$

$\cos A = \sqrt{1-\sin^2 A} = \frac{11}{61}$

$\sin B = \sqrt{1-\cos^2 B} = \frac{28}{53}$

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

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

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

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2. If $\tan A = \frac{45}{28}$ and $\cos B = \frac{12}{13}$ (A, B acute), then $\cos(A-B) =$

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

$\sin B = \sqrt{1-\cos^2 B} = \frac{5}{13}$

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

$= (\frac{28}{53})(\frac{12}{13}) + (\frac{45}{53})(\frac{5}{13}) = \frac{561}{689}$

Ans: (A) $\frac{561}{689}$

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3. $\sec 195^\circ =$

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

$\sec 195^\circ = \frac{1}{\cos 195^\circ} = -(\sqrt{6}-\sqrt{2})$

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

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4. $\tan 165^\circ =$

$\tan 165^\circ = \tan(135^\circ + 30^\circ)$

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

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

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5. $\sin 102^\circ \cos 42^\circ - \cos 102^\circ \sin 42^\circ =$

$\sin 102^\circ \cos 42^\circ - \cos 102^\circ \sin 42^\circ = \sin(102^\circ - 42^\circ)$

$= \sin 60^\circ = \frac{\sqrt{3}}{2}$

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

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6. $\sin 34^\circ \cos 4^\circ - \cos 34^\circ \sin 4^\circ =$

$\sin 34^\circ \cos 4^\circ - \cos 34^\circ \sin 4^\circ = \sin(34^\circ - 4^\circ)$

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

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

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7. $2\cos 8\theta \sin 9\theta =$

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

$2\cos 8\theta \sin 9\theta = \sin\theta + \sin 17\theta$

Ans: (A) $\sin\theta + \sin 17\theta$

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

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

$2\cos 2\theta \sin 8\theta = \sin 6\theta + \sin 10\theta$

Ans: (D) $\sin 6\theta + \sin 10\theta$

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9. $\cos 105^\circ - \cos 15^\circ =$

$\cos 105^\circ - \cos 15^\circ = -2\sin 60^\circ \sin 45^\circ$

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

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

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

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

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

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

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

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

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

Ans: (C) -1

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12. If $\cot A = \frac{9}{7}$ and $\cot B = \frac{1}{9}$, then $\cot(A-B) =$

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

$= \frac{\frac{9}{7}\cdot\frac{1}{9}+1}{\frac{1}{9}-\frac{9}{7}} = -\frac{36}{37}$

Ans: (C) $-\frac{36}{37}$

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13. $\frac{\cot 40^\circ \cot 20^\circ - 1}{\cot 20^\circ + \cot 40^\circ} =$

$\frac{\cot 40^\circ \cot 20^\circ - 1}{\cot 20^\circ + \cot 40^\circ} = \cot(40^\circ + 20^\circ) = \cot 60^\circ$

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

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

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14. $\cos^2 15^\circ - \cos^2 135^\circ =$

$\cos^2 15^\circ - \cos^2 135^\circ = \sin(135^\circ + 15^\circ)\sin(135^\circ - 15^\circ) = \sin 150^\circ \sin 120^\circ$

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

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

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15. $\tan 88^\circ \tan 2^\circ =$

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

$\tan 88^\circ \tan 2^\circ = \cot 2^\circ \tan 2^\circ = 1$

Ans: (B) 1

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

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

$S_1 = \frac{31}{30},\ S_2 = \frac{1}{3},\ S_3 = \frac{1}{30}$

$\tan(A+B+C) = \frac{\frac{31}{30} - \frac{1}{30}}{1 - \frac{1}{3}} = \frac{3}{2}$

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

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17. $\operatorname{cosec} 75^\circ =$

$\sin 75^\circ = \sin(45^\circ + 30^\circ)$

$\operatorname{cosec} 75^\circ = \frac{1}{\sin 75^\circ} = \sqrt{6} - \sqrt{2}$

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

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18. If $\tan A = \frac{7}{12}$ and $\tan B = \frac{5}{19}$ (A, B acute), then $A + B =$

$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{7}{12} + \frac{5}{19}}{1 - \frac{7}{12} \cdot \frac{5}{19}}$

$= \frac{\frac{193}{228}}{\frac{193}{228}} = 1$

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

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

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19. $(1 + \tan 6^\circ)(1 + \tan 39^\circ) =$

$6^\circ + 39^\circ = 45^\circ,\ \tan(6^\circ + 39^\circ) = 1$

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

$\therefore (1 + \tan 6^\circ)(1 + \tan 39^\circ) = 2$

Ans: (B) 2

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20. $(1 + \tan 32^\circ)(1 + \tan 13^\circ) =$

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

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

$\therefore (1 + \tan 32^\circ)(1 + \tan 13^\circ) = 2$

Ans: (D) 2

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

$\cot(A+B+C) = 0$ gives $\sum \tan A \tan B = 1$.

Ans: (C) 1

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

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

$\frac{18}{5} + \left(\frac{6}{5} + 3\right) \tan C = 1$

$\tan C = -\frac{13}{21}$

Ans: (D) $-\frac{13}{21}$

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23. $\sin 105^\circ - \sin 135^\circ =$

$\sin 105^\circ - \sin 135^\circ = 2 \cos 120^\circ \sin(-15^\circ) = \sin 15^\circ$

Ans: (B) $\sin 15^\circ$

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24. $\tan 66^\circ - \tan 24^\circ =$

$24^\circ + 42^\circ = 66^\circ$ and $\tan 24^\circ \tan 66^\circ = 1$:

$\tan 66^\circ - \tan 24^\circ - \tan 42^\circ = \tan 42^\circ \Rightarrow \tan 66^\circ - \tan 24^\circ = 2\tan 42^\circ$

Ans: (D) $2\tan 42^\circ$

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25. $\tan 61^\circ - \tan 29^\circ =$

$29^\circ + 32^\circ = 61^\circ$ and $\tan 29^\circ \tan 61^\circ = 1$:

$\tan 61^\circ - \tan 29^\circ - \tan 32^\circ = \tan 32^\circ \Rightarrow \tan 61^\circ - \tan 29^\circ = 2\tan 32^\circ$

Ans: (B) $2\tan 32^\circ$
