EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 09

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 $\sin A = \frac{45}{53}$ and $\tan B = \frac{7}{24}$ (A, B acute), then $\sin(A+B) =$

A. $\frac{987}{1325}$ **B.** $\frac{884}{1325}$ **C.** $\frac{1276}{1325}$ **D.** $\frac{357}{1325}$

2. If $\tan A = \frac{40}{9}$ and $\tan B = \frac{15}{8}$ (A, B acute), then $\cos(A-B) =$

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

3. $\tan 345^\circ =$

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

4. $\sin 285^\circ =$

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. $\sin 80^\circ \cos 20^\circ - \cos 80^\circ \sin 20^\circ =$

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

6. $\cos 34^\circ \cos 26^\circ - \sin 34^\circ \sin 26^\circ =$

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

7. $2\sin 6\theta \sin 8\theta =$

A. $\cos 2\theta - \cos 14\theta$ **B.** $-\cos 2\theta + \cos 14\theta$

C. $\sin 2\theta + \sin 14\theta$ **D.** $\cos 2\theta + \cos 14\theta$

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

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

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

9. $\cos 120^\circ + \cos 30^\circ =$

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

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

10. $\sin 6\theta + \sin 4\theta =$

A. $2\sin 5\theta\cos\theta$ **B.** $2\sin\theta\cos 5\theta$

C. $2\cos 5\theta\sin\theta$ **D.** $-2\sin 5\theta\cos\theta$

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11. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{3}{7}$, then $\tan(A-B) =$

A. $\frac{13}{17}$ **B.** $\frac{1}{17}$ **C.** $\frac{1}{11}$ **D.** $\frac{1}{14}$

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12. If $\cot A = 5$ and $\cot B = 3$, then $\cot(A-B) =$

A. -7 **B.** $-\frac{4}{7}$ **C.** -8 **D.** 2

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13. $\frac{\tan 36^\circ - \tan 6^\circ}{1+\tan 36^\circ\tan 6^\circ} =$

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

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14. $\cos^2 37\frac{1}{2}^\circ - \cos^2 82\frac{1}{2}^\circ =$

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

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

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

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

A. $\frac{51}{41}$ **B.** -3 **C.** $-\frac{55}{17}$ **D.** $-\frac{59}{17}$

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17. $\tan 15^\circ =$

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

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18. If $\tan A = \frac{5}{9}$ and $\tan B = \frac{2}{7}$ (A, B acute), then $A+B =$

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

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19. $(1-\tan 38^\circ)(1-\tan 97^\circ) =$

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

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20. $\tan 36^\circ + \tan 99^\circ - \tan 36^\circ\tan 99^\circ =$

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

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21. If $A+B+C = \frac{\pi}{2}$, $\tan A = \frac{1}{4}$ and $\tan B = 1$, then $\tan C$ is

A. $-\frac{5}{3}$ **B.** $\frac{5}{3}$ **C.** $\frac{3}{5}$ **D.** $-\frac{3}{5}$

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22. If $A+B+C = \pi$, $\tan A = \frac{9}{8}$ and $\tan B = 5$, then $\tan C$ is

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

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23. $\cos 165^\circ + \cos 75^\circ =$

A. 0 **B.** $\cos 45^\circ$

C. $-\cos 45^\circ$ **D.** $\sin 45^\circ$

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24. $\tan 84^\circ - \tan 6^\circ =$

A. $2\tan 78^\circ$

B. $2\tan 6^\circ$

C. $\tan 78^\circ$

D. $\tan 156^\circ$

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25. $\tan 58^\circ - \tan 32^\circ =$

A. $2\tan 32^\circ$

B. $\tan 26^\circ$

C. $\tan 52^\circ$

D. $2\tan 26^\circ$

Key sheet

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

Solutions

1. If $\sin A = \frac{45}{53}$ and $\tan B = \frac{7}{24}$ (A, B acute), then $\sin(A+B) =$

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

$\tan B = \frac{7}{24} \Rightarrow \sin B = \frac{7}{25},\ \cos B = \frac{24}{25}$

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

$= (\frac{45}{53})(\frac{24}{25}) + (\frac{28}{53})(\frac{7}{25}) = \frac{1276}{1325}$

Ans: (C) $\frac{1276}{1325}$

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2. If $\tan A = \frac{40}{9}$ and $\tan B = \frac{15}{8}$ (A, B acute), then $\cos(A-B) =$

$\tan A = \frac{40}{9} \Rightarrow \sin A = \frac{40}{41},\ \cos A = \frac{9}{41}$

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

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

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

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

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3. $\tan 345^\circ =$

$\tan 345^\circ = \tan(300^\circ + 45^\circ)$

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

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

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4. $\sin 285^\circ =$

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

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

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

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5. $\sin 80^\circ \cos 20^\circ - \cos 80^\circ \sin 20^\circ =$

$\sin 80^\circ \cos 20^\circ - \cos 80^\circ \sin 20^\circ = \sin(80^\circ - 20^\circ)$

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

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

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6. $\cos 34^\circ \cos 26^\circ - \sin 34^\circ \sin 26^\circ =$

$\cos 34^\circ \cos 26^\circ - \sin 34^\circ \sin 26^\circ = \cos(34^\circ + 26^\circ)$

$= \cos 60^\circ = \frac{1}{2}$

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

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7. $2\sin 6\theta \sin 8\theta =$

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

$2\sin 6\theta \sin 8\theta = \cos 2\theta - \cos 14\theta$

Ans: (A) $\cos 2\theta - \cos 14\theta$

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

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

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

Ans: (D) $\cos\theta+\cos 17\theta$

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9. $\cos 120^\circ+\cos 30^\circ =$

$\cos 120^\circ+\cos 30^\circ = 2\cos 75^\circ\cos 45^\circ$

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

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

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10. $\sin 6\theta+\sin 4\theta =$

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

$\sin 6\theta+\sin 4\theta = 2\sin 5\theta\cos\theta$

Ans: (A) $2\sin 5\theta\cos\theta$

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11. If $\tan A=\frac{1}{2}$ and $\tan B=\frac{3}{7}$, then $\tan(A-B)=$

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

$=\frac{\frac{1}{2}-\frac{3}{7}}{1+\frac{1}{2}\cdot\frac{3}{7}}=\frac{1}{17}$

Ans: (B) $\frac{1}{17}$

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12. If $\cot A=5$ and $\cot B=3$, then $\cot(A-B)=$

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

$=\frac{5\cdot 3+1}{3-5}=-8$

Ans: (C) -8

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13. $\frac{\tan 36^\circ-\tan 6^\circ}{1+\tan 36^\circ\tan 6^\circ}=$

$\frac{\tan 36^\circ-\tan 6^\circ}{1+\tan 36^\circ\tan 6^\circ}=\tan(36^\circ-6^\circ)=\tan 30^\circ$

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

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

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14. $\cos^2 37\frac{1}{2}^\circ-\cos^2 82\frac{1}{2}^\circ =$

$\cos^2 37\frac{1}{2}^\circ-\cos^2 82\frac{1}{2}^\circ=\sin(82\frac{1}{2}^\circ+37\frac{1}{2}^\circ)\sin(82\frac{1}{2}^\circ-37\frac{1}{2}^\circ)=\sin 120^\circ\sin 45^\circ$

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

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

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

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

$\tan 65^\circ\tan 25^\circ=\cot 25^\circ\tan 25^\circ=1$

Ans: (D) 1

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

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

$S_1 = \frac{55}{12},\ S_2 = \frac{29}{12},\ S_3 = \frac{1}{3}$

$\tan(A+B+C) = \frac{\frac{55}{12} - \frac{1}{3}}{1 - \frac{29}{12}} = -3$

Ans: (B) -3

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17. $\tan 15^\circ =$

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

$= 2 - \sqrt{3}$

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

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18. If $\tan A = \frac{5}{9}$ and $\tan B = \frac{2}{7}$ (A, B acute), then $A + B =$

$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{5}{9} + \frac{2}{7}}{1 - \frac{5}{9} \cdot \frac{2}{7}}$

$= \frac{\frac{53}{63}}{\frac{53}{63}} = 1$

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

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

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19. $(1 - \tan 38^\circ)(1 - \tan 97^\circ) =$

$38^\circ + 97^\circ = 135^\circ,\ \tan(38^\circ + 97^\circ) = -1$

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

$\therefore (1 - \tan 38^\circ)(1 - \tan 97^\circ) = 2$

Ans: (C) 2

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20. $\tan 36^\circ + \tan 99^\circ - \tan 36^\circ \tan 99^\circ =$

$36^\circ + 99^\circ = 135^\circ,\ \tan(36^\circ + 99^\circ) = -1$

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

$\therefore \tan 36^\circ + \tan 99^\circ - \tan 36^\circ \tan 99^\circ = -1$

Ans: (D) -1

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21. If $A + B + C = \frac{\pi}{2}$, $\tan A = \frac{1}{4}$ and $\tan B = 1$, then $\tan C$ is

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

$\frac{1}{4} + (\frac{1}{4} + 1)\tan C = 1$

$\tan C = \frac{3}{5}$

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

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22. If $A + B + C = \pi$, $\tan A = \frac{9}{8}$ and $\tan B = 5$, then $\tan C$ is

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

$\frac{9}{8} + 5 + \tan C = \frac{45}{8} \tan C$

$\tan C = \frac{49}{37}$

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

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23. $\cos 165^\circ + \cos 75^\circ =$

$\cos 165^\circ + \cos 75^\circ = 2\cos 120^\circ \cos 45^\circ = -\cos 45^\circ$

Ans: (C) $-\cos 45^\circ$

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24. $\tan 84^\circ - \tan 6^\circ =$

$6^\circ + 78^\circ = 84^\circ$ and $\tan 6^\circ \tan 84^\circ = 1$:

$\tan 84^\circ - \tan 6^\circ - \tan 78^\circ = \tan 78^\circ \Rightarrow \tan 84^\circ - \tan 6^\circ = 2\tan 78^\circ$

Ans: (A) $2\tan 78^\circ$

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25. $\tan 58^\circ - \tan 32^\circ =$

$32^\circ + 26^\circ = 58^\circ$ and $\tan 32^\circ \tan 58^\circ = 1$:

$\tan 58^\circ - \tan 32^\circ - \tan 26^\circ = \tan 26^\circ \Rightarrow \tan 58^\circ - \tan 32^\circ = 2\tan 26^\circ$

Ans: (D) $2\tan 26^\circ$
