EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 07

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 $\cos A = \frac{15}{17}$ and $\cos B = \frac{11}{61}$ (A, B acute), then $\sin(A+B) =$

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

2. If $\cos A = \frac{40}{41}$ and $\sin B = \frac{4}{5}$ (A, B acute), then $\cos(A-B) =$

A. $\frac{84}{205}$ **B.** $-\frac{133}{205}$ **C.** $\frac{187}{205}$ **D.** $\frac{156}{205}$

3. $\cos 105^\circ =$

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. $\cot 105^\circ =$

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

5. $\sin 175^\circ \cos 25^\circ - \cos 175^\circ \sin 25^\circ =$

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

6. $\sin 117^\circ \cos 18^\circ + \cos 117^\circ \sin 18^\circ =$

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

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

A. $-\sin 4\theta + \sin 8\theta$ **B.** $\cos 4\theta + \cos 8\theta$

C. $\sin 8\theta + \cos 4\theta$ **D.** $\sin 4\theta + \sin 8\theta$

8. $2\sin 3\theta \sin 5\theta =$

A. $\sin 2\theta + \sin 8\theta$ **B.** $-\cos 2\theta + \cos 8\theta$

C. $\cos 2\theta - \cos 8\theta$ **D.** $\cos 2\theta + \cos 8\theta$

9. $\sin 165^\circ - \sin 105^\circ =$

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

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

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

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

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

A. $\frac{11}{16}$ **B.** $-\frac{11}{12}$ **C.** $\frac{11}{2}$ **D.** $-\frac{1}{4}$

12. If $\tan A = \frac{7}{8}$ and $\tan B = 3$, then $\tan(A+B) =$

A. $-\frac{31}{13}$ **B.** $\frac{31}{8}$ **C.** $\frac{31}{29}$ **D.** $\frac{17}{13}$

13. $\frac{1+\tan 165^\circ}{1-\tan 165^\circ} =$

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

14. $\sin^2 82\frac{1}{2}^\circ - \sin^2 52\frac{1}{2}^\circ =$

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

15. $\tan 54^\circ \tan 36^\circ =$

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

16. $\sin(A+B+C) =$

A. $\sum \sin A \cos B \cos C - \prod \sin A$

B. $\sin A + \sin B + \sin C - \sin A \sin B \sin C$

C. $\prod \sin A - \sum \sin A \cos B \cos C$

D. $\sum \sin A \cos B \cos C + \prod \sin A$

17. $\tan^2 15^\circ + \tan^2 75^\circ =$

A. 28 **B.** 7 **C.** -14 **D.** 14

18. If $\tan A = \frac{1}{10}$ and $\tan B = \frac{9}{11}$ (A, B acute), then $A + B =$

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

19. $\tan 31^\circ + \tan 14^\circ + \tan 31^\circ \tan 14^\circ =$

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

20. $(1 - \cot 100^\circ)(1 - \cot 125^\circ) =$

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

21. If $A + B + C = \pi$, $\tan A = \frac{7}{8}$ and $\tan B = \frac{5}{8}$, then $\tan C$ is

A. $\frac{96}{29}$ **B.** $-\frac{96}{29}$ **C.** $\frac{29}{96}$ **D.** $-\frac{29}{96}$

22. If $A + B + C = \pi$, then $\cot A \cot B + \cot B \cot C + \cot C \cot A =$

A. -1 **B.** $\cot A \cot B \cot C$

C. 1 **D.** 0

23. $\sin 95^\circ - \sin 145^\circ =$

A. $\cos 25^\circ$ **B.** $\sin 25^\circ$

C. $-\sin 25^\circ$ **D.** $-\cos 25^\circ$

24. $\tan 52^\circ - \tan 38^\circ =$

A. $\tan 14^\circ$

B. $2\tan 14^\circ$

C. $2\tan 38^\circ$

D. $\tan 28^\circ$

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25. $\tan 71^\circ - \tan 19^\circ =$

A. $2\tan 19^\circ$

B. $\tan 52^\circ$

C. $\tan 104^\circ$

D. $2\tan 52^\circ$

Key sheet

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

Solutions

1. If $\cos A = \frac{15}{17}$ and $\cos B = \frac{11}{61}$ (A, B acute), then $\sin(A+B) =$

$\sin A = \sqrt{1-\cos^2 A} = \frac{8}{17}$

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

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

$= (\frac{8}{17})(\frac{11}{61}) + (\frac{15}{17})(\frac{60}{61}) = \frac{988}{1037}$

Ans: (A) $\frac{988}{1037}$

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2. If $\cos A = \frac{40}{41}$ and $\sin B = \frac{4}{5}$ (A, B acute), then $\cos(A-B) =$

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

$\cos B = \sqrt{1-\sin^2 B} = \frac{3}{5}$

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

$= (\frac{40}{41})(\frac{3}{5}) + (\frac{9}{41})(\frac{4}{5}) = \frac{156}{205}$

Ans: (D) $\frac{156}{205}$

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3. $\cos 105^\circ =$

$\cos 105^\circ = \cos(135^\circ - 30^\circ)$

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

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

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4. $\cot 105^\circ =$

$\tan 105^\circ = \tan(60^\circ + 45^\circ)$

$\cot 105^\circ = \frac{1}{\tan 105^\circ} = -(2-\sqrt{3})$

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

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5. $\sin 175^\circ \cos 25^\circ - \cos 175^\circ \sin 25^\circ =$

$\sin 175^\circ \cos 25^\circ - \cos 175^\circ \sin 25^\circ = \sin(175^\circ - 25^\circ)$

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

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

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6. $\sin 117^\circ \cos 18^\circ + \cos 117^\circ \sin 18^\circ =$

$\sin 117^\circ \cos 18^\circ + \cos 117^\circ \sin 18^\circ = \sin(117^\circ + 18^\circ)$

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

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

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

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

$2\sin 6\theta \cos 2\theta = \sin 4\theta + \sin 8\theta$

Ans: (D) $\sin 4\theta + \sin 8\theta$

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8. $2\sin 3\theta \sin 5\theta =$

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

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

Ans: (C) $\cos 2\theta - \cos 8\theta$

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9. $\sin 165^\circ - \sin 105^\circ =$

$\sin 165^\circ - \sin 105^\circ = 2\cos 135^\circ \sin 30^\circ$

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

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

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

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

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

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

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

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

$= \frac{\frac{7}{2}+2}{1-\frac{7}{2}\cdot 2} = -\frac{11}{12}$

Ans: (B) $-\frac{11}{12}$

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12. If $\tan A = \frac{7}{8}$ and $\tan B = 3$, then $\tan(A+B) =$

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

$= \frac{\frac{7}{8}+3}{1-\frac{7}{8}\cdot 3} = -\frac{31}{13}$

Ans: (A) $-\frac{31}{13}$

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13. $\frac{1+\tan 165^\circ}{1-\tan 165^\circ} =$

$\frac{1+\tan 165^\circ}{1-\tan 165^\circ} = \tan(45^\circ + 165^\circ) = \tan 210^\circ$

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

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

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14. $\sin^2 82\frac{1}{2}^\circ - \sin^2 52\frac{1}{2}^\circ =$

$\sin^2 82\frac{1}{2}^\circ - \sin^2 52\frac{1}{2}^\circ = \sin(82\frac{1}{2}^\circ + 52\frac{1}{2}^\circ)\sin(82\frac{1}{2}^\circ - 52\frac{1}{2}^\circ) = \sin 135^\circ \sin 30^\circ$

$= \frac{\sqrt{2}}{4}$

Ans: (B) $\frac{\sqrt{2}}{4}$

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15. $\tan 54^\circ \tan 36^\circ =$

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

$\tan 54^\circ \tan 36^\circ = \cot 36^\circ \tan 36^\circ = 1$

Ans: (D) 1

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16. $\sin(A+B+C) =$

Expand $\sin\{(A+B)+C\}$ and then $\sin(A+B)$, $\cos(A+B)$.

Ans: (A) $\sum \sin A \cos B \cos C - \prod \sin A$

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17. $\tan^2 15^\circ + \tan^2 75^\circ =$

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

$\therefore \tan^2 15^\circ + \tan^2 75^\circ = 14$

Ans: (D) 14

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18. If $\tan A = \frac{1}{10}$ and $\tan B = \frac{9}{11}$ (A, B acute), then $A + B =$

$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} = \frac{\frac{1}{10} + \frac{9}{11}}{1 - \frac{1}{10} \cdot \frac{9}{11}}$

$= \frac{\frac{101}{110}}{\frac{101}{110}} = 1$

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

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

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19. $\tan 31^\circ + \tan 14^\circ + \tan 31^\circ \tan 14^\circ =$

$31^\circ + 14^\circ = 45^\circ,\ \tan(31^\circ + 14^\circ) = 1$

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

$\therefore \tan 31^\circ + \tan 14^\circ + \tan 31^\circ \tan 14^\circ = 1$

Ans: (A) 1

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20. $(1 - \cot 100^\circ)(1 - \cot 125^\circ) =$

$100^\circ + 125^\circ = 225^\circ,\ \cot(100^\circ + 125^\circ) = 1$

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

$\therefore (1 - \cot 100^\circ)(1 - \cot 125^\circ) = 2$

Ans: (C) 2

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21. If $A + B + C = \pi$, $\tan A = \frac{7}{8}$ and $\tan B = \frac{5}{8}$, then $\tan C$ is

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

$\frac{7}{8} + \frac{5}{8} + \tan C = \frac{35}{64} \tan C$

$\tan C = -\frac{96}{29}$

Ans: (B) $-\frac{96}{29}$

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22. If $A + B + C = \pi$, then $\cot A \cot B + \cot B \cot C + \cot C \cot A =$

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

Ans: (C) 1

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23. $\sin 95^\circ - \sin 145^\circ =$

$\sin 95^\circ - \sin 145^\circ = 2 \cos 120^\circ \sin(-25^\circ) = \sin 25^\circ$

Ans: (B) $\sin 25^\circ$

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24. $\tan 52^\circ - \tan 38^\circ =$

$38^\circ + 14^\circ = 52^\circ$ and $\tan 38^\circ \tan 52^\circ = 1$:

$\tan 52^\circ - \tan 38^\circ - \tan 14^\circ = \tan 14^\circ \Rightarrow \tan 52^\circ - \tan 38^\circ = 2\tan 14^\circ$

Ans: (B) $2\tan 14^\circ$

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25. $\tan 71^\circ - \tan 19^\circ =$

$19^\circ + 52^\circ = 71^\circ$ and $\tan 19^\circ \tan 71^\circ = 1$:

$\tan 71^\circ - \tan 19^\circ - \tan 52^\circ = \tan 52^\circ \Rightarrow \tan 71^\circ - \tan 19^\circ = 2\tan 52^\circ$

Ans: (D) $2\tan 52^\circ$
