EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 10

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 $\cos A = \frac{8}{17}$ and $\cos B = \frac{4}{5}$ (A, B acute), then $\sin(A - B) =$

A. $\frac{77}{85}$ **B.** $\frac{84}{85}$ **C.** $-\frac{13}{85}$ **D.** $\frac{36}{85}$

2. If $\sin A = \frac{15}{17}$ and $\cos B = \frac{12}{13}$ (A, B acute), then $\cos(A + B) =$

A. $\frac{140}{221}$ **B.** $\frac{220}{221}$ **C.** $\frac{21}{221}$ **D.** $\frac{171}{221}$

3. $\sin 195^\circ =$

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. $\tan 255^\circ =$

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

5. $\cos 123^\circ \cos 27^\circ - \sin 123^\circ \sin 27^\circ =$

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

6. $\sin 108^\circ \cos 18^\circ - \cos 108^\circ \sin 18^\circ =$

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

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

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

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

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

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

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

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

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

10. $\sin 12\theta + \sin 8\theta =$

A. $-2 \sin 10\theta \cos 2\theta$ **B.** $2 \sin 2\theta \cos 10\theta$

C. $2 \cos 10\theta \sin 2\theta$ **D.** $2 \sin 10\theta \cos 2\theta$

11. If $\tan A = \frac{5}{8}$ and $\tan B = \frac{7}{2}$, then $\tan(A+B) =$

A. $-\frac{66}{19}$ **B.** $\frac{22}{17}$ **C.** $\frac{46}{19}$ **D.** $\frac{33}{8}$

12. If $\tan A = 6$ and $\tan B = \frac{9}{4}$, then $\tan(A+B) =$

A. $-\frac{3}{10}$ **B.** $-\frac{33}{50}$ **C.** $\frac{33}{4}$ **D.** $\frac{33}{58}$

13. $\frac{\tan 187^\circ - \tan 37^\circ}{1+\tan 187^\circ \tan 37^\circ} =$

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

14. $\sin^2 75^\circ - \sin^2 15^\circ =$

A. $\sqrt{3}$ **B.** 0 **C.** $-\frac{\sqrt{3}}{2}$ **D.** $\frac{\sqrt{3}}{2}$

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

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

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

A. $-\frac{1}{2}$ **B.** $\frac{5}{28}$ **C.** $-\frac{4}{5}$ **D.** $-\frac{1}{5}$

17. $\sin 15^\circ + \cos 15^\circ =$

A. $\sqrt{6}$ **B.** $\frac{\sqrt{6}}{2}$ **C.** $\frac{\sqrt{6}}{3}$ **D.** $-\frac{\sqrt{6}}{2}$

18. If $\tan A = \frac{12}{11}$ and $\tan B = \frac{1}{23}$ (A, B acute), then $A - B =$

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

19. $(1+\tan 9^\circ)(1+\tan 36^\circ) =$

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

20. $\tan 3^\circ + \tan 132^\circ - \tan 3^\circ \tan 132^\circ =$

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

21. If $A + B + C = \frac{\pi}{2}$, $\tan A = 5$ and $\tan B = \frac{1}{3}$, then $\tan C$ is

A. $-\frac{1}{8}$ **B.** -8 **C.** $\frac{1}{8}$ **D.** 8

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

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

23. $\cos 20^\circ + \cos 260^\circ + \cos 220^\circ =$

A. 0 **B.** $-\sin 20^\circ$

C. $\cos 20^\circ$ **D.** $\sin 20^\circ$

24. $\tan 76^\circ - \tan 14^\circ =$

A. $\tan 62^\circ$ **B.** $2\tan 14^\circ$

C. $2\tan 62^\circ$ **D.** $\tan 124^\circ$

25. $\tan 50^\circ - \tan 40^\circ =$

A. $\tan 20^\circ$

B. $\tan 10^\circ$

C. $2\tan 10^\circ$

D. $2\tan 40^\circ$

Key sheet

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

Solutions

1. If $\cos A = \frac{8}{17}$ and $\cos B = \frac{4}{5}$ (A, B acute), then $\sin(A - B) =$

$\sin A = \sqrt{1 - \cos^2 A} = \frac{15}{17}$

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

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

$= (\frac{15}{17})(\frac{4}{5}) - (\frac{8}{17})(\frac{3}{5}) = \frac{36}{85}$

Ans: (D) $\frac{36}{85}$

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2. If $\sin A = \frac{15}{17}$ and $\cos B = \frac{12}{13}$ (A, B acute), then $\cos(A + B) =$

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

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

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

$= (\frac{8}{17})(\frac{12}{13}) - (\frac{15}{17})(\frac{5}{13}) = \frac{21}{221}$

Ans: (C) $\frac{21}{221}$

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3. $\sin 195^\circ =$

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

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

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

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4. $\tan 255^\circ =$

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

$= 2 + \sqrt{3}$

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

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5. $\cos 123^\circ \cos 27^\circ - \sin 123^\circ \sin 27^\circ =$

$\cos 123^\circ \cos 27^\circ - \sin 123^\circ \sin 27^\circ = \cos(123^\circ + 27^\circ)$

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

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

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6. $\sin 108^\circ \cos 18^\circ - \cos 108^\circ \sin 18^\circ =$

$\sin 108^\circ \cos 18^\circ - \cos 108^\circ \sin 18^\circ = \sin(108^\circ - 18^\circ)$

$= \sin 90^\circ = 1$

Ans: (D) 1

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

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

$2 \sin 7\theta \sin 6\theta = \cos \theta - \cos 13\theta$

Ans: (C) $\cos \theta - \cos 13\theta$

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

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

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

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

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

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

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

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

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10. $\sin 12\theta + \sin 8\theta =$

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

$\sin 12\theta + \sin 8\theta = 2\sin 10\theta \cos 2\theta$

Ans: (D) $2\sin 10\theta \cos 2\theta$

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11. If $\tan A = \frac{5}{8}$ and $\tan B = \frac{7}{2}$, then $\tan(A+B) =$

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

$= \frac{\frac{5}{8}+\frac{7}{2}}{1-\frac{5}{8}\cdot\frac{7}{2}} = -\frac{66}{19}$

Ans: (A) $-\frac{66}{19}$

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12. If $\tan A = 6$ and $\tan B = \frac{9}{4}$, then $\tan(A+B) =$

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

$= \frac{6+\frac{9}{4}}{1-6\cdot\frac{9}{4}} = -\frac{33}{50}$

Ans: (B) $-\frac{33}{50}$

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13. $\frac{\tan 187^\circ - \tan 37^\circ}{1+\tan 187^\circ \tan 37^\circ} =$

$\frac{\tan 187^\circ - \tan 37^\circ}{1+\tan 187^\circ \tan 37^\circ} = \tan(187^\circ - 37^\circ) = \tan 150^\circ$

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

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

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14. $\sin^2 75^\circ - \sin^2 15^\circ =$

$\sin^2 75^\circ - \sin^2 15^\circ = \sin(75^\circ+15^\circ)\sin(75^\circ-15^\circ) = \sin 90^\circ \sin 60^\circ$

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

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

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

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

$\frac{\cos 15^\circ - \sin 15^\circ}{\cos 15^\circ + \sin 15^\circ} = \tan 30^\circ = \frac{1}{\sqrt{3}}$

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

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

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

$S_1 = \frac{25}{3},\ S_2 = \frac{53}{3},\ S_3 = 5$

$\tan(A+B+C) = \frac{\frac{25}{3} - 5}{1 - \frac{53}{3}} = -\frac{1}{5}$

Ans: (D) $-\frac{1}{5}$

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17. $\sin 15^\circ + \cos 15^\circ =$

$\sin 15^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}}$

$\therefore \sin 15^\circ + \cos 15^\circ = \frac{\sqrt{6}}{2}$

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

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18. If $\tan A = \frac{12}{11}$ and $\tan B = \frac{1}{23}$ (A, B acute), then $A - B =$

$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B} = \frac{\frac{12}{11} - \frac{1}{23}}{1 + \frac{12}{11} \cdot \frac{1}{23}}$

$= \frac{\frac{265}{253}}{\frac{265}{253}} = 1$

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

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

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19. $(1 + \tan 9^\circ)(1 + \tan 36^\circ) =$

$9^\circ + 36^\circ = 45^\circ,\ \tan(9^\circ + 36^\circ) = 1$

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

$\therefore (1 + \tan 9^\circ)(1 + \tan 36^\circ) = 2$

Ans: (C) 2

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20. $\tan 3^\circ + \tan 132^\circ - \tan 3^\circ \tan 132^\circ =$

$3^\circ + 132^\circ = 135^\circ,\ \tan(3^\circ + 132^\circ) = -1$

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

$\therefore \tan 3^\circ + \tan 132^\circ - \tan 3^\circ \tan 132^\circ = -1$

Ans: (B) -1

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21. If $A + B + C = \frac{\pi}{2}$, $\tan A = 5$ and $\tan B = \frac{1}{3}$, then $\tan C$ is

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

$\frac{5}{3} + (5 + \frac{1}{3}) \tan C = 1$

$\tan C = -\frac{1}{8}$

Ans: (A) $-\frac{1}{8}$

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

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

$3 + \frac{2}{5} + \tan C = \frac{6}{5} \tan C$

$\tan C = 17$

Ans: (B) 17

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23. $\cos 20^\circ + \cos 260^\circ + \cos 220^\circ =$

$\cos 260^\circ + \cos 220^\circ = 2\cos 240^\circ \cos 20^\circ = -\cos 20^\circ$

$\therefore$ value $= 0$

Ans: (A) 0

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24. $\tan 76^\circ - \tan 14^\circ =$

$14^\circ + 62^\circ = 76^\circ$ and $\tan 14^\circ \tan 76^\circ = 1$:

$\tan 76^\circ - \tan 14^\circ - \tan 62^\circ = \tan 62^\circ \Rightarrow \tan 76^\circ - \tan 14^\circ = 2\tan 62^\circ$

Ans: (C) $2\tan 62^\circ$

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25. $\tan 50^\circ - \tan 40^\circ =$

$40^\circ + 10^\circ = 50^\circ$ and $\tan 40^\circ \tan 50^\circ = 1$:

$\tan 50^\circ - \tan 40^\circ - \tan 10^\circ = \tan 10^\circ \Rightarrow \tan 50^\circ - \tan 40^\circ = 2\tan 10^\circ$

Ans: (C) $2\tan 10^\circ$
