EXPRESSWALA ACADEMY

Maths 1A: Compound Angles

MCQ Test, Set 08

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 $\tan A = \frac{12}{5}$ and $\sin B = \frac{33}{65}$ (A, B acute), then $\sin(A - B) =$

A. $\frac{4}{5}$ **B.** $-\frac{116}{845}$ **C.** $\frac{837}{845}$ **D.** $\frac{3}{5}$

2. If $\tan A = \frac{4}{3}$ and $\cos B = \frac{33}{65}$ (A, B acute), then $\cos(A + B) =$

A. $\frac{323}{325}$ **B.** $\frac{12}{13}$ **C.** $-\frac{5}{13}$ **D.** $-\frac{36}{325}$

3. $\operatorname{cosec} 165^\circ =$

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

4. $\sec 105^\circ =$

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

5. $\cos 163^\circ \cos 43^\circ + \sin 163^\circ \sin 43^\circ =$

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

6. $\cos 171^\circ \cos 36^\circ + \sin 171^\circ \sin 36^\circ =$

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

7. $2 \cos 7\theta \cos 5\theta =$

A. $-\cos 2\theta + \cos 12\theta$ **B.** $\cos 2\theta + \cos 12\theta$

C. $\cos 2\theta - \cos 12\theta$ **D.** $\sin 2\theta + \sin 12\theta$

8. $2 \cos 7\theta \sin 4\theta =$

A. $\sin 3\theta - \sin 11\theta$ **B.** $-\sin 3\theta + \sin 11\theta$

C. $\sin 3\theta + \sin 11\theta$ **D.** $\cos 3\theta - \cos 11\theta$

9. $\sin 105^\circ + \sin 15^\circ =$

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

10. $\sin 9\theta - \sin 3\theta =$

A. $-2 \cos 6\theta \sin 3\theta$ **B.** $2 \cos 3\theta \sin 6\theta$

C. $2 \cos 6\theta \sin 3\theta$ **D.** $2 \sin 6\theta \cos 3\theta$

11. If $\cot A = \frac{2}{9}$ and $\cot B = 4$, then $\cot(A - B) =$

A. $\frac{1}{2}$ **B.** 38 **C.** $\frac{17}{38}$ **D.** $-\frac{1}{34}$

12. If $\tan A = \frac{2}{7}$ and $\tan B = 3$, then $\tan(A + B) =$

A. -19 **B.** $\frac{23}{13}$ **C.** 23 **D.** $\frac{23}{7}$

13. $\frac{\cot 111^\circ \cot 39^\circ - 1}{\cot 39^\circ + \cot 111^\circ} =$

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

14. $\cos^2 90^\circ - \sin^2 45^\circ =$

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

15. $\frac{\cos 120^\circ - \sin 120^\circ}{\cos 120^\circ + \sin 120^\circ} =$

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

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

A. $-\frac{5}{3}$ **B.** $\frac{7}{10}$ **C.** $-\frac{17}{12}$ **D.** $-\frac{7}{6}$

17. $\sec 15^\circ \operatorname{cosec} 15^\circ =$

A. 4 **B.** -4 **C.** $\frac{1}{4}$ **D.** 8

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

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

19. $(1 + \cot 32^\circ)(1 + \cot 103^\circ) =$

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

20. $\tan 32^\circ + \tan 103^\circ - \tan 32^\circ \tan 103^\circ =$

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

21. If $A + B + C = \pi$, $\tan A = 4$ and $\tan B = 3$, then $\tan C$ is

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

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

A. $-\frac{17}{20}$ **B.** $\frac{20}{17}$ **C.** $\frac{17}{20}$ **D.** $-\frac{20}{17}$

23. $\cos 45^\circ + \cos 165^\circ + \cos 75^\circ =$

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

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

24. $\tan 77^\circ - \tan 13^\circ =$

A. $\tan 128^\circ$ **B.** $2\tan 13^\circ$

C. $2\tan 64^\circ$ **D.** $\tan 64^\circ$

25. $\tan 86^\circ - \tan 4^\circ =$

A. $\tan 164^\circ$

B. $2\tan 82^\circ$

C. $2\tan 4^\circ$

D. $\tan 82^\circ$

Key sheet

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

Solutions

1. If $\tan A = \frac{12}{5}$ and $\sin B = \frac{33}{65}$ (A, B acute), then $\sin(A - B) =$

$\tan A = \frac{12}{5} \Rightarrow \sin A = \frac{12}{13},\ \cos A = \frac{5}{13}$

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

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

$= (\frac{12}{13})(\frac{56}{65}) - (\frac{5}{13})(\frac{33}{65}) = \frac{3}{5}$

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

---

2. If $\tan A = \frac{4}{3}$ and $\cos B = \frac{33}{65}$ (A, B acute), then $\cos(A + B) =$

$\tan A = \frac{4}{3} \Rightarrow \sin A = \frac{4}{5},\ \cos A = \frac{3}{5}$

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

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

$= (\frac{3}{5})(\frac{33}{65}) - (\frac{4}{5})(\frac{56}{65}) = -\frac{5}{13}$

Ans: (C) $-\frac{5}{13}$

---

3. $\operatorname{cosec} 165^\circ =$

$\sin 165^\circ = \sin(120^\circ + 45^\circ)$

$\operatorname{cosec} 165^\circ = \frac{1}{\sin 165^\circ} = \sqrt{6} + \sqrt{2}$

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

---

4. $\sec 105^\circ =$

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

$\sec 105^\circ = \frac{1}{\cos 105^\circ} = -(\sqrt{6} + \sqrt{2})$

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

---

5. $\cos 163^\circ \cos 43^\circ + \sin 163^\circ \sin 43^\circ =$

$\cos 163^\circ \cos 43^\circ + \sin 163^\circ \sin 43^\circ = \cos(163^\circ - 43^\circ)$

$= \cos 120^\circ = -\frac{1}{2}$

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

---

6. $\cos 171^\circ \cos 36^\circ + \sin 171^\circ \sin 36^\circ =$

$\cos 171^\circ \cos 36^\circ + \sin 171^\circ \sin 36^\circ = \cos(171^\circ - 36^\circ)$

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

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

---

7. $2 \cos 7\theta \cos 5\theta =$

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

$2 \cos 7\theta \cos 5\theta = \cos 2\theta + \cos 12\theta$

Ans: (B) $\cos 2\theta + \cos 12\theta$

---

8. $2\cos 7\theta \sin 4\theta =$

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

$2\cos 7\theta \sin 4\theta = -\sin 3\theta + \sin 11\theta$

Ans: (B) $-\sin 3\theta + \sin 11\theta$

---

9. $\sin 105^\circ + \sin 15^\circ =$

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

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

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

---

10. $\sin 9\theta - \sin 3\theta =$

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

$\sin 9\theta - \sin 3\theta = 2\cos 6\theta \sin 3\theta$

Ans: (C) $2\cos 6\theta \sin 3\theta$

---

11. If $\cot A = \frac{2}{9}$ and $\cot B = 4$, then $\cot(A-B) =$

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

$= \frac{\frac{2}{9}\cdot 4 + 1}{4 - \frac{2}{9}} = \frac{1}{2}$

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

---

12. If $\tan A = \frac{2}{7}$ and $\tan B = 3$, then $\tan(A+B) =$

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

$= \frac{\frac{2}{7} + 3}{1 - \frac{2}{7}\cdot 3} = 23$

Ans: (C) 23

---

13. $\frac{\cot 111^\circ \cot 39^\circ - 1}{\cot 39^\circ + \cot 111^\circ} =$

$\frac{\cot 111^\circ \cot 39^\circ - 1}{\cot 39^\circ + \cot 111^\circ} = \cot(111^\circ + 39^\circ) = \cot 150^\circ$

$= -\sqrt{3}$

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

---

14. $\cos^2 90^\circ - \sin^2 45^\circ =$

$\cos^2 90^\circ - \sin^2 45^\circ = \cos(90^\circ + 45^\circ)\cos(90^\circ - 45^\circ) = \cos 135^\circ \cos 45^\circ$

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

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

---

15. $\frac{\cos 120^\circ - \sin 120^\circ}{\cos 120^\circ + \sin 120^\circ} =$

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

$\frac{\cos 120^\circ - \sin 120^\circ}{\cos 120^\circ + \sin 120^\circ} = \tan(-75^\circ) = -(2+\sqrt{3})$

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

---

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

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

$S_1 = \frac{17}{4},\ S_2 = 4,\ S_3 = \frac{3}{4}$

$\tan(A+B+C) = \frac{\frac{17}{4} - \frac{3}{4}}{1-4} = -\frac{7}{6}$

Ans: (D) $-\frac{7}{6}$

---

17. $\sec 15^\circ \operatorname{cosec} 15^\circ =$

$\sec 15^\circ = \sqrt{6} - \sqrt{2}$

$\therefore \sec 15^\circ \operatorname{cosec} 15^\circ = 4$

Ans: (A) 4

---

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

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

$= \frac{\frac{101}{90}}{\frac{101}{90}} = 1$

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

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

---

19. $(1 + \cot 32^\circ)(1 + \cot 103^\circ) =$

$32^\circ + 103^\circ = 135^\circ,\ \cot(32^\circ + 103^\circ) = -1$

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

$\therefore (1 + \cot 32^\circ)(1 + \cot 103^\circ) = 2$

Ans: (A) 2

---

20. $\tan 32^\circ + \tan 103^\circ - \tan 32^\circ \tan 103^\circ =$

$32^\circ + 103^\circ = 135^\circ,\ \tan(32^\circ + 103^\circ) = -1$

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

$\therefore \tan 32^\circ + \tan 103^\circ - \tan 32^\circ \tan 103^\circ = -1$

Ans: (B) -1

---

21. If $A + B + C = \pi$, $\tan A = 4$ and $\tan B = 3$, then $\tan C$ is

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

$4 + 3 + \tan C = 12 \tan C$

$\tan C = \frac{7}{11}$

Ans: (A) $\frac{7}{11}$

---

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

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

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

$\tan C = \frac{17}{20}$

Ans: (C) $\frac{17}{20}$

---

23. $\cos 45^\circ + \cos 165^\circ + \cos 75^\circ =$

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

$\therefore$ value $= 0$

Ans: (B) 0

---

24. $\tan 77^\circ - \tan 13^\circ =$

$13^\circ + 64^\circ = 77^\circ$ and $\tan 13^\circ \tan 77^\circ = 1$:

$\tan 77^\circ - \tan 13^\circ - \tan 64^\circ = \tan 64^\circ \Rightarrow \tan 77^\circ - \tan 13^\circ = 2\tan 64^\circ$

Ans: (C) $2\tan 64^\circ$

---

25. $\tan 86^\circ - \tan 4^\circ =$

$4^\circ + 82^\circ = 86^\circ$ and $\tan 4^\circ \tan 86^\circ = 1$:

$\tan 86^\circ - \tan 4^\circ - \tan 82^\circ = \tan 82^\circ \Rightarrow \tan 86^\circ - \tan 4^\circ = 2\tan 82^\circ$

Ans: (B) $2\tan 82^\circ$
