

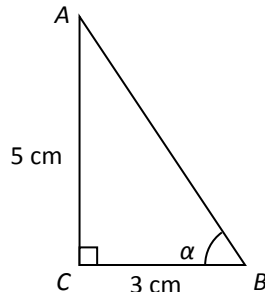
Trigonometric Relations

Multiple Choice Question

1. [14-15 Standardized Test #5]

In the figure, $\cos \alpha =$

- A. $\frac{3}{4}$
 B. $\frac{4}{3}$
 C. $\frac{3\sqrt{34}}{34}$
 D. $\frac{5\sqrt{34}}{34}$



2. [14-15 Standardized Test #7]

$\triangle ABC$ is a right-angled triangle, where $\tan \angle BAC = \tan \angle ABC$. Which of the following must be true?

- I. $AC = BC$
 II. $AC \perp BC$
 III. $\sin \angle BAC = \cos \angle ABC$

- A. I and II only B. I and III only
 C. II and III only D. I, II and III

3. [14-15 Final Exam #14]

Which of the following is/are an identity/identities?

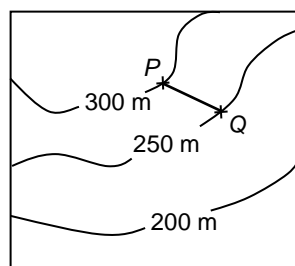
- I. $\sin(\theta + \theta) = 2 \sin \theta$
 II. $\tan^2 45^\circ = \cos^2 \theta + \sin^2 \theta$
 III. $\cos\left(\frac{3\theta}{\theta}\right) = \frac{\cos 3\theta}{\cos \theta}$

- A. I only B. II only
 C. I and III only D. I, II and III

4. [14-15 Final Exam #15]

The figure shows a part of a contour map. The map is drawn to the scale 1 : 15000 and the length of PQ is measured to be 1 cm on the map. The gradient of road PQ is

- A. $\frac{1}{300}$
 B. $\frac{1}{3}$
 C. 3.
 D. 300.



5. [14-15 Final Exam #23]

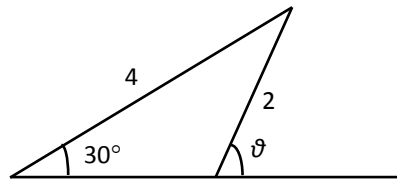
$$\frac{\sin \theta \cos 60^\circ}{\sin^2 30^\circ} - \frac{\cos(90^\circ - \theta)}{\tan 45^\circ} =$$

- A. $\sin \theta$. B. $2 \sin \theta$.
 C. $3 \sin \theta$. D. $2 \sin \theta - \cos \theta$.

6. [14-15 Final Exam #25]

In the figure, $\sin \theta =$

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



7. [15-16 Standardized Test #4]

$$\frac{1}{\tan \theta \sin(90^\circ - \theta)} + \frac{2}{\cos \theta} =$$

- A. 2 . B. $\frac{3}{\cos \theta}$.
 C. $\frac{\sin \theta + 2 \cos \theta}{\cos^2 \theta}$. D. $\frac{\cos \theta + 2 \sin \theta}{\sin \theta \cos \theta}$.

8. [15-16 Standardized Test #7]

If a and b are acute angles such that $a + b = 90^\circ$, which of the following must be true?

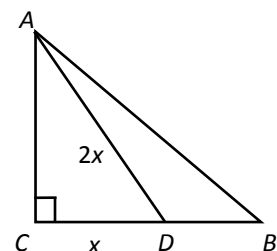
- I. $\sin a = \cos(90^\circ - b)$
 II. $\frac{\sin a}{\sin b} = \tan(90^\circ - b)$
 III. $\sin^2 a + \cos^2 b = 1$

- A. I only
 B. II only
 C. III only
 D. None of the above

9. [15-16 Standardized Test #8]

In the figure, BDC is a straight line and $\angle BAC = 45^\circ$. Find BD .

- A. $(\sqrt{3} - 1)x$
 B. x
 C. $\sqrt{3}x$
 D. $2x$



10. [15-16 Final Exam #9]

Find the acute angle θ in $\tan 75^\circ = \frac{\cos 15^\circ}{\sin \theta}$.

- A. 15° B. 45°
C. 60° D. 75°

11. [15-16 Final Exam #20]

Simplify $\frac{[\sin(90^\circ - \theta) + \sin \theta][\cos(90^\circ - \theta) - \cos \theta]}{\tan 45^\circ}$.

- A. -1 B. 1
C. $\tan \theta$ D. $2\sin^2 \theta - 1$

12. [16-17 Standardized Test #6]

$\sin^2 10^\circ + \sin^2 20^\circ + \sin^2 30^\circ + \dots + \sin^2 80^\circ =$

- A. 4. B. 4.5.
C. 8. D. 8.5.

13. [16-17 Final Exam #9]

$\frac{\cos(90^\circ - \theta)\sin(90^\circ - \theta)}{\tan \theta} =$

- A. $\sin \theta$. B. $\cos \theta$.
C. $\sin^2 \theta$. D. $\cos^2 \theta$.

14. [16-17 Final Exam #10]

$1 - \sin^2 \theta + \tan^2 \theta \cos^2 \theta =$

- A. $\tan^2 \theta$. B. $\cos^2 \theta$.
C. $\sin^2 \theta$. D. 1 .

15. [17-18 Standardized Test 2 #6]

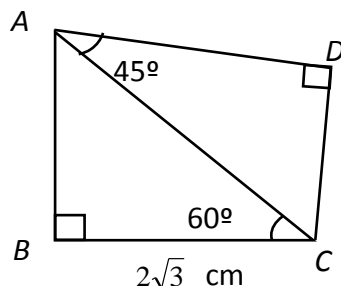
$\frac{\tan 30^\circ}{\cos 30^\circ \sin 45^\circ} =$

- A. $\frac{4\sqrt{3}}{9}$.
B. $\frac{2\sqrt{2}}{3}$.
C. $2\sqrt{2}$.
D. $2\sqrt{6}$.

16. [17-18 Standardized Test 2 #7]

In the figure, find the area of the quadrilateral $ABCD$.

- A. $(2\sqrt{3} + 4) \text{ cm}^2$
 B. $(2\sqrt{3} + 12) \text{ cm}^2$
 C. $(6\sqrt{3} + 12) \text{ cm}^2$
 D. $(6\sqrt{3} + 24) \text{ cm}^2$



17. [17-18 Final Exam #8]

$$\left(\frac{\cos \theta}{\tan \theta} - \frac{1}{\sin \theta} \right)^2 =$$

- A. 1.
 B. $\sin^2 \theta$.
 C. $-\sin^2 \theta$.
 D. $\frac{1}{\sin^2 \theta}$.

18. [17-18 Final Exam #19]

Which of the following are correct?

- I. $\frac{1}{\tan(90^\circ - \theta)} \equiv \frac{\sin \theta}{\cos \theta}$
 II. $\cos^3 \theta - \cos \theta \equiv -\cos \theta \sin^2 \theta$
 III. $1 - 2\cos^2 \theta + \cos^4 \theta \equiv \sin^2 \theta \cos^2 \theta \tan^2 \theta$

- A. I and II only
 B. I and III only
 C. II and III only
 D. I, II and III

19. [18-19 Standardized Test 2 #5]

If $\tan \theta = \frac{1}{3}$, find $\frac{5 \sin \theta + 4 \cos \theta}{3 \sin \theta - 2 \cos \theta}$.

- A. -3
 B. $-\frac{17}{6}$
 C. $-\frac{17}{3}$
 D. $\frac{17}{3}$

20. [18-19 Standardized Test 2 #8]

If θ is an acute angle, which of the following are correct?

- I. $\cos^2 \theta - \sin^2 \theta \equiv 1 - 2 \sin^2 \theta$
- II. $\tan(90^\circ - \theta) + \tan \theta \equiv \frac{1}{\sin \theta \cos \theta}$
- III. $\sin(90^\circ - \theta) \cos(90^\circ - \theta) \tan^2(90^\circ - \theta) \equiv \frac{\cos \theta - \cos \theta \sin^2 \theta}{\sin \theta}$
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

21. [18-19 Final Exam #10]

If $\cos \theta = \frac{5}{13}$ and θ is an acute angle, find the value of $\sin \theta + \tan(90^\circ - \theta)$.

- A. $\frac{125}{156}$
- B. $\frac{17}{13}$
- C. $\frac{209}{156}$
- D. $\frac{216}{65}$

22. [18-19 Final Exam #19]

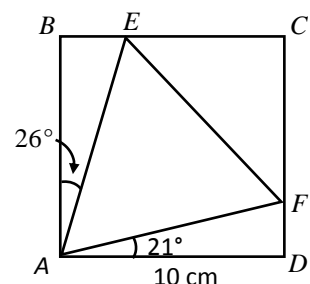
In a right-angled $\triangle ABC$, if $\cos \angle A = \cos \angle B$, find the value of $\tan \angle B$.

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

23. [18-19 Final Exam #20]

In the figure, $ABCD$ is a square with side 10 cm. E and F lie on BC and CD respectively. If $\angle BAE = 26^\circ$ and $\angle DAF = 21^\circ$, find the value of $\angle CEF$ correct to 3 significant figures.

- A. 38.2°
- B. 39.7°
- C. 50.3°
- D. 51.8°



24. [18-19 Final Exam #21]

In the figure, $ABCDE$ is a regular pentagon. O is the centre of the pentagon. If $OA = 8$ cm, find the area of pentagon $ABCDE$ correct to 3 significant figures.

- A. 129 cm^2 .
- B. 152 cm^2 .
- C. 259 cm^2 .
- D. 304 cm^2 .

