Acute Angles in a Right Triangle

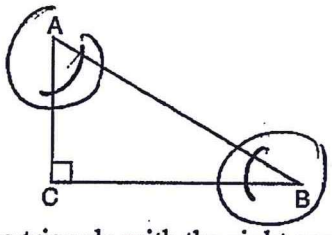
$\sin A = \cos B$**: In a right triangle, the sine of one acute angle is equal to the cosine of the other acute angle**

$A + B = 90$**: The two acute angles in a right triangle are complementary**

1. In scalene triangle ABC shown in the diagram below, $m\angle C = 90°$.

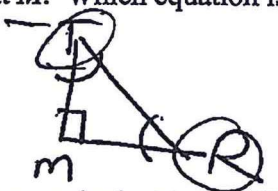
Which equation is always true?

1) $\sin A = \sin B$
2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$



2. Right triangle TMR is a scalene triangle with the right angle at M. Which equation is true?

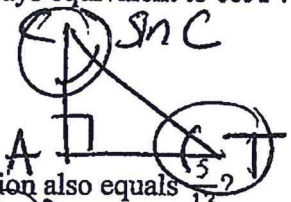
1) ~~$\sin M = \cos T$~~
2) ~~$\sin R = \cos R$~~
3) $\sin T = \cos R$
4) ~~$\sin T = \cos M$~~



3. Right triangle ACT has $m\angle A = 90°$. Which expression is always equivalent to $\cos T$?

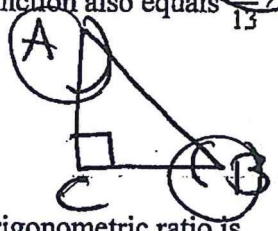
1) $\cos C$
2) $\sin C$
3) $\tan T$
4) $\sin T$

$\sin A = \cos B$



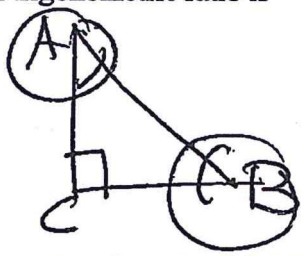
4. In right triangle ABC, $m\angle C = 90°$. If $\cos B = \frac{5}{13}$, which function also equals $\frac{5}{13}$?

1) $\tan A$
2) $\tan B$
3) $\sin A$
4) $\sin B$

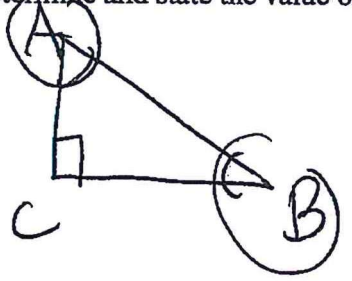


5. In right triangle ABC, $m\angle C = 90°$ and $AC \neq BC$. Which trigonometric ratio is equivalent to $\sin B$?

1) $\cos A$ CosA
2) $\cos B$
3) $\tan A$
4) $\tan B$



6. In right triangle ABC with the right angle at C, $\sin A = 2x + 0.1$ and $\cos B = 4x - 0.7$. Determine and state the value of x. Explain your answer.



$\sin A = \cos B$

$2x + 0.1 = 4x - 0.7$

$-2x \quad -2x$

$0.1 = 2x - 0.7$

$+0.7 \quad +0.7$

$\frac{0.8}{2} = \frac{2x}{2}$

$0.4 = x$

64

7. If $\sin(3x + 2)^\circ = \cos(4x - 10)^\circ$, what is the value of x to the *nearest tenth*?

(1) 7.6 (2) 12.0 (3) 14.0 (4) 26.9

$\sin A = \cos B$

$A+B=90$ $3x+2+4x-10=90$

$7x-8=90$

$+8 \quad +8$

$\frac{7x}{7}=\frac{98}{7}$

$x=14$

8. If $\sin(2x+7)^\circ = \cos(4x-7)^\circ$, what is the value of x?

1) 7
2) 15
3) 21
4) 30

$\sin A = \cos B$

$A+B=90$

$2x+7+4x-7=90$

$\frac{6x}{6}=\frac{90}{6}$

$x=15$

9. In a right triangle, $\sin(40-x)^\circ = \cos(3x)^\circ$. What is the value of x?

1) 10
2) 15
3) 20
4) 25

$\sin A = \cos B$

$A+B=90$

$40-x+3x=90$

$2x+40=90$

$-40 \quad -40$

$\frac{2x}{2}=\frac{50}{2}$

$x=25$

10. In a right triangle, the acute angles have the relationship $\sin(2x+4) = \cos(46)$. What is the value of x?

1) 20
2) 21
3) 24
4) 25

$\sin A = \cos B$

$A+B=90$

$2x+4+46=90$

$2x+50=90$

$-50 \quad -50$

$\frac{2x}{2}=\frac{40}{2}$

$x=20$

11. Which expression is always equivalent to $\sin x$ when $0^\circ < x < 90^\circ$?

1) $\cos(90^\circ - x)$
2) $\cos(45^\circ - x)$
3) $\cos(2x)$
4) $\cos x$

$\sin A = \cos B$

$\sin x = \cos(90-x)$

$x+(90-x)=90$

12. Which of the following is equivalent to $\sin 40$?

1) $\sin 50$ (2) $\cos 50$ 3) $\cos 40$ 4) $\tan 50$

$\sin A = \cos B$

$\sin 40 = \cos 50$

$A+B=90$

$40+B=90$

$-40 \quad -40$

$B=50$

these must add to 90

13. Which of the following is equivalent to $\cos 57$?

1) $\sin 57$ (2) $\sin 33$ 3) $\cos 33$ 4) $\cos 123$

$\sin 33$

$90-57=33$

14. Which expression is equal to $\sin 30^\circ$?

1) $\tan 30^\circ$
2) $\sin 60^\circ$
3) $\cos 60^\circ$
4) $\cos 30^\circ$

$\cos 60$

$90-30=60$

15. Given: Right triangle ABC with right angle at C. If $\sin A$ increases, does $\cos B$ increase or decrease? Explain why.

increases because $\sin A = \cos B$

$\sin A = \cos B$

16. If $\sin 2x = \cos(x+15)$, determine the value of x.

$A+B=90$

$2x+x+15=90$

$3x+15=90$

$-15 \quad -15$

$\frac{3x}{3} = \frac{75}{3}$

$x=25$

$\cos A = \sin B$

17. If $\cos(x+8) = \sin(2x+7)$, determine the value of x.

$A+B=90$

$x+8+2x+7=90$

$3x+15=90$

$-15 \quad -15$

$\frac{3x}{3} = \frac{75}{3}$

$x=25$

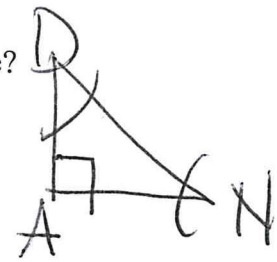
18. In right triangle DAN, $m\angle A = 90°$. Which statement must always be true?

1) $\cos D = \cos N$

2) $\cos D = \sin N$

3) $\sin A = \cos N$

4) $\cos A = \tan N$



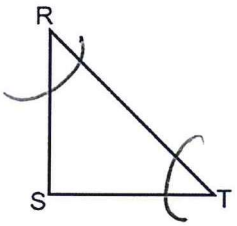
19. In right triangle RST shown below, which of the following must be true?

I: $\sin R = \cos S$

II: $\cos T = \sin R$

III: $\sin T = \cos R$

IV: $\tan R = \tan S$



1) I and IV

2) II and III

3) I, II, and III

4) III only