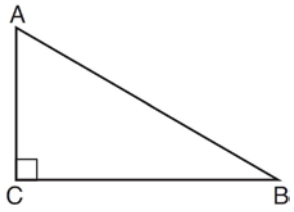
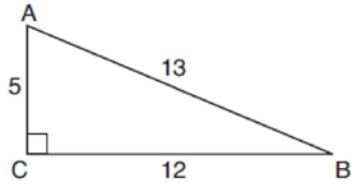
G.SRT.C.7: Cofunctions 1

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



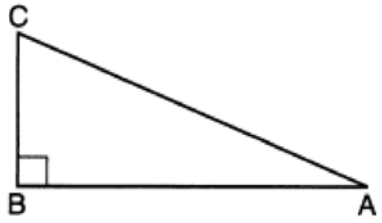
Which equation is always true?
1) $\sin A = \sin B$
2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$

2 In $\triangle ABC$ below, angle C is a right angle.



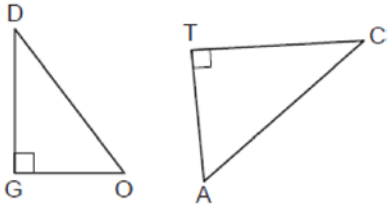
Which statement must be true?
1) $\sin A = \cos B$
2) $\sin A = \tan B$
3) $\sin B = \tan A$
4) $\sin B = \cos B$

3 Right triangle ABC is shown below.



Which trigonometric equation is always true for triangle ABC?
1) $\sin A = \cos C$
2) $\cos A = \sin A$
3) $\cos A = \cos C$
4) $\tan A = \tan C$

4 In the diagram below, $\triangle DOG \sim \triangle CAT$, where $\angle G$ and $\angle T$ are right angles.



Which expression is always equivalent to $\sin D$?
1) $\cos A$
2) $\sin A$
3) $\tan A$
4) $\cos C$

5 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) $\cos A = \tan N$

6 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) $\sin T = \cos M$

7 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?
1) $\tan \angle A = \tan \angle B$
2) $\sin \angle A = \sin \angle B$
3) $\cos \angle A = \tan \angle B$
4) $\sin \angle A = \cos \angle B$

8 If scalene triangle XYZ is similar to triangle QRS and $m\angle X = 90°$, which equation is always true?
1) $\sin Y = \sin S$
2) $\cos R = \cos Z$
3) $\cos Y = \sin Q$
4) $\sin R = \cos Z$

9 In right triangle ABC, $m\angle C = 90°$ and $AC \neq BC$. Which trigonometric ratio is equivalent to $\sin B$?
1) $\cos A$
2) $\cos B$
3) $\tan A$
4) $\tan B$

10 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) $\sin T$

11 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) $\sin B$

12 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \frac{\sqrt{21}}{5}$. What is $\sin B$?
1) $\frac{\sqrt{21}}{5}$
2) $\frac{\sqrt{21}}{2}$
3) $\frac{2}{5}$
4) $\frac{5}{\sqrt{21}}$

13 Which expression is always equivalent to $\sin x$ when $0° < x < 90°$?
1) $\cos(90° - x)$
2) $\cos(45° - x)$
3) $\cos(2x)$
4) $\cos x$

14 Which expression is equal to $\sin 30°$?
1) $\tan 30°$
2) $\sin 60°$
3) $\cos 60°$
4) $\cos 30°$

15 The expression $\sin 57°$ is equal to
1) $\tan 33°$
2) $\cos 33°$
3) $\tan 57°$
4) $\cos 57°$

16 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

17 For the acute angles in a right triangle, $\sin(4x)° = \cos(3x+13)°$. What is the number of degrees in the measure of the *smaller* angle?
1) 11°
2) 13°
3) 44°
4) 52°

18 In a right triangle, $\sin(40-x)° = \cos(3x)°$. What is the value of x?
1) 10
2) 15
3) 20
4) 25

19 If $\sin(2x+7)° = \cos(4x-7)°$, what is the value of x?
1) 7
2) 15
3) 21
4) 30

20 If $\sin(3x+9)° = \cos(5x-7)°$, what is the value of x?
1) 8
2) 11
3) 33
4) 42

21 In a right triangle, $\sin(4x+3)° = \cos(2x-9)°$. Determine and state the value of x.

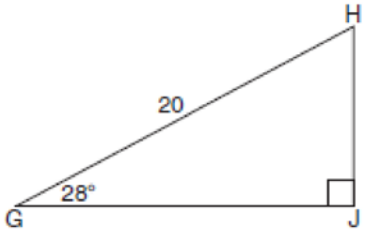
22 Find the value of R that will make the equation $\sin 73° = \cos R$ true when $0° < R < 90°$. Explain your answer.

23 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.

24 Explain why $\cos(x) = \sin(90-x)$ for x such that $0 < x < 90$.

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

26 When instructed to find the length of $\overline{HJ}$ in right triangle HJG, Alex wrote the equation $\sin 28° = \frac{HJ}{20}$ while Marlene wrote $\cos 62° = \frac{HJ}{20}$. Are both students' equations correct? Explain why.



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Answer Section

1 ANS: 4 REF: 061512geo
2 ANS: 1 REF: 081919geo
3 ANS: 1 REF: 012304geo
4 ANS: 1 REF: 062312geo
5 ANS: 2
Sine and cosine are cofunctions.

REF: 082403geo
6 ANS: 3
Sine and cosine are cofunctions.

REF: 062206geo
7 ANS: 4 REF: 011609geo
8 ANS: 4 REF: 082210geo
9 ANS: 1 REF: 011922geo
10 ANS: 2 REF: 082311geo
11 ANS: 3 REF: 061703geo
12 ANS: 1 REF: 081606geo
13 ANS: 1 REF: 081504geo
14 ANS: 3
$90 - 30 = 60$

REF: 012401geo
15 ANS: 2
$90 - 57 = 33$

REF: 061909geo
16 ANS: 1
$2x + 4 + 46 = 90$

$2x = 40$

$x = 20$

REF: 061808geo
17 ANS: 3
$4x + 3x + 13 = 90$ $4(11) < 3(11) + 13$

$7x = 77$ $44 < 46$

$x = 11$

REF: 012021geo

18 ANS: 4

$40 - x + 3x = 90$

$2x = 50$

$x = 25$

REF: 081721geo

19 ANS: 2

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

$6x = 90$

$x = 15$

REF: 081824geo

20 ANS: 2

$3x + 9 + 5x - 7 = 90$

$8x + 2 = 90$

$8x = 88$

$x = 11$

REF: 062420geo

21 ANS:

$4x + 3 + 2x - 9 = 90$

$6x - 6 = 90$

$6x = 96$

$x = 16$

REF: 012531geo

22 ANS:

$73 + R = 90$ Equal cofunctions are complementary.

$R = 17$

REF: 061628geo

23 ANS:

$4x - .07 = 2x + .01$ Sin$A$ is the ratio of the opposite side and the hypotenuse while $\cos B$ is the ratio of the adjacent

$2x = 0.8$

$x = 0.4$

side and the hypotenuse. The side opposite angle A is the same side as the side adjacent to angle B. Therefore, $\sin A = \cos B$.

REF: fall1407geo

24 ANS:
The acute angles in a right triangle are always complementary. The sine of any acute angle is equal to the cosine of its complement.

REF: spr1407geo

25 ANS:
$\cos B$ increases because $\angle A$ and $\angle B$ are complementary and $\sin A = \cos B$.

REF: 011827geo

26 ANS:
Yes, because 28º and 62º angles are complementary. The sine of an angle equals the cosine of its complement.

REF: 011727geo