

Complement Matchup

Use sine and cosine partners in right triangles.

HIGH SCHOOL • HSG-SRT.C.7

CCSS.Math.Content.HSG-SRT.C.7 "Explain and use the relationship between the sine and cosine of complementary angles."

NAME _____

DATE _____

THE BIG IDEA

Two acute angles are complementary when their measures add to 90° . For complementary angles, the sine of one angle equals the cosine of the other angle: $\sin(\theta) = \cos(90^\circ - \theta)$.

WORKED EXAMPLE

Find $\cos(75^\circ)$ exactly.

1. The complement of 75° is $90^\circ - 75^\circ = 15^\circ$.
2. $\cos(75^\circ) = \sin(15^\circ)$.
3. $\sin(15^\circ) = (\sqrt{6} - \sqrt{2})/4$.

Answer: $(\sqrt{6} - \sqrt{2})/4$

PRACTICE 6 problems

- 1** Angles a and b are complementary. If $\sin(a) = 3/7$, find $\cos(b)$.

ANSWER _____

- 2** Angles m and n are complementary. If $\cos(m) = 5/8$, find $\sin(n)$.

ANSWER _____

- 3** Write $\cos(28^\circ)$ as the sine of a complementary angle.

ANSWER _____

- 4** Write $\sin(54^\circ)$ as the cosine of a complementary angle.

ANSWER _____

- 5** Angle x is acute, and $\cos(x) = 5/13$. Find the sine of the angle complementary to x.

ANSWER _____

- 6** Angles R and S are complementary. If $\sin(R) = 8/17$, find $\cos(S)$.

ANSWER _____

APPLY IT Show your work

- 1** While planning a skate video, a ramp makes a 35° angle with level ground and a 55° angle with a vertical rail. A class reference chart rounds $\sin(35^\circ)$ to 0.57. Using the chart, what value should you use for $\cos(55^\circ)$?

WORK SPACE

ANSWER _____

- 2** At a concert, a lighting cable makes a 39° angle with the stage floor and a 51° angle with a vertical support. A reference chart rounds $\cos(51^\circ)$ to 0.63. What value should the lighting crew use for $\sin(39^\circ)$?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Angles A and B are complementary acute angles. If $\sin(A) = 7/25$, find $\cos(B)$ and $\sin(B)$ without finding either angle. Explain your reasoning.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Angles a and b are complementary. If $\sin(a) = 3/7$, find $\cos(b)$.	3/7
2	Angles m and n are complementary. If $\cos(m) = 5/8$, find $\sin(n)$.	5/8
3	Write $\cos(28^\circ)$ as the sine of a complementary angle.	$\sin(62^\circ)$
4	Write $\sin(54^\circ)$ as the cosine of a complementary angle.	$\cos(36^\circ)$
5	Angle x is acute, and $\cos(x) = 5/13$. Find the sine of the angle complementary to x.	5/13
6	Angles R and S are complementary. If $\sin(R) = 8/17$, find $\cos(S)$.	8/17

PART 2 • APPLY IT

- 0.57** The two angles are complementary. Therefore, $\cos(55^\circ) = \sin(35^\circ) = 0.57$.
- 0.63** The floor angle and vertical-support angle are complementary. Therefore, $\sin(39^\circ) = \cos(51^\circ) = 0.63$.

CHALLENGE

$\cos(B) = 7/25$ and $\sin(B) = 24/25$. Since B is complementary to A, $\cos(B) = \sin(A)$. Also, $\cos(A) = 24/25$, so $\sin(B) = \cos(A)$.

Accept equivalent notation with or without degree symbols. For the challenge, accept a correct explanation that uses complementary-angle identities and the 7-24-25 right triangle relationship.