What's an inverse?

1) $15 = r + 19$
$-19 \quad -19$

2) $-21 = n - 6$
$+6 \quad +6$

3) $\dfrac{84}{7} = \dfrac{7k}{7}$

4) $6 = \dfrac{a}{11} \cdot 11$ $11 \cdot$

An inverse undoes another operation

multiplication & division
addition & subtraction

<u>Vocabulary</u>

<u>Inverse</u> - "undo" operations $\cdot 7$ $\div 7$

Subtraction addition

$\sqrt{}$ $(\ )^2$

<u>Reciprocal</u> - Flip a fraction $\dfrac{1}{7}$ $\dfrac{7}{1}$

6 $\frac{1}{6}$

<u>Opposite</u> a reverse of something "different sign"

other side $+$ vs $-$

completely different -7 7

8 -8

$\dfrac{1}{7}$ $-\dfrac{1}{7}$

Vocabulary

Inverse - the operation that reverses the effect of another operation. "undo"

Reciprocal - the reciprocal of a number is 1 divided by that number. The reciprocal of any number x, is x^{-1}

Opposite - two numbers are opposites when they are the same distance from zero, but on opposing sides of the number line. Opposite refers to direction or sign of a number.

6.4 Inverse Trigonometry
(MVP 6.10 Finding the Value of a Relationship)

Part I: What's your angle?

Andrea and Bonita are going for a walk straight up the side of a hill. Andrea decided to stretch before heading up the hill while Bonita thought this would be a good time to get a head start. Once Bonita was 100 feet away from Andrea, she stopped to take a break and looked at her GPS device that told her that she had walked 100 feet and had already increased her elevation by 40 feet. With a bit of time to waste, Bonita wrote down the trigonometric ratios for ∠A and for ∠B.
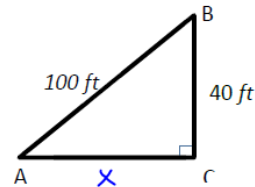
1. Name the trigonometric ratios for ∠A and for ∠B.

$\sin A = \frac{2}{5}$

$\cos A = \frac{x}{100}$

$\tan A = \frac{40}{x}$

$\sin B = \frac{x}{100}$
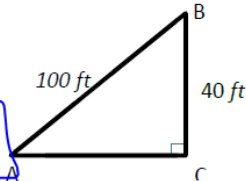
$\cos B = \frac{2}{5}$

$\tan B = \frac{x}{40}$

When Andrea caught up, she said "What about the unknown angle measures? When I was at the bottom and looked up to see you, I was thinking about the "upward" angle measure from me to you. Based on your picture, this would be ∠A." Bonita knows that she can solve equations involving variables by isolating the variable. She then wrote the following trig ratio she found: $\sin A = \frac{2}{5}$ and said "Now we just have to get 'A' by itself." Together, the girls talked about using *inverse trigonometric functions* to find unknown angle values. Bonita explained, "The inverse of sine is also written as sin^{-1}. To solve for ∠A, take the inverse of the trigonometric function on both sides to get ∠A by itself." Using Bonita's explanation, Andrea solved for ∠A using the following steps:

$$\sin A = \frac{2}{5}$$

$$sin^{-1}(\sin A) = sin^{-1}\left(\frac{2}{5}\right)$$

inverse sine $A \approx 23.578°$

$A = sin^{-1}\left(\frac{2}{5}\right)$

100 ft

B

40 ft

C

$8 \cdot \frac{x}{8} = 2 \cdot 8$

2. Use the trigonometric ratio you found for cos B to find the value of ∠B.

cos^{-1}

$$\cos B = \frac{2}{5}$$

$$B = cos^{-1}\left(\frac{2}{5}\right) = 66.422$$