

Nasco's Dedicated to Delivery

The object of this game is to match cards held in one's hand with the various trigonometric parameters like sine (sin), cosine (cos), and tangent (tan) for common angles, and thus score points in competitive fun. This game will improve a student's ability to quickly recognize trigonometric values and increase their trigonometric manipulative skills.

There are 2 card decks comprising this game:

- A Numerical Card deck
- A Trigonometric Card deck

A Trigonometric Table also comprises the game and is shown below. This table presents the sin, cos, and tan figures for common angles in integer, square root, and decimal form. For the purposes of this game, only the integer and square root forms will be used.

Note that the Trigonometric Card deck also contains a trigonometric identity card, which adds an element of learning and fun to the game.

Trigonometric Table

Common Angles →	0°	30°	45°	60°	90°	180°
Sin	0	$\frac{1}{2}\sqrt{1}$ (.5)	$\frac{1}{2}\sqrt{2}$ (.707)	$\frac{1}{2}\sqrt{3}$ (.866)	1	0
Cos	1	$\frac{1}{2}\sqrt{3}$ (.866)	$\frac{1}{2}\sqrt{2}$ (.707)	$\frac{1}{2}\sqrt{1}$ (.5)	0	-1
Tan	0	$\frac{1}{3}\sqrt{3}$ (.577)	$\sqrt{1}$ (1)	$\sqrt{3}$ (1.732)	∞	0

Play

Each of the 2-4 players will start the game with 3 cards drawn or dealt from the Numerical Card deck. After this is done, a Trigonometric Card will be turned over and a round of play begins. Players must then search their hands for cards that match what they have in their hand with the Trigonometric Table to see if there is a match and points may be scored.

Let's examine 2 rounds of play shown here to orient one to how the game works. First let us look at Example 1. Notice how the cards have been dealt to all four players and a Trigonometric Card indicating "sin" has been turned over for the round of play.

Referring to the Trigonometric Table above (or hopefully later by memory), Player #1 looks at the sin row of the Trigonometric Table to see if they have cards that match any of the sin values for the angles shown. Card 1 matches the sin value for 60 degrees. Card 3 matches the sin value for either 0 degrees or 180 degrees. Therefore, Player #1 may take 20 points for the 60 degree match, and 20 points for either the 0 or 180 degree match. Their total for this round of play is 40 points. Player #1 must discard cards 1 and 3, and take 2 new cards from the Numerical Card deck.

Player #2 examines their cards and finds that card 4 matches the sin value 30 degrees, Card 5 matches that for 45 degrees, and Card 6 matches that for 0 or 180 degrees. Player #2 scores 20 points for each match and receives a total of 60 points for this round of play. Player 2 then discards Cards 4, 5, and 6, then takes 3 new cards from the Numerical Card deck.

Player #3 examines their cards and finds that card 8 matches that for 30 degrees, and card 9 matches that for 90 degrees... thus scoring a total of 40 points for this round of play. Cards 8 and 9 are discarded and 2 new cards are taken from the Numerical Card deck.

Player #4 reviews the cards in their hand and determines that they cannot score any points with matches and must take “0” points for this round of play. They do not discard or take any new cards.

EXAMPLE 1

Player 1

Diagram showing three boxes labeled 1, 2, and 3. Box 1 contains $\frac{1}{2}\sqrt{3}$, Box 2 contains ∞ , and Box 3 contains 0.

[illegible]**Player 3**

Play (Continued)

The next round of play begins when a new Trigonometric Card is turned over and the players must once again search their hands for matches to score more points. For the Trigonometric Cards for sin, cos, and tan... players are looking across the rows of the Trigonometric Table to find angle matches. However, when the trigonometric identity card is revealed, players must scan down the angle columns looking for a match, and 2 of 3 cards must be there for a match. Look at Example 2 for a round of play explained when a trigonometric identity card is exposed.

Player #1 examines their cards and compares it to the Trigonometric Table columns. They notice that cards 3 and 2 match the sin and cos values for a 60 degree angle, thus making the trigonometric identity true. Player #1 scores 30 points for this identity match, discards cards 3 and 2, and takes 2 new cards from the Numerical Card deck.

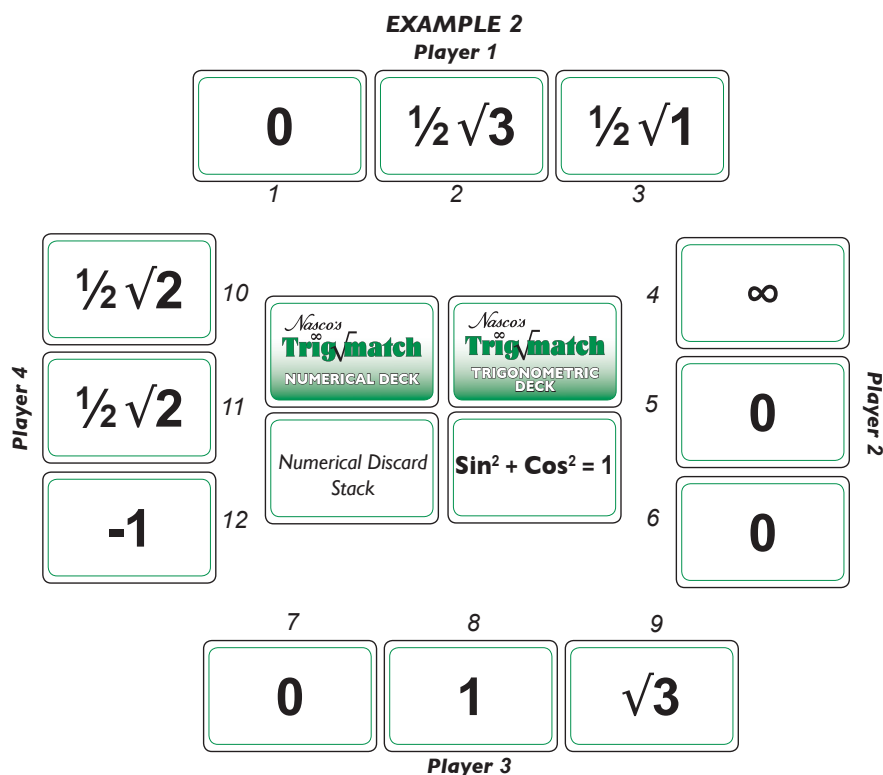
Player #2 looks at their cards and determines they cannot make any sine and cosine matches and therefore scores no points. They do not discard or take any new cards.

Player #3 examines their cards to find that cards 7 and 8 match for either a 0 or 90 degree trigonometric identity. They score 30 points, discard cards 7 and 8, and take 2 new cards from the Numerical Card deck.

Player #4 looks over their cards and finds they can match cards 10 and 11 with the sin and cos of a 45 degree angle. This is good for 30 points. They then discard cards 10 and 11 and take two new cards from the Numerical Card deck.

Play proceeds in this manner until one of the players achieves the agreed-upon number of points to constitute a game victory. It is suggested that point levels of 200, 300, or 400 points be considered for winning.

If during play, the card deck become exhausted, they may be replenished from the discarded cards, reshuffled, and play continued. At no time may any player hold more than 3 cards in their hand.



Scoring

During each round of play, as discussed in Example 1, players who can form a match always receive 20 points for each match. They can have multiple matches on each round of play, also discussed in Example 1. But it is always 20 points for each match, and remains that value throughout the game. There is only one exception to this, which is explained in Example 2. When the trigonometric identity card, $\sin^2 + \cos^2 = 1$ appears, then each match to this card is 30 points. The trigonometric identity card is a bonus situation.

Classroom Play

This game may be used in the classroom. Students may break into teams of 2 or 3 players, each team receiving 5 Numerical Cards and play continuing as described earlier, with each team acting as though it was a single player.

Another variation is for the teacher to challenge all the teams simultaneously and let the teams accumulate points as they respond to the teacher:

- Turning over the Trigonometric Cards.
- Calling out who has the sine for an angle of "X" degrees.
- Who can make a trigonometric identity for "Y" degrees.

Nasco

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