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## Gendering trigonometric concepts

**Zameer Ashraf and Dr. Chitra Singh**

### Abstract

The study was undertaken to explore the trigonometric concepts among male and female students. 400 respondents were selected with due representation of gender. All respondents were selected from 10<sup>th</sup> standard. Whole data was selected by using Random Sampling Technique (RST). The trigonometric concept scale developed by Jasdeep, K, S and Pooja, A. (2016) was used for data collection. The data was subjected to statistical treatment by using Frequency Distribution, Percentage, Mean, S. D and independent 't' test. The results revealed that there exists significant differences between male and female respondents on conceptualisation of trigonometry ( $P < 0.01$ ). Male respondents were reported with high level of the trigonometric inclination as compared to female respondents.

**Keywords:** Trigonometric concept, male students, female students

### 1. Introduction

Trigonometry is a branch of mathematics that studies relationships involving lengths and angles of triangles. The field emerged during the third century before Christ from applications of pure mathematics to astronomical studies. The 3rd-century astronomers first noted that the lengths of the sides of a right-angle triangle and therefore the angles between those sides have mounted relationships: that's, if at least the length of one side and measurement of one angle is understood, then all other angles and lengths will be determined algorithmically. These calculations soon came to be outlined as the pure mathematics functions and these days are pervasive in each pure and applied mathematics: basic strategies of study like the Fourier rework, for example, or the wave equation, use trigonometric functions to perceive rotary phenomena across several applications in fields as various as physics, mechanical and electrical engineering, music and acoustics, astronomy, ecology, and biology. Trigonometry is conjointly the muse of measuring. Trigonometry is most merely related to flat right-angle triangles (each of that could be a two-dimensional triangle with one angle adequate ninety degrees). The applicability to non-right angle triangles exists, but, since any non-right-angle triangle (on a flat plane) can be bisected to form two right-angle triangles, most problems will be reduced to calculations on right-angle triangles. Thus, the majority of applications relate to right-angle triangles. One exception to this is trigonometry, the study of triangles on spheres, surfaces of constant positive curvature, in elliptic geometry. Trigonometry on surfaces of negative curvature is half of non-Euclidean geometry. Trigonometry basics are often taught in schools, either as a separate course or as a part of a pre-calculus course. In context to same, large number of researchers has reported gender inequalities are existing in the field of trigonometric concepts of mathematics. Notable among them are; Leder, (1985) [19], Hedges & Nowell, (1995) [6], Peterson & Fennema, (1985) [48]; Randhawa, (1994) [6] Aanad, A. K. & Fennema, (1985) [6]. Leder (1992) [19], Bronholt, Goodnow, & Conney, (1994) [2], Guiso, Monte, Sapienza, & Zingales, (2008) [5]; Hyde, *et al.*, (2009) [7]. Keeping in view, the investigator intended to explore the inclination of male and female students towards conceptualisation of Determinants. The detailed statement of the problem is as under:

**1.2 Research problem:** The statement of the research problem is as under:  
"Gendering Trigonometric Concept"

**1.3 Objectives of the study:** The objectives of the present study are as under:

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To explore trigonometric concepts among male and female students.

**1.4 Hypothesis:** Following hypothesis has been framed for the present study:

There exists no significant difference between male and female students on their conceptual understanding of trigonometry.

**1.5 Operational definition:** The operational definitions of terms and variables are as under:

a) **Trigonometric concepts:** Trigonometric concepts in the present study refers the set of achievement obtained by the respondents on trigonometric concept scale developed by Jasdeep, K. S and Pooja, A. (2016).

b) **Male and female students:** In the present study, male and female students refers dichotomy of the respondents made on the basis of their sex.

**1.6 Delimitations of the study:** The present study will be delimited two districts of the Kashmir valley viz. Baramulla and Kupwara of Union Territory of Jammu and Kashmir. The study will be delimited to (Determinants Dimension) only. Besides, the study will be delimited to 400 respondents of 10<sup>th</sup> class only.

**1.7 Methodology:** The present study has been operated through descriptive survey method. Further, design if the study is based on below mentioned parameters.

❖ **Sample:** The sample for the present study consists of 400 respondents with due representation of gender. Accordingly, 200 male and 200 female students were selected for the presents study.

❖ **Sapling technique:** The required sample was selected with the help of random sampling technique. The details about the procedure of selecting the sample are given as under in below mentioned table.

**Table 1:** Showing sample breakup of the respondents included in the study

Category	Male Students		Female Students	
	Srinagar	Budgam	Srinagar	Budgam
Teachers	100	100	100	100
Total 400				

**Test used:** For measuring the trigonometric concepts among students, the investigator employed the trigonometric concepts scale developed by Jasdeep, K, S and Pooja, A. (2016).

**1.8 Statistical treatment:** The collected data was put to suitable statistical treatment by using descriptive and inferential techniques. The detailed procedure of statistical treatment was analysed as under:

**1.8.1 Descriptive Analysis:** In this domain the data was analysed with the help of frequency and percentage analysis. The measuring criterion was analyses as under:  
In the below mentioned tables measuring criteria was calculated with the help of below mentioned procedure:

$$x = \left( \frac{\sum x}{N} \right) 100$$

Here x= Gained level of norm

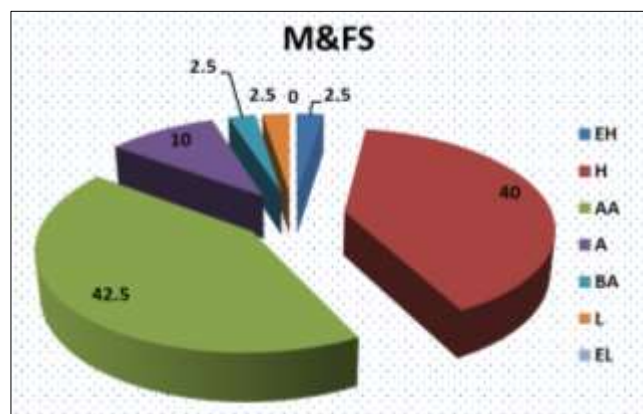
$\sum x$ = Sum of score obtained by respondents on particular level of determinants inclination.

**Table: 2:** Showing the composite score of frequency and percentage wise analysis of male and female students on their level of trigonometric concepts. (=200 each).

Level	Male & Female Students	
	Percentage	Frequency
EH	2.50	10
H	40.00	160
AA	42.50	170
A	10.00	40
BA	2.50	10
L	2.50	10
EL	0.00	0.00
Total	100	400

**Index**

- EH= Extreme High
- H= High
- AA=Above Average
- A=Average
- BA=Below Average
- L= Low
- EL=Extreme Low



**Fig 1:** Showing the composite score of the graphical representation of male and female students on their level of trigonometric concepts.

**Index**

- EH= Extreme High
- H= High
- AA=Above Average
- A=Average
- BA=Below Average
- L= Low
- EL=Extreme Low

**Interpretation:** The results presented in above reported table (please refer Table 2, Fig. 2) gives information about the composite frequency and percent wise distribution of male and female students on various levels of trigonometric concepts. The obtained results indicate that 2.50% (F=10) male and female students were seen with extreme high level of trigonometric concepts. In pursuance to same, it was found that 40.00% (F=160) male and female students were seen with high level of trigonometric concepts. Besides, 42.50% (F=170) male and female students were seen with above average level of trigonometric concepts. In addition to this, 10% (F=40) male and female students were seen with average level of trigonometric concepts. The results reveal that 2.50% (F=10.00) male and female students were seen with below average level of trigonometric concepts. The obtained results reveal that 2.50% (F=10.00) male and female students were seen with low level of trigonometric concepts. Accordingly,

0.00% (F=0.00) male and female students were seen with extreme low level of trigonometric concepts.

**1.8.2: Comparative analysis:** The comparative analysis of the respondents was made on the basis of independent ‘t’ test. The comparative analysis was made with the help of below mentioned statistical procedure:

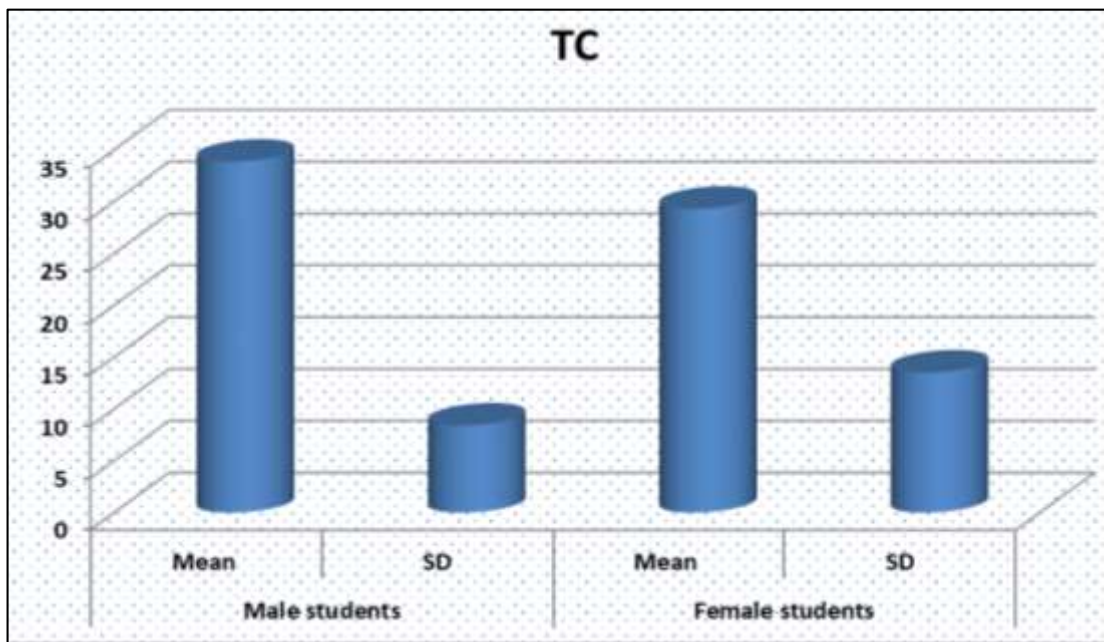
$$t = \frac{M1 - M2}{\sqrt{\frac{(SD1)^2 + (SD2)^2}{N1 + N2}}}$$

**Table 3:** Showing significant of mean difference between male and female students on composite score of trigonometric concepts. (N=200)

CS	Male students		Female students		‘t’ value
	Mean	SD	Mean	SD	
TC	33.84	8.39	29.30	13.50	4.04**

**Index**

- CS= Composite Score
- TC= Trigonometric concepts
- \*\*= Significant at 0.01 level of confidence



**Fig 3:** Showing the representation of significant of mean difference between male and female students on trigonometric concepts.

**Index**

- TC= Trigonometric concepts
- MS=Male Students
- FS=Female Students

**Interpretation:** The perusal of the above reported table (Please refer table 3, Fig. 3) gives information about the mean comparisons of male and female students on composite score of trigonometric concepts. The calculated results indicate that the mean score of male students was seen 33.84 which is relatively higher than the mean score of female adolescents (M=29.30). Besides, when the both group of students were comparatively analysed the ‘t’ value came out to be 4.04, which is significant at 0.01 level of confidence. Thus, from the above reported results there seems significant difference between male and female students on their conceptual understanding about trigonometry. Male students were seen as high mean achievers as compared to female students on their trigonometric concepts.

Therefore, from the above reported results, significant difference has been reported between male and female students on their level of trigonometric concepts. Thus, impact of gender seems significant. Accordingly the status of the hypothesis is reported as under:

**Hypothesis:** There exists no significant difference between male and female students on below mentioned dimensions of trigonometric concepts.

- Meaning and conceptual exploration
- Trigonometric riation and angles

- Trigonometric ratio and specific angles
- Height and distance
- Trigonometry identity based

.....Status: Rejected

Indeed the above supported null hypothesis has been rejected, as significant difference has been reported between male and female students on their level of trigonometric concepts.

**Rejected:** The results are carried in consonance of the host of the researchers like;

“Hyde & Geiringer, (1975) [9]; Mann, S., Sakuma, & Masaki, (1990), Fennema KL. (1974), Leder, (1985) [19], Hedges & Nowell, (1995) [6], Peterson & Fennema, (1985) [48]; Randhawa, (1994) [6] Aanad, A. K. & Fennema, (1985) [1]. Leder (1992) [19], Bronholt, Goodnow, & Conney, (1994) [2] Ma, K. (1995) Guiso, Monte, Sapienza, & Zingales, (2008) [5]; Hyde, *et al.*, (2009) [7]”

**2. Conclusions of the study:** As reported earlier the aim of the study was to explore the level of trigonometric concepts of male and female students. In context to same, Significant difference has been reported between male and female students on all dimensions including composite score of trigonometry concept. Male students were seen with high achievers on this dimension as compared to their counterparts (female students).

**3. Conflict of interests:** During the entire research process, no any conflict of interest has been declared.

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