NACIONES UNIDAS SCHOOL IED
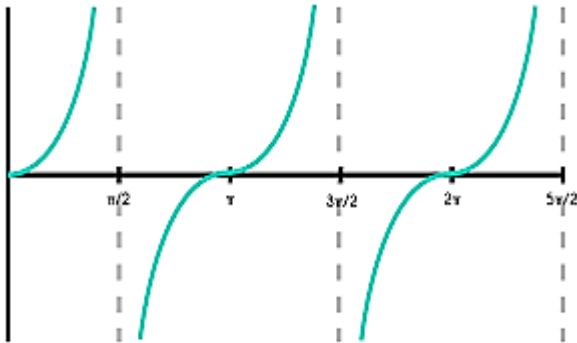## PREPARATORY WORKSHOP FOR COMPETENCES TEST
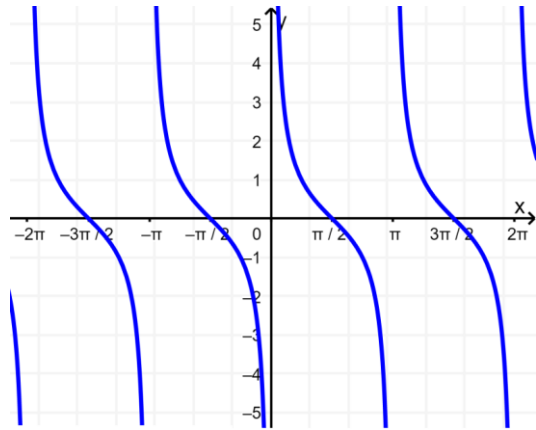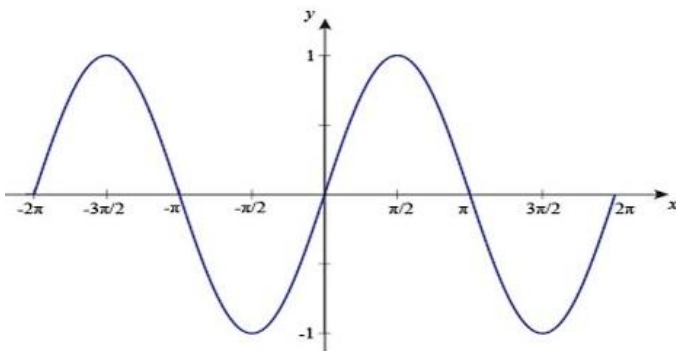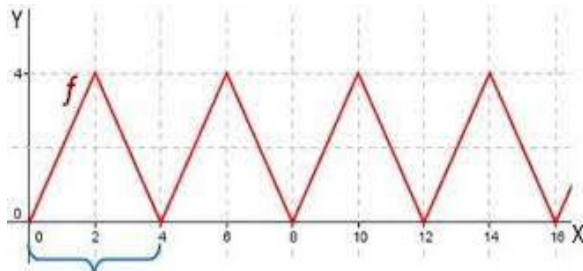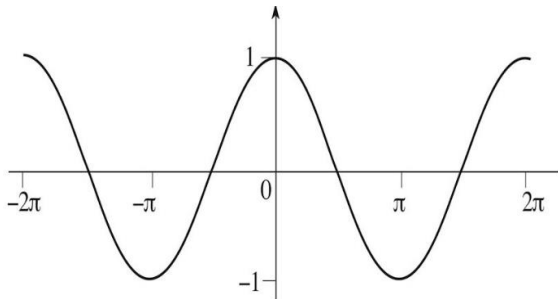## SECOND TERM
MATH 10th

This workshop must be solved in the mathematics notebook, as a requirement
to take the competency test.
Delivery date: July 16th, 2024

1. What trigonometric function does the following graph correspond to? Describe it.

2. Which of the following graphs corresponds to the SINE function? Why?

3. Comparing the blue graph to the red graph, shown below, a change is observed. This change is in the period, in the amplitude, is there a horizontal displacement or is there a vertical displacement? Explain your answer.
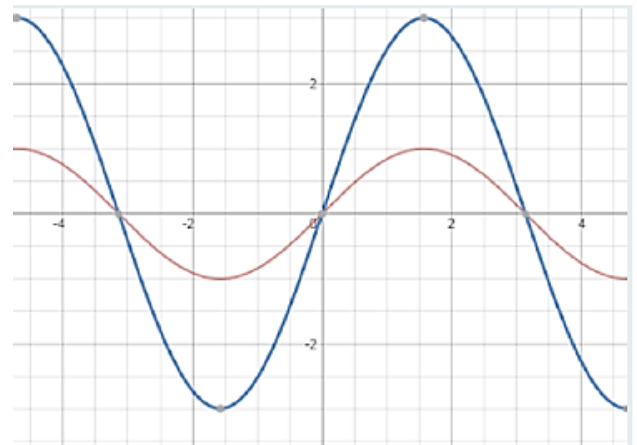
4. Comparing the blue graph to the red graph, shown below, a change is observed. This change is in the period, in the amplitude, is there a horizontal displacement or is there a vertical displacement? Explain your answer.
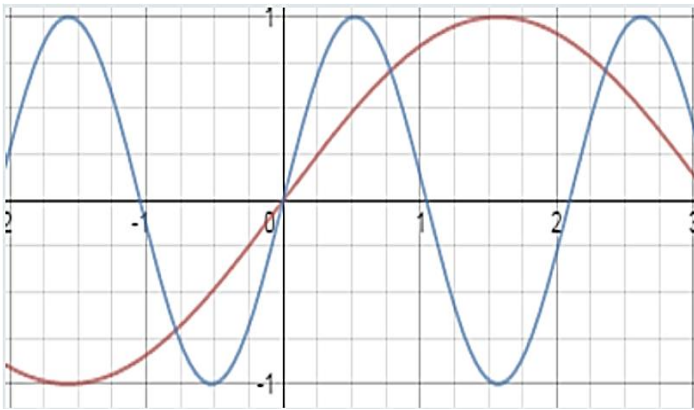
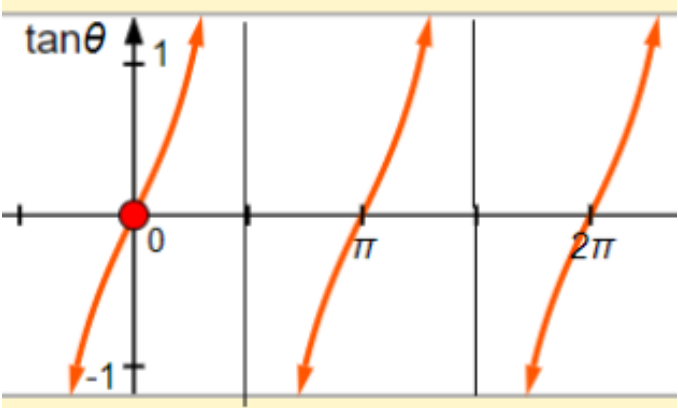5. The following expression describes the fundamental transformations of trigonometric functions.

$$f(x)= a \text{ sen } (bx \pm c) \pm d$$

Write what the values a, b, c and d represent respectively.

6. The image represents the tangent function in the plane.

According to the graph, what is the period and amplitude of the function?

7. From the graph below, describe the domain, range, amplitude and period.
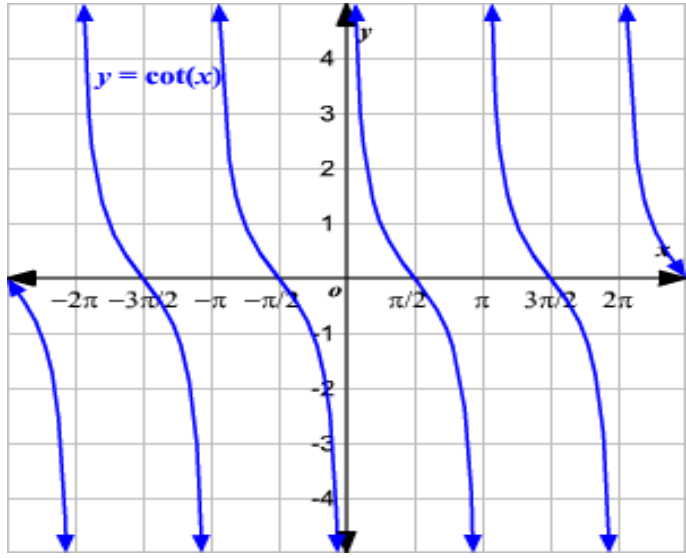
8. According to the following graph, describe which trigonometric function it corresponds to and determine its amplitude, period, displacements and maximum and minimum points.
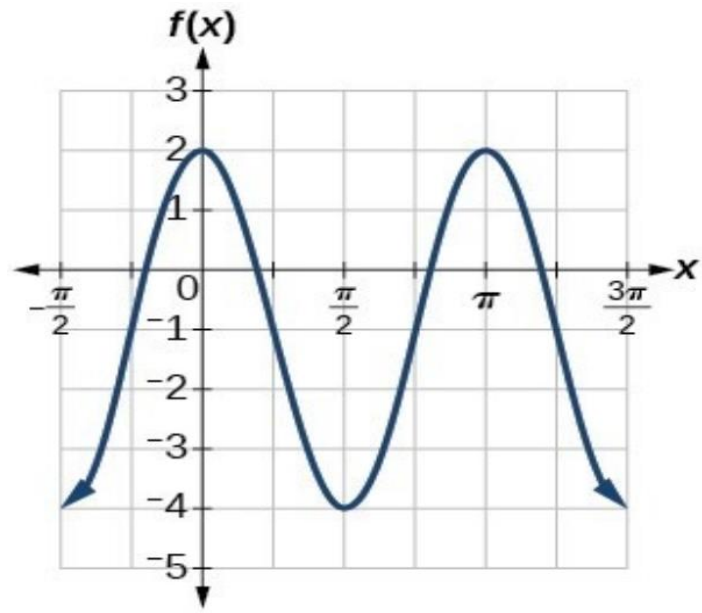
9. Which of the trigonometric functions pass through the origin: (0,0)?

10. To observe the effects of a medication, it is injected into an animal and the behavior of temperature (ºC) as a function of time (hours) is recorded, as shown in the graph.

Which of the following expressions corresponds to the curve that describes the temperature of the animal as a function of time?

$F(t) = 2\cos\left(\frac{2\pi}{3}t\right) + 36$	$F(t) = 3\cos\left(\frac{2\pi}{3}t\right) + 38$
$F(t) = 2\operatorname{sen}\left(\frac{2\pi}{3}t\right) + 36$	$F(t) = 3\operatorname{sen}\left(\frac{2\pi}{3}t\right) + 38$

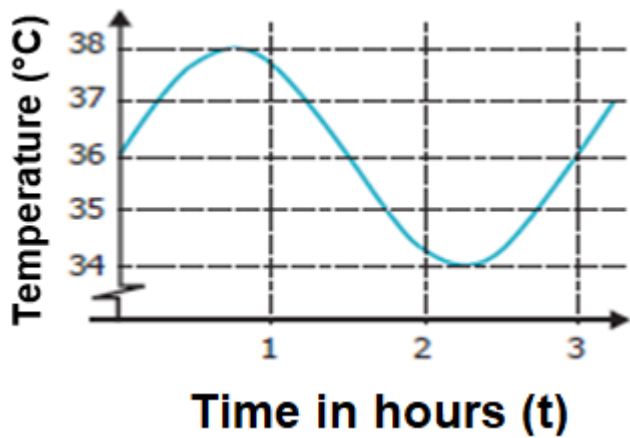11. What would be the perimeter of the triangle that is formed?
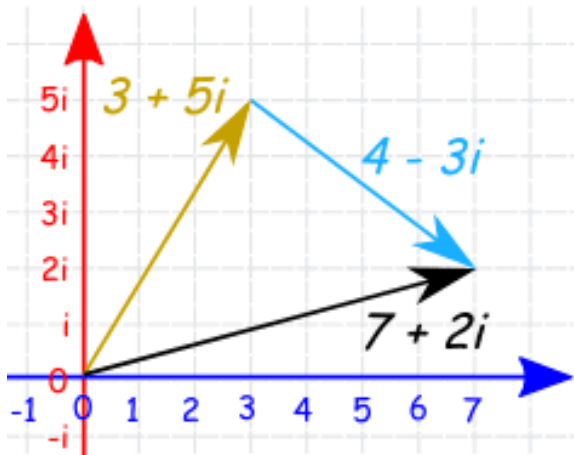
12. Multiply the numbers represented in the complex plane.
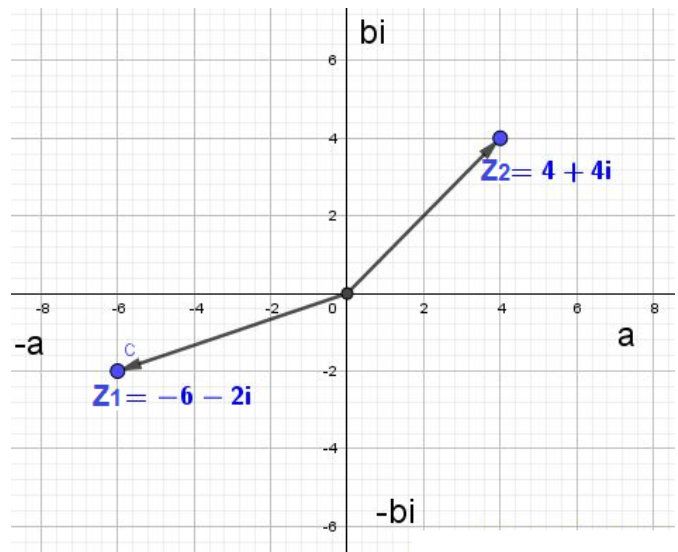
13. Pythagorean triples are triples of numbers (a, b, c) that satisfy the equation $a^2 + b^2 = c^2$ in that same order. For example, (3, 4, 5) is a Pythagorean triple because $3^2 + 4^2 = 5^2$. In which of the following tables are there Pythagorean triples?

(6, 8, 10)	(4, 5, 6)
(5, 12, 13)	(5, 6, 7)

(10, 8, 6)	(6, 5, 4)
(13, 12, 5)	(7, 6, 5)

ANSWER THE QUESTIONS 14 ACCORDING TO THE FOLLOWING INFORMATION

From the bank of a river, an observer sees the tip of a tree located on the other bank, at an angle of 60°. When you move away 20 meters, you observe it at an angle of 30°, as shown in the following figure:

To know the width of the river and the height of the tree, the trigonometric ratios and the system of equations shown below can be used:

$$Tan30^{\bullet} = \frac{\sqrt{3}}{3} \quad ; \quad Tan60^{\bullet} = \sqrt{3}$$

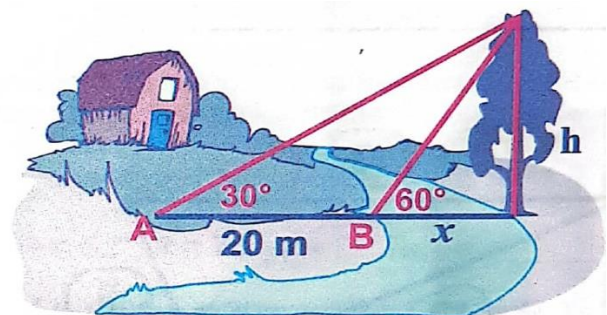$$\begin{cases} h = (20 + x)Tan30° \\ h = x\,Tan60° \end{cases}$$

14. Based on the above information, find the width of the river and the height of the tree.

ANSWER THE QUESTIONS 15 TO 19 ACCORDING TO THE FOLLOWING INFORMATION

On a football field, the line that marks the middle of the field is a straight line. Point A(0, 40) is on this line, and point B(90, 0) is on the same line.

15. What is the x-coordinate of point A?

16. What is the y-coordinate of point B?

17. What is the slope of the line that passes through points A and B?

18. Using the slope formula, what is the equation of the line passing through points A and B?

19. If a football player is in position C(45, 20), is he closer to the halfway line or one of the touchlines?

ANSWER THE QUESTIONS 20 TO 24 ACCORDING TO THE FOLLOWING INFORMATION

In a park, there is a fountain with a circular pool. The pool has a circumference of radius r = 5 meters and its center is at point C(3,4).

20. What is the radius of the circular pool?

21. What is the x-coordinate of the center of the pool?

22. What is the y-coordinate of the center of the pool?

23. Using the formula of the canonical equation of circumference, what is the equation of the pool?

24. If a child is standing at point D(6, 4), is he in or out of the pool?

25. A study is made on the number of days that the effect of a new drug lasts in patients suffering from chronic migraine, the data are shown in the following table. Find the measures of dispersion worked so far: range, variance, and standard deviation.

DAYS(X_I)	FREQUENCY (F_I)
0	100
1	250
2	300
3	500
4	450
5	2000

26. Based on the results, what can you conclude about the effectiveness of the drug? Explain your answer.

ANSWER THE QUESTIONS 27 ACCORDING TO THE FOLLOWING INFORMATION

A university in the country organizes a reunion for alumni, inviting the students of the first 4 decades since its foundation; the age of the alumni who

attended is distributed as shown in the following table:

AGE RANGE	F_i
50-54	7
54-58	10
58-62	16
62-66	2
66-70	18
70-74	11
74-78	8

Generación 1964

27. By determining the dispersion measures what can be concluded with respect to the attendees? At least 2 conclusions.

ANSWER THE QUESTIONS 28 ACCORDING TO THE FOLLOWING INFORMATION

A statistical study is made about the number of children that 100 women over the age of 20 have, obtaining the following data.

No. de hijos	No. de mujeres
0	13
1	20
2	25
3	20
4	11
5	7
6	4

28. Find the dispersion measures, develop your procedure in the following table and at the end you will find a space for you to write your conclusions.

ANSWER THE QUESTIONS 29 AND 30 ACCORDING TO THE FOLLOWING INFORMATION

The following frequency distribution table shows the average temperatures in Celsius for the month of July in the city of Medellín.

i	x_i	f_i	F_i	h_i	H_i
14 - 15	14, 5	4	4	0, 10	0, 10
16 - 17	16, 5	10	14	0, 25	0, 35
18 - 19	18, 5	15	29	0, 38	0, 73
20 - 21	20, 5	11	40	0, 28	1, 00

The values of the measures of central tendency and dispersion for this data distribution are also shown.

MEASURES OF CENTRAL TENDENCY		DISPERSION MEASURES	
arithmetic average	18,5	range	7
median	18,8	variance	3,57
mode	9,44	standard deviation	1,89

29. How dispersed are the data? Justify the answer.

30. Is the mean obtained in each data distribution reliable? Justify your answer.