Mathematics

Lesson plan
For

Third Preparatory

Second Term(

Teacher
Mr/ ... ...

Supervisor
Mr/

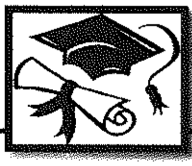
Principal
Mr.

Algebra

Lesson plan
For

Third preparatory

Second Term



Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Unit 1: Equations

First: Solving two equations of the first degree in two variables graphically

Obectives:

1) To solve an equation of first degree in two variables graphically.
2) To solve two equations of first degree in two variables graphically.

Previous requirement for student:

If $y - 3x = 2$ find three solutions for the equation.

Educational and technological resources:

Student book + Calculator + Active board.

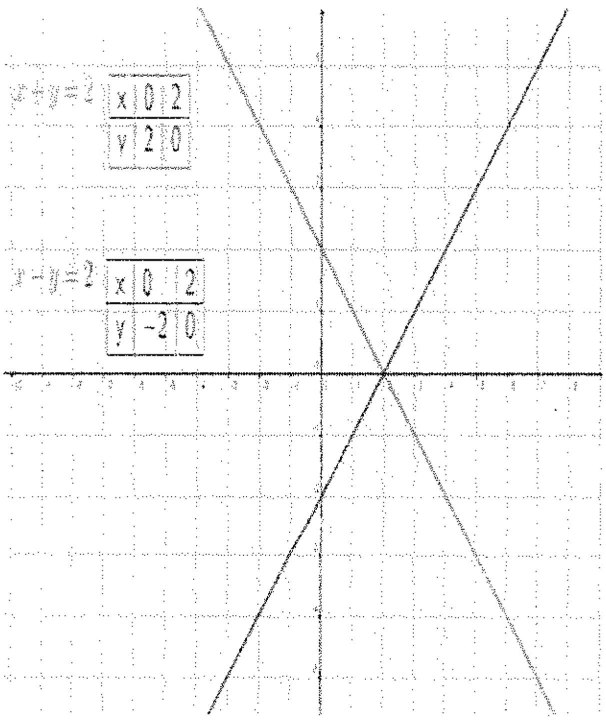
Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

1) Find the solution set of the following two equations graphically:

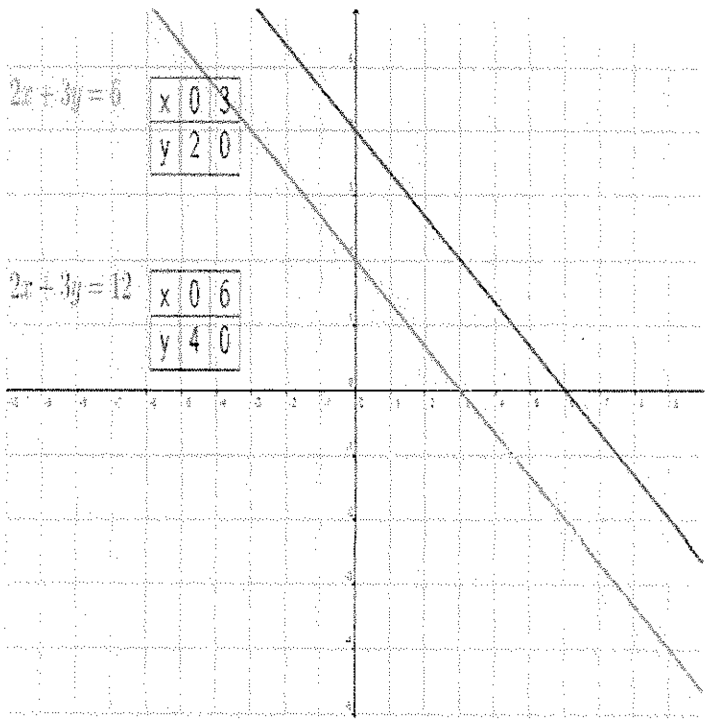
a) $L_1 : x + y = 2$, $L_2 : x - y = 2$



$L_1 \cap L_2$ at the point $(2, 0)$

$S.S. = \{(2, 0)\}$

b) $L_1 : 2x + 3y = 6$, $L_2 : 2x + 3y = 12$



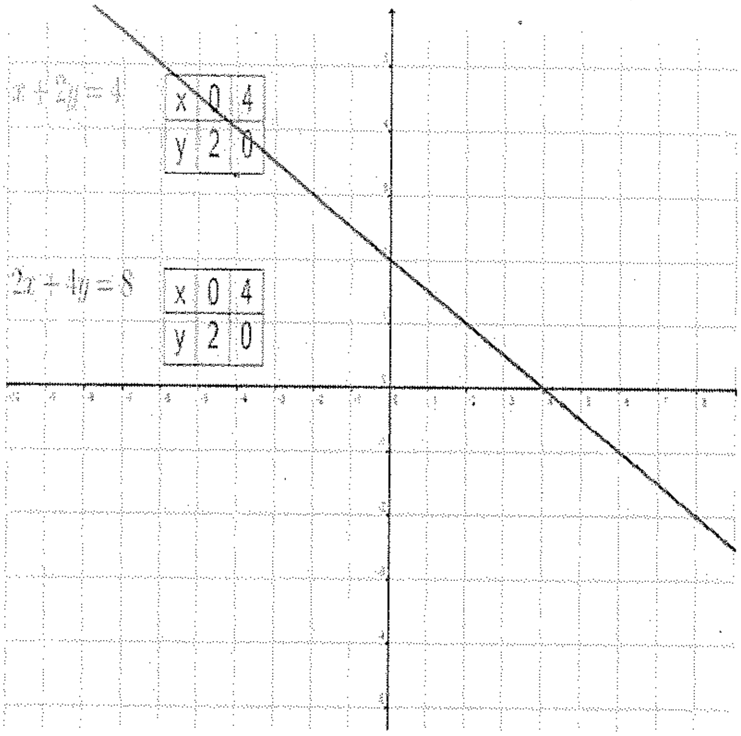
$L_1 // L_2$

$S.S. = \emptyset$

$L_1 : x + 2y = 4$, $L_2 : 2x + 4y = 8$

The two straight lines which represent the two equations are congruent.
The two equations have infinite number of solutions.

$S.S. = \left\{(x, y) : y = 2 - \frac{x}{2}\right\}$



Evaluation:

Find the solution set of the following two equations graphically:

$L_1 : x + y = 3$, $L_2 : x - y = 1$

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Student book page 4 Drill + page 5 Drill

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Second: Solving two equations of the first degree in two variables algebrically

Objective:

1) To Solve two equations of the first degree in two variables algebrically.
2) To find number of solutions of two equations of the first degree in two variables.

Previous requirement for student:

Complete:

If $2x - y = 3$ then then the coordinates of the intersection point with $y -$ axis is ...

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

Student book page **6**

Find the solution set of the two equations

$\mathbf{2x - y = 3}$ (1), $\mathbf{x + 2y = 4}$ (2)

Solution:

Substitution method

To use the **substitution method** to solve two equations:

1) Solve one equation for one variable.
2) Substitute this expression into the other equation.
3) Solve for the other variable.
4) Substitute the value of the known variable in the equation in Step 1.
5) Solve for the other variable.
6) Check the values in both equations.

From the equation (2), $x = 4 - 2y$ (3)

by substitution in the equation (1) $\therefore\ 2(4 - 2y) - y = 3$

$\therefore\ 8 - 4y - y = 3$ $\quad \therefore 8 - 5y = 3$ $\quad \therefore -5y = 3 - 8$ $\quad \therefore \frac{-5y}{-5} = \frac{-5}{-5}$ $\quad \therefore y = 1$

Substituting in equation (3) $\therefore\ x = 4 - 2 \times 1 = 2$

$\therefore$ The solution set of the two equations $= \{(2, 1)\}$

Check using both equations:

$2x - y = 3$, $2 \times 2 - 1 \stackrel{?}{=} 3$, $3 = 3$ ✓

$x + 2y = 4 , 2 + 2 \times 1 \stackrel{?}{=} 4 , 4 = 4 ✓$

Another solution

Elimination method

To use the **elimination method** to solve a system of linear equations:

1) Add or subtract the equations to eliminate one variable.
2) Solve the resulting equation for the other variable.
3) Substitute the value for the known variable into one of the original equations.
4) Solve for the other variable.
5) Check the values in both equations.

$2x - y = 3$ (1) , By multiplying the two sides of the equation(1) $\times$ 2

$x + 2y = 4$ (2)

$4x - 2y = 6$ (3)

Adding (2)and (3)

$\therefore 5x = 10 \quad \therefore x = \frac{10}{5} = 2$

Substituting in (1)

$\therefore 2 \times 2 - y = 3 \qquad \therefore 4 - y = 3$

$\therefore 4 - 3 = y \qquad \therefore y = 1$

$\therefore$ The solution set of the two equations $= \{(2, 1)\}$

Check using both equations:

$2x - y = 3 , 2 \times 2 - 1 \stackrel{?}{=} 3 , 3 = 3 ✓$

$x + 2y = 4 , 2 + 2 \times 1 \stackrel{?}{=} 4 , 4 = 4 ✓$

Example 2:

Find algebraically, the solution set of the following equations:

$3x + 4y = 24 \quad , x - 2y + 2 = 0$

Example 3:

What is the number of solutions of each pair in the following equations?

a) $x + 2y = 1 \quad , 2x + 3y = 12$

b) $4x - y + 7 = 0 \quad , 2y - 8x = 14$

c) $2x - 3y = 6 , y = \frac{2}{3}x + 3$

Evaluation:

Find algebraically, the solution set of the following equations:

$2x + y = 1 \quad , x + 2y = 5$

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Application on solving two equations of the first degree in two variables algebrically

Objective:

To Solving two equations of the first degree in two variables algebrically.

Previous requirement for student:

Find the values of a , b knowing that (3, −1) is the solution of the two equations $a x + b y - 5 = 0$, $3 a x + b y = 17$

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

1) Complete:

a) The solution set of the two equations $x + y = 0$, $y - 5 = 0$ is ....

b) The solution set of the two equations $x + 3 y = 4$, $3 y + x = 1$ is ....

c) The solution set of the two equations $4 x + y = 6$, $8 x + 2 y = 12$ is ....

d) If the two straight lines which represent the two equations $x + 3 y = 4$, $x + a y = 7$ are parallel, then a =.......

e) If there is only one solution for the two equations $x + 2 y = 1$ and $2 x + k y = 2$, then k cannot equal ....

2) Two acute angles in a right angled triangle . The difference between their measures is 10°. Find the measure of each angle.

3) A rectangle with a length more than its width by 5 cm. If the perimeter of the rectangle is42 cm , Find the area of the rectangle

4) Example 6: Student book page 7

A two − digit number of sum of its digits is 11. If the two digits are reversed, then the resulted number is 27 more than the original number.

What is the original number?

5) The sum of the ages of a man and his son is 55 years. If the man' sage is more than four times his son' sage by 5 years. Find the age of each of them.

Evaluation:

The sum of two natural numbers is 24 and their difference is 2.

Find the two numbers.

H. A. Student book page **8** Second and Third

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Second: Solving an equation of second degree in one unknown Graphically and algebrically

Objective:

To Solve an equation of second degree in one unknown Graphically

Previous requirement for student:

Solve the equation $x^2 - 4x + 3 = 0$.

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

First: the graphical solution:

To solve $a x^2 + b x + c = 0$ graphically we follow the steps:

1) We draw the function curve of $f(x) = a x^2 + b x + c$ where $a \neq 0$.

2) Identify the set of x coordinates of the points of intersection of the function curve with the x – axis, thus we get the solution of the equation.

Example 1:

Draw the graphical representation of the function f where $f(x) = x^2 - x - 2$ in the interval $[-2, 3]$.

From the drawing, find

a) The coordinates of the vertex point of the curve.

b) The equqtion of axis of symmetry of the curve.

c) The maximum value or the minimum value of the function

d) The solution set of the equation $x^2 - x - 2 = 0$

Evaluation:

Draw the graphical representation of the function f where $f(x) = x^2 - 4x + 3$ in the interval $[-1, 5]$.

From the drawing, find

a) The coordinates of the vertex point of the curve.

b) The equqtion of axis of symmetry of the curve.

c) The maximum value or the minimum value of the function

d) The solution set of the equation $x^2 - 4x + 3 = 0$

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Second: The algebraic solution by using the general rule:

Objective:

To Solve an equation of second degree in one unknown algebrically using general rule.

Previous requirement for student:

Solve the equation $x^2 - x - 6 = 0$.

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

You can solve an equation of second degree: $a x^2 + b x + c = 0$

where a, b and $c \in R$, $a \neq 0$, using the rule $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Notes:

1) $b^2 - 4ac$ is called discriminant of the equation $a x^2 + b x + c = 0$.

2) If $b^2 - 4ac = 0$ then the equation has two equal real roots which are $\dfrac{-b}{2a}$

2) If $b^2 - 4ac < 0$ *then the equation has tno real roots and* $S.S. = \emptyset$

2) If $b^2 - 4ac > 0$ *then the equation has two different real roots which are* $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Examples

1) Find the solution set of the equation $3x^2 = 5x - 1$ rounding the results to two decimal places.

2) In a disk throwing race the path way of the disk to one of the players follows the relation: $y = -0.043x^2 + 4.9x + 13$ where x represents the horizontal distance in meters, y represents the disk height from the floor surface. Find the horizontal distance at which the disk falls to the nearset hundredths.

3) Find the solution set of the equation $x + \dfrac{4}{x} = 6$ rounding the results to three decimal places.

4) Find the solution set of the equation $(x - 3)^2 - 5x = 0$ rounding the results to three decimal places.

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Evaluation:

Find the solution set of the equation $2x^2 - 4x + 1 = 0$ rounding the results to three decimal places.

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Solving two equations in two variables, one of them is of the first degree and the other is of the second degree

Objective:

To Solve two equations in two variables, one of them is of the first degree and the other is of the second degree

Previous requirement for student:

Solve the equation $2x^2 - x = 0$.

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

Solve the first degree equation for one variable in terms of second variable ; then substitute for this variable in the second degree equation to obtain an equation that involves second variable alone and solve that equation.

Examples

1) Find algebraically the solution set of the two equations:

$x^2 + y^2 = 10 , 2x + y = 1.$

$$S.S. = \left\{(-1,3), \left(\frac{9}{5}, \frac{-13}{5}\right)\right\}$$

2) A rectangle of a perimeter 14 cm and area 12 cm^2. Find its two dimensions.

3) Find algebraically the solution set of the two equations:

$x - y = 0 , xy = 4.$

4) For a rhombus, the difference between the lengths of its diagonals equals 4cm and its perimeter is 40cm, find the lengths of the diagonals.

Evaluation:

Find algebraically the solution set of the two equations:

$x - 2y = 8 , y^2 = x.$

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Unit test

Objective:

To Solve two equations in two variables, one of them is of the first degree and the other is of the second degree

Previous requirement for student:

Solve the equation $2x^2 - x = 0$.

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

Find the solution set of the following equations:

A) $x + 3y = 7$ and $5x - y = 3$ graphically and algebraically

B) $x^2 - 4x + 1 = 0$ using the rule, rounding the sum to nearest hundredths.

C) $y - x = 3$ and $x^2 + y^2 - xy = 13$

2) Draw the graphical representation of the function f where $f(x) = x^2 - 2x - 1$ in the interval $[-2, 4]$.

From the drawing, find

a) The coordinates of the vertex point of the curve.

b) The equqtion of axis of symmetry of the curve.

c) The maximum value or the minimum value of the function

d) The solution set of the equation $x^2 - 2x - 1 = 0$

3) The sum of two numbers is 90 and their product is 2000. Find the two numbers.

4) A bike rider moved from city A in the direction of east to city B. From city B, he moves north to city C to travel a distance of 14 km. If the sum of the squares of the traveled distance is 100 km^2. Find the shortest distance between city A and C.

5) When a dolphin jumps water surface, its pathway follows the relation:

$y = -0.2x^2 + 2x$ where y is the height of the dolphin above water and x is the horizontal distance in feet. Find the horizontal distance that the dolphin covers when it jumps from water.

H. A

Revision Sheet

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Set of zeroes of a polynomial function

Objective:

To find Set of zeroes of a polynomial function

Previous requirement for student:

Solve the equation $x^2 - 5x + 4 = 0$.

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

If f: R $\longrightarrow$ R is a polynomial in x, then the set of values of x which makes f (x) = 0 is called the set of zeroes of the function f and its denoted by the symbol **z (f)**.

z (f) is the solution set of the equation f (x) = 0

In general, to get the zeros of the function f, put f(x) = 0 and solve the resulted equation to find the set of values of x.

Examples

1) **Find z(f)** for each of the following polynomials :

1) **f(x)** = $2x - 4$

2) **f(x)** = $x^2 - 9$

3) **f(x)** = 5

4) **f(x)** = 0

5) **f(x)** = $x^2 + 4$

6) **f(x)** = $x^6 - 32x$

7) **f(x)** = $x^2 + x + 1$

2) If **z(f)** = {2}, f(x) = $x^3 - m$, then find the value of m.

3) If the set of zeroes of the function f where f(x) = $a x^2 + b x + 15$ is {3, 5}.

Find the values of a and b

Evaluation:

Find z(f) for each of the following polynomials:

1) f(x) = $x^2 - 25$ 2) f(x) = $x^2 - 7x$ 3) f(x) = $x^3 - 4x$

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Algebraic fractional function

Objective:

1) To recognize the Algebraic fractional fractional .

2) To find the the domain of algebraic of Algebraic fractional function.

3) To identify the common domain of two or more algebraic fractional functions.

Previous requirement for student:

Find z(f) for $f(x) = 2x^2 - x$.

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

$\frac{a}{b} \in \mathbb{R}$ if $b \neq 0$

$n(x) = \frac{x-1}{x+2}$ is called an algebraic fractional function or an algebraic fraction ,

The domain of $n = \mathbb{R} - \{-2\}$

If p and f are two polynomial functions and **z(f)** is the set of zeroes of f, then the function n where n : R - **z (f)** $\longrightarrow \mathbb{R}$,

Note:

1) $n(x) = \frac{p(x)}{f(x)}$ is called real algebraic fractional function or briefly called an algebraic fraction.

2) The domain of algebraic fractional function = $\mathbb{R}$ - the set of zeroes of the denominator.

Example 1:

Identify the domain of each of the following algebraic fractional function then *find* n (0), n (2), n (-2):

a) $n(x) = \frac{x+3}{4}$ b) $n(x) = \frac{x-2}{2x}$ c) $n(x) = \frac{1}{x+2}$

d) $n(x) = \frac{x^2+9}{x^2-16}$ e) $n(x) = \frac{x^2+1}{x^2-x}$ f) $n(x) = \frac{x^2-1}{x^2+1}$

Example 2:

If the domain of the function n: $n(x) = \frac{x-1}{x^2 - ax + 9}$ is R - {3} *then find* the value of a.

The common domain of two or more algebraic fraction:

If n_1 and n_2 are two algebraic fractions, and if the domain of $n_1 = R - X_1$ *(where X_1, the set of zeroes of the denominator of n_1) of the domain* $n_2 = R - X_2$ *(where X_2, the set of zeroes of the denominator of n_2)*

then the common domain of the two fractions n_1 and n_2 $= R - (X_1 \cup X_2)$

$= R$ *- the set of zeroes of the two denominators of the two fractions.*

$\therefore$ *the common domain of a number of algebraic fractions*

$= R$ *- the set of zeroes the denoinators of these fractions*

Example 3:

If n_1 , n_2 are two algebraic fractions where:

$n_1(X) = \dfrac{1}{x-1}$, $n_2(X) = \dfrac{3}{x^2-4}$ *then calculate* the common domain of n_1 , n_2

Evaluation:

Find the common domain for each of the following :

1. $n_1(X) = \dfrac{1}{x}$, $n_2(X) = \dfrac{2}{x+1}$
2. $n_1(X) = \dfrac{3}{x^2-x}$, $n_2(X) = \dfrac{2x-3}{x^2-1}$
3. $n_1(X) = \dfrac{3}{x-2}$, $n_2(X) \dfrac{5}{x+2}$, $n_3(X) = \dfrac{x}{x^3-4x}$
4. $n_1(X) = \dfrac{x^2-4}{x^2-5x-6}$, $n_2(X) = \dfrac{5x}{x^2-x}$, $n_3(X) = \dfrac{x^2-3x-4}{x^2-x-2}$

H. A.

Student book page **22 Exercise 2 = 2 all**

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Equality of two algebraic fractions

Objective:

1) To reduce the algebraic fraction

2) To recognize the equality of two algebraic fraction.

3) To determine when two algebraic fractions are equal

Previous requirement for student:

Find the common domain to the sets of the following algebraic fractions:

$\frac{x^2 - 4}{x^2 - 5x + 6}$, $\frac{7}{x^2 - 9}$, $\frac{x^2 - 3x - 4}{x^2 - x - 2}$

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

Reducing the algebraic fraction

If n is an algebraic fraction where : $n(x) = \frac{x^2 + x}{x^2 - 1}$

Complete :

1. The domain of n = ...
2. The common factor between the numerator and denominator after factorizing both of them perfect facterization is ....≠zero where x doesn't take the value of ....
3. The algebraic fraction in the simplest form after removing the common factor = ...
4. Does the domain of the algebraic fraction change after putting it in the simplest form ?

Example 1:

If $n(x) = \frac{x^3 + x^2 - 6x}{x^4 - 13x^2 + 36}$ then reduce n(x) in the simplest form showing the domain of n.

Equality of two algebraic fractions to be equal

Find $n_1(x)$ and $n_2(x)$ in the simplest form showing the domain of each of the following :

1 $n_1(x) = \dfrac{x+3}{x^2-9}$, $n_2(x) = \dfrac{2}{2x-6}$

2 $n_1(x) = \dfrac{2x}{2x+4}$, $n_2(x) = \dfrac{x^2+2x}{x^2+4x+4}$

Does $n_1 = n_2$ in each case ? Explain your answer.

It is said that the two algebraic fractions n_1 and n_2 are equal(i.e : $n_1 = n_2$) if the two following conditions are satisfied .

the domain of n_1 = the domain of n_2 , $n_1(x) = n_2(x)$ for each $x \in$ the common domain.

Example 2:

If $n_1(x) = \dfrac{x^2}{x^3-x^2}$, $n_2(x) = \dfrac{x^3+x^2+x}{x^4-x}$ prove that : $n_1 = n_2$

Example 3:

If $n_1(x) = \dfrac{x^2-4}{x^2+x-6}$, $n_2(x) = \dfrac{x^3-x^2-6x}{x^3-9x}$

prove that $n_1(x) = n_2(x)$ for the values of x which belong to the common domain and find the domain.

Evaluation:

Complete the following :

1. The simplest form of the function $f(x) = \dfrac{4x^2-2x}{2x}$, $x \neq 0$ is ....
2. The common domain of the function n_1 , n_2 where $n_1(x) = \dfrac{x-2}{x^2-4}$, $n_2(x) = \dfrac{1}{x+1}$ is ....
3. If $n_1(x) = \dfrac{1+a}{x-2}$, $n_2(x) = \dfrac{4}{x-2}$ and $n_1(x) = n_2(x)$ then a = ...
4. If the simplest form of the algebraical fraction $n(x) = \dfrac{x^2-4x+4}{x^2-a}$ is $n(x) = \dfrac{x-2}{x-2}$ then a = ...
5. If $n_1(x) = \dfrac{-7}{x+2}$, $n_2(x) = \dfrac{x}{x-k}$ and the common domain of two function n_1 . n_2 is R - {-2 , 7} then k = ...

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Student book pages **27 and 28 Exercise 2 = 3 all**

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Operations on algebraic fractions

First : Adding and subtracting the algebraic fractions

Objective:

1) To add the algebraic fractions

2) To subtract the algebraic fractions.

Previous requirement for student:

In each of the following prove that : $n_1 = n_2$

1) $n_1(x) = \frac{1}{x}$, $n_2(x) = \frac{x^2+4}{x^3+4x}$

2) $n_1(x) = \frac{x^3+x}{x^3+x^2+x+1}$, $n_2(x) = \frac{x}{x+1}$

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

If $x \in$ the common domain of the two algebraic fractions n_1, n_2 where:

1 $n_1(x) = \frac{f_1(x)}{f_2(x)}$, $n_2(x) = \frac{f_3(x)}{f_2(x)}$

(two algebraic fractions having a common denominator)

then: $n_1(x) + n_2(x) = \frac{f_1(x)}{f_2(x)} + \frac{f_3(x)}{f_2(x)} = \frac{f_1(x) + f_3(x)}{f_2(x)}$,

$n_1(x) - n_2(x) = \frac{f_1(x)}{f_2(x)} - \frac{f_3(x)}{f_2(x)} = \frac{f_1(x)}{f_2(x)} + \frac{-f_3(x)}{f_2(x)}$

2 $n_1(x) = \frac{f_1(x)}{f_2(x)}$, $n_2(x) = \frac{f_3(x)}{f_4(x)}$

(two algebraica fractions having two different denominators)

then: $n_1(x) + n_2(x) = \frac{f_1(x)}{f_2(x)} + \frac{f_3(x)}{f_4(x)}$

$= \frac{f_1(x) \times f_4(x) + f_3(x) \times f_2(x)}{f_2(x) \times f_4(x)}$,

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Second : Multiplying and Divding the algebraic fractions

Objective:

1) To Multiply the algebraic fractions

2) To divide the algebraic fractions.

Previous requirement for student:

Find n(x) in the simplest form showing the domain of n :

$$n(x) = \frac{x^2 - 8x + 12}{x^2 - 4x + 4} \div \frac{x^2 - 4x - 5}{x^2 - 7x + 10}$$

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

2) Cooperative learning.

Educational steps:

For each algebric fraction n (x) ≠ 0, there is a multiplicative inverse. It is the reciprocal of the fraction and denoted by $n^{-1}(X)$.

If $n(X) = \frac{x-2}{x+5}$, then $n^{-1}(x) = \frac{x+5}{x-2}$ where the domain of n = R - {-5}, the domain of n^{-1} = R-{-2, -5} and then $n(X) \times n^{-1}(X) = 1$

If n_1, n_2 are two algebraic fractions where:

$n_1(x) = \frac{f_1(x)}{f_2(x)}$, $n_2(x) = \frac{f_3(x)}{f_4(x)}$ *then :*

1 $n_1(x) \times n_2(x) = \frac{f_1(x)}{f_2(x)} \times \frac{f_3(x)}{f_4(x)} = \frac{f_1(x) \times f_3(x)}{f_2(x) \times f_4(x)}$

where x ∈ the common domain of the two algebraic fractions n_1, n_2 i.e R - (Z (f_2) ∪ Z (f_4))

2 $n_1(x) \div n_2(x) = \frac{f_1(x)}{f_2(x)} \div \frac{f_3(x)}{f_4(x)} = \frac{f_1(x)}{f_2(x)} \times \frac{f_4(x)}{f_3(x)}$

then, the domain of $n_1 \div n_2$ is the common domain of n_1, n_2, n_2^{-1} i.e R - (Z(f_2) ∪ Z(f_3) ∪ Z(f_4))

Example 1:

If $f(x) = \dfrac{x+1}{x^2 - x - 2} \times \dfrac{x^2 + 3x - 10}{3x^2 + 16x + 5}$

then find f(x) in the simplest form and identify its domain, then find f(0) , f(-1) if possible.

Example 2:

If $f(x) = \dfrac{x^2 - 9}{2x^2 + 3x} \div \dfrac{3x^2 + 6x - 45}{4x^2 - 9}$

then find n(x) in the simplest form showing the domain of n .

Evaluation:

Find n(x) in the simplest form identifying a domain in each of the following :

1. $n(x) = \dfrac{x^2 + x + 1}{x} \times \dfrac{x^2 - x}{x^3 - 1}$

2. $n(x) = \dfrac{x^3 - 1}{x^2 - x} \times \dfrac{x + 3}{x^2 + x + 1}$

3. $n(x) = \dfrac{3x - 15}{x + 3} \div \dfrac{5x - 25}{4x + 12}$

4. $n(x) = \dfrac{x^2 + 2x - 3}{x + 3} \div \dfrac{x^2 - 1}{x + 1}$

H. A.

Student book page 33 **Exercise 2 = 4 from 6 to 10**

اكتب في جوجل mozkratgahza

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Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3rd Prep.

Unit Test

Objective:

1) To reduce the algebraic fraction
2) To determine when two algebraic fractions are equal
3) To add the algebraic fractions
4) To subtract the algebraic fractions.
5) To Multiply the algebraic fractions
6) To divide the algebraic fractions.

Previous requirement for student:

Find n(x) in the simplest form showing the domain of n :

$$n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} \div \frac{2x - 10}{x^2 - 6x + 9}$$

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

First: Complete the following :

1. The simplest form of the function f, where $f(x) = \frac{3x}{x+1} \div \frac{x}{x+1}$ is .... and its domain is ....

2. If the algebraic fraction $\frac{x-a}{x-3}$ has a multiplicative inverse of $\frac{x-3}{x+2}$ then a = ...

3. If $n_1(x) = \frac{x+1}{x-2}$, $n_2(x) = \frac{x^2+x}{x^2-2x}$ then the common domain in which $n_1 = n_2$ is .....

Second:

1. Find the common domain for which $f_1(x)$ and $f_2(x)$ are equal, where :
$f_1(x) = \frac{x^2 + x - 12}{x^2 - 5x + 4}$, $f_2(x) = \frac{x^2 - 2x - 3}{x^2 + 2x + 1}$

2. If : $f(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x+7}{x-2}$ then find n (x) in the simplest form and identify its domain and find f(1).

3 If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ prove that $n_1 = n_2$

4 If the domain of the function n where $n(X) = \frac{b}{x} + \frac{9}{x + a}$ is R- {0, 4}, n (5) = 2 find the values of a, b.

5 Find the function in its simplest form and identify its domain :

first: $n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$ **second :** $n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$

6 If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 - 2)}$

first: find $n^{-1}(x)$ and identify its domain. **second:** if $n^{-1}(x) = 3$ what is the value of x.

H. A.

Student book pages 144 and 145

اكتب في جوجل mozkratgahza

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Unit 3 Probability

Objective:

1) To do operations on events (intersection and union).

2) To recognize mutually exclusive events.

Previous requirement for student:

A regular dice is rolled once randomly and the upper face is observed as:

1. Sample space (S) = {......, ..., ..., ..., ..., ...}.
2. The event of having 7 is .... and the event is called .... and the probability of appearnce = ...
3. The event of getting a number less than 9 is .... and the event is called .... and the probability of appearance = ...
4. The event of getting a prime even number is .... and it is a subset of .... and the probability of occurrance = $\frac{\cdots\cdots}{\cdots\cdots}$

Educational and technological resources:

Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.

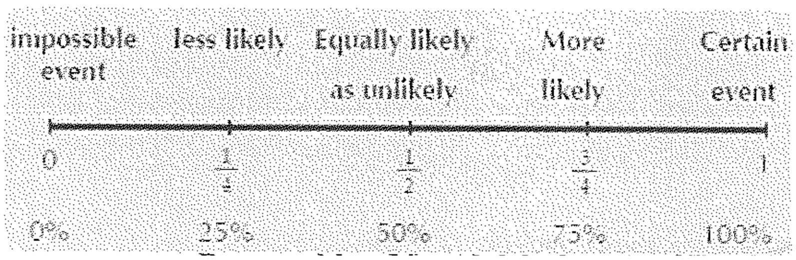
2) Cooperative learning.

Educational steps:

If A is an event of S i e A ⊂ S then $P(A) = \frac{n(A)}{n(S)}$

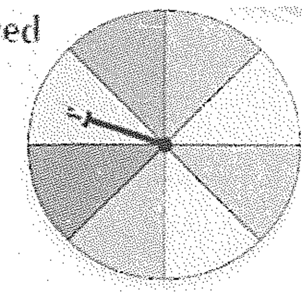
where n (A): number of elements of the event A, n (S) is the number of elements of sample space S, and P (A) is the probability of occuring event (A)

we notice that: probability can be written as a fraction or percentage as follows:



Examples:

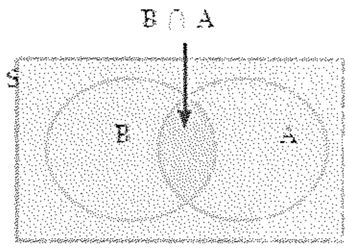
1. A box contains 3 white balls and 4 red balls. If a ball is randomly drawn, then calculate the probability that the ball drawn is .....:
   - A) white.
   - B) white or red.
   - C) blue.



2. The opposite figure is a spinner divided into eight equal colored sectors *Find* the probability that the indicater stops on :
   - A) the green color.
   - B) the yellow color.
   - C) the blue color.

Operations on events :

First: intersection



If A and B are two events from a sample space (S), then the intersection of the two events A and B which are denoted by the symbol $A \cap B$ means the events A and B occur together.

Note that : **It is said that an event occured if the outcome of the experiment is an element of the elements of the set expressing this event.**

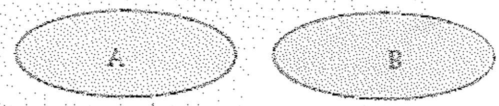
Example 1:

A set of identical cards numbered from 1 to 8 with no repetition mixed up and well, if a card is drawn randomly.

1. write down the sample space.
2. write down the following events.
   - A) Event A : The drawn card has an even number.
   - B) Event B : The drawn card has a prime number.
   - C) Event C : The drawn card has a number divisible by 4.
3. Use Venn diagram to calculate the probability of:
   - A) occurring A and B together.
   - B) occurring A and C together.
   - C) occurring B and C together.

Mutually exclusive events:

It is said that A and B are mutually exclusive events if $A \cap B = \phi$



and it is said that a set of events are mutually exclusive if every pair is mutually exclusive.

Evaluation:

A regular dice is rolled once :

1. Write down the sample space.
2. Write the following events :
   a. A = the event of getting an even number.
   b. B = the event of getting an odd number.
   c. C = the event of getting an a prime even number.
3. Find the following probabilities of :
   a. The occurrence of two events A and B together.
   b. The occurrence of two events A and C together.

Second : union

Example 2:

9 identical cards numbered from 1 to 9 a card was drawn randomally

first Write down the sample space.

second Write down the following events :

A. Getting a card with an even number .

B. Getting a card with an even a number divisible by 3.

C. Getting a card with an even a prime number greater than by 5.

third use the venn diagram to calculate the probability of:

a. Occurrence of A or B

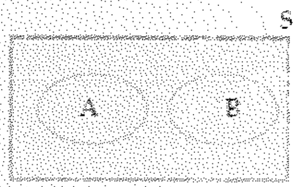
b. Occurrence of A or C

c. Find $P(A) + P(B) - P(A \cap B)$, $P(A \cup B)$ what do you notice ?

Remark: From the opposite figure, A and B are mutually exclusive events from the sample space S,

then $A \cap B = \phi$

$$P(A \cap B) = \frac{\text{number of elements of } \phi}{\text{number of elements of } S} = \frac{\text{Zero}}{\text{number of elements of } S} = \text{Zero}$$



if A and B are two mutually exclusive events then $P(A \cup C) = P(A) + P(C)$

Evaluation:

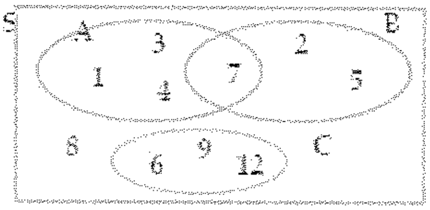
1. If A and B are two events in the sample space of a random experiment : Complete

A) $P(A) = 0.2$
$P(B) = 0.6$
$P(A \cap B) = 0.3$
$P(A \cup B) = ...$

B) $P(A) = 0.55$
$P(B) = \frac{3}{10}$
$P(A \cap B) = ...$
$P(A \cup B) = \frac{13}{20}$

C) $P(A) = ...$
$P(B) = \frac{1}{4}$
$P(A \cap B) = \text{zero}$
$P(A \cup B) = 0.9$

2. use the venn opposite diagram to find :



A) $P(A \cap B)$, $P(A \cup B)$

B) $P(A \cap C)$, $P(A \cup C)$

C) $P(B \cap C)$, $P(B \cup C)$

H. A.

Student book pages 40 and 41

Date	Domain	Time	Period	Class
/ / 201	Algebra	Min.		3^{rd} Prep.

Complementary event and difference between two events

Objective:

1) To recognize Complementary event and difference between two events.
2) To solve exercises on complementary event and difference between two events.

Previous requirement for student:

If A, and B are two events from a sample space of a random experiment, and

$P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$

then find P (A) If:

A) A, and B are mutually exclusive events. B) $B \subset A$

Educational and technological resources:

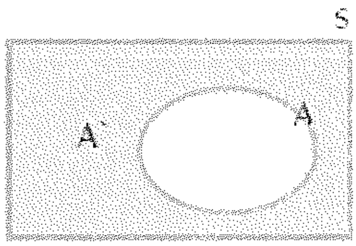
Student book + Calculator + Active board.

Learning strategies:

1) Brain storming.
2) Cooperative learning.

Educational steps:

in the venn diagram opposite :



If S is the universal set, $A \subset S$

then the complementery set of A is A`

complete:

1) $A \cup A`$ = ........ , $A \cap A`$ = ...

2) If S = {1, 2, 3, 4, 5, 6, 7} A = {2, 4, 6} then: A` = {............}.

The complementary event :

The complementary event to an event A is the event of not occurring A.

If $A \subset S$ then A` is the complementary event to event A where $A \cup A` = S$, $A \cap A` = \emptyset$

Then the event and the complementary event are two mutually exclusive events.

Example 1:

If S the sample space of a random experiment , $A \subset S$, A` is the complementry event to the event A and S = {1, 2, 3, 4, 5, 6}.

Complete the following table and record your observation.

event A	event A`	P (A)	P (A`)	P (A) + P (A`)
{2, 4, 6}				
	{3, 6}			
{5}				
{1, 2, 3, 4, 5, 6}				

Note:

1) P (A) + P (A`) = 1 then: P (A`) = 1 - P (A) , P (A) = 1 - P (A`)

2) P (A) + P (A`) = P (S) = 1

Example 2:

A classroom contains 40 students. 16 of them read Al-Akhbar newspaper, 15 read Al Ahram news paper and 8 read both newspapers. If a student is selected randomly calculate the probability that the student :

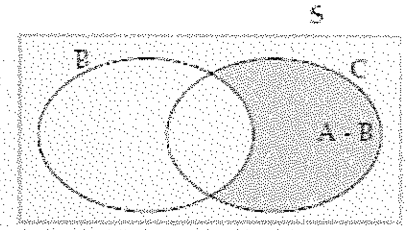
A reads Al-Akhbar newspaper

B doesn't read Al-Akhbar newspaper

C reads Al-Ahram newspaper

D reads both newspaper.

Notice that : the event of reading Al Akhbar newspaper is represented by venn opposite diagram by set A while the event of reading Al Akhbar only but not other newspaper is represented by the set A - B and read as A difference B



The difference between two events

If A, B are events of s, then A-B is the event of the occurrence of A and the non-occurrence of B, i.e., the occurrence of the event A only. Note that : (A - B) ∪ (A ∩ B) = A

In the previous example Find 1 the probability that the student reads Al - Akhbar newspaper only.

2 the probability that the student reads Al - Ahram newspaper only.

3 the probability that the student reads Al - Akhbar only or Al - Ahram only.

Evaluation:

45 students participated in some sports activity, 27 of them are members in the school football team, 15 in basketball team and 9 in both football and basketball team. A student is randomly selected. Represent this situation using a venn diagram, then find the probability that the selected student is :

A a member in the football team.

B a member in the basketball team.

C a member in the basketball team and football team.

D a member does not participate in any team.

H. A.

Student book page 44

Geometry

Lesson plan
For

Third preparatory

Second Term(   )

Grade	Domain	Title	Time	Period	Date	Place
2^{nd} prep	*Alg.*	Basic Definitions and Concepts				

lesson objectives

At the end of this lesson The student should be able to:

1)The basic concepts related to the circle.
2)The concept of axis of symmetry in the circle.

learning tools & resources

Colored pens, white board ,schoolbook ,.....................

Previous experience

drawing circles

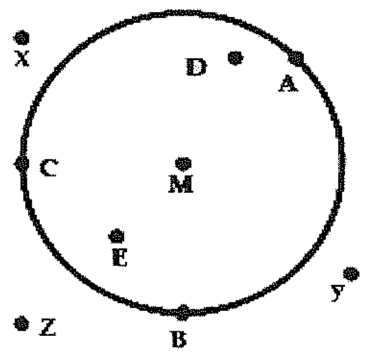
Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

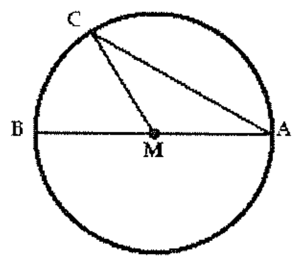
lesson activities

The circle: is the set of points of a plane which are at constant distance from a fixed point in the same plane. The fixed point is called the centre of the circle and the constant distance is called the radius length.

1. The set of points inside the circle like points: M, D, E, ...
2. The set of points on the circle like points: A, B, C, ...
3. The set of points outside the circle like points: X, Y, Z, ...



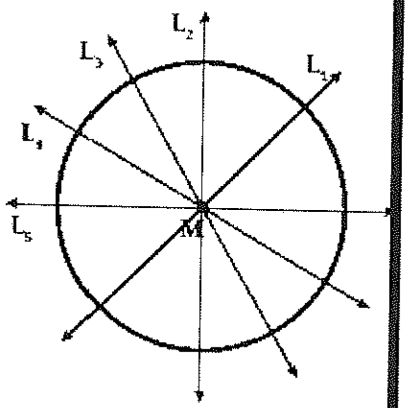
Surface of the circle: set of points of the circle ∪ the set of points inside the circle.



Radius of a circle: is a line segment with one endpoint at the center and the other endpoint on the circle.

The chord: is a straight segment whose end points are any two points on the circle.

Diameter: is the chord passing through the center of the circle.



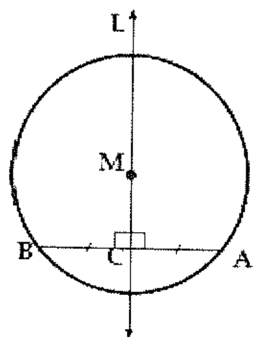
Any straight line passing through the center of a circle is an axis of symmetry of it.

Important corollaries

the straight line passing through the center of the circle and the midpoint of any chord of it is perpendicular to this chord.

the straight line passing through the center of a circle and perpendicular to any chord of it bisects this chord.

the perpendicular bisector of any chord of a circle passes through the center of the circle.

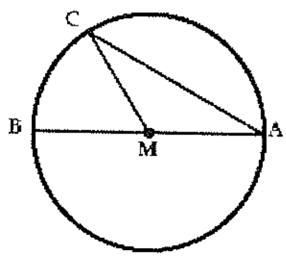


Performance assessment

1) What are the number of diameters in any circle?

2) What is the number of axes of symmetry in the circle?

3) To prove that the diameter of a circle is its largest chord in length, complete:
In the triangle A M C : AM + MC > ....
In circle M: CM = BM (radii)
Thus: AM + ... > .... ` AB > ....



4) If the radius length of a circle = r then the diameter length = ... perimeter
of the circle = ..., area of the circle = ...

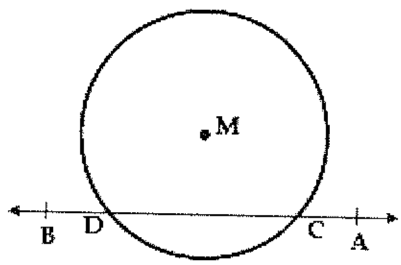
5)

In the figure opposite, complete:

$\overleftrightarrow{AB}$ ∩ circle M = ...

$\overleftrightarrow{AB}$ ∩ surface of circle M = ...

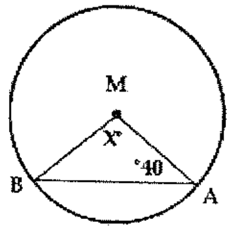
M ∉ circle M, M ∈ ....



Enhancement activities

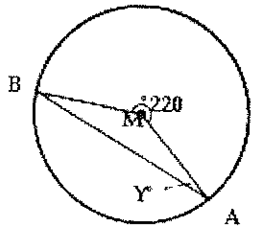
In each of the following figures find the value of the used symbol in measuring:

a



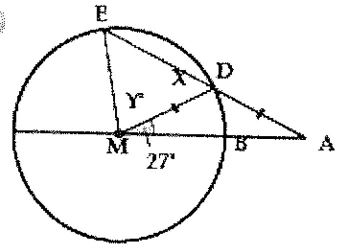
X = ...

b



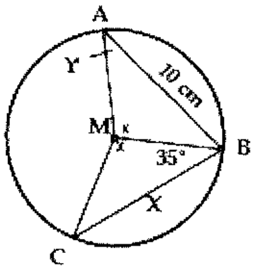
X = ...

c



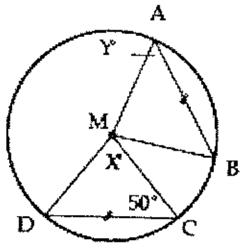
X = ..., Y = ...

d



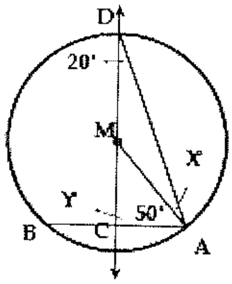
X = ..., Y = ...

e



X = ..., Y = ...

f



X = ..., Y = ...

Home work :schoolbook page 55 no 1

Grade	Domain	Title	Time	Period	Date	Place
2^{nd} prep	*Alg.*	EX. on Basic Definitions and Concepts				

lesson objectives

At the end of this lesson The student should be able to :

1) Solve exercises on the basic concepts related to the circle.

learning tools & resources

Colored pens, white board ,schoolbook ,......................

Previous experience

Basic Definitions and Concepts

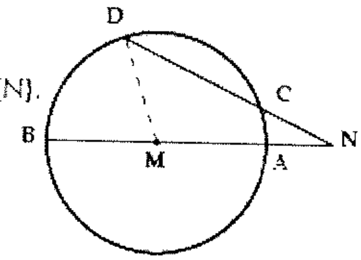
Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

Ex 1

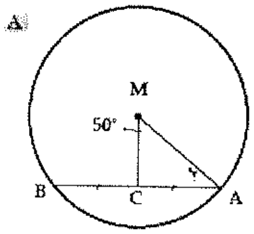
In the figure opposite: $\overline{AB}$ is a diameter in circle M. $\overrightarrow{BA} \cap \overrightarrow{DC} = \{N\}$.
Prove that: NB > ND



Ex 2

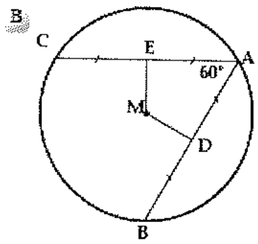
M circle in each of the following figures complete:

A



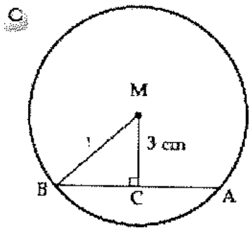
m (∠ M A C) = ...

B



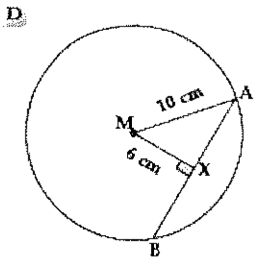
m (∠ D M E) = ...

C



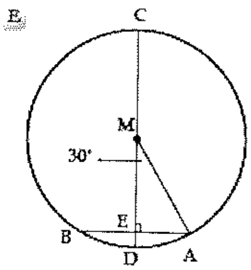
If A B = 8 cm
then M B = ...

D



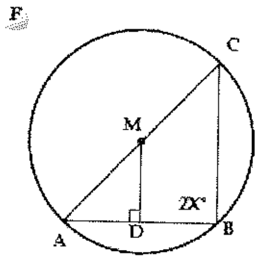
A B = ...

E



If A B = 10 cm
then C D = ...

F

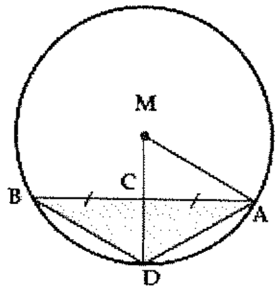


X = ...

Ex 3

In the figure opposite : M circle with radius length 13 cm, $\overline{AB}$ is a chord of length 24 cm, C is the midpoint of $\overline{AB}$, $\overrightarrow{MC} \cap$ circle M = {D}

Find the area of the triangle A D B.



Ex 4

$\overline{AB}$ and $\overline{CD}$ are two parallel chords in circle M. AB = 12 cm, CD = 16 cm. Find the distance between those two chords if the radius length of circle M equals 10 cm.

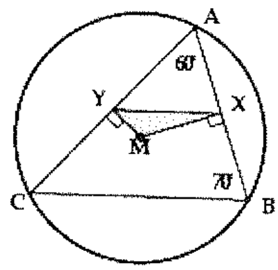
Enhancement activities

Ex 5

In the figure opposite: In circle M, $\overline{MX} \perp \overline{AB}$, $\overline{MY} \perp \overline{AC}$,

m ($\angle$ A) = 60°, m ($\angle$ B) = 70°

Find : the measures of the angles of the triangle M X Y



Home work :schoolbook page 55 no 2.

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Grade	Domain	Title	Time	Period	Date	Place
		EX. on Basic Definitions and Concepts				

lesson objectives

At the end of this lesson The student should be able to :
1) Solve exercises on the basic concepts related to the circle
2) Solve exercises on the concept of axis of symmetry in the circle.

learning tools & resources

Colored pens, white board ,schoolbook ,....................

Previous experience

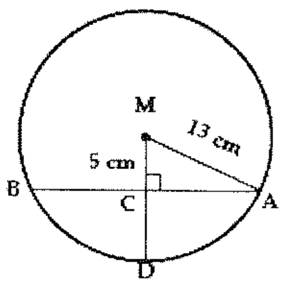
Basic Definitions and Concepts

Teaching Strategy

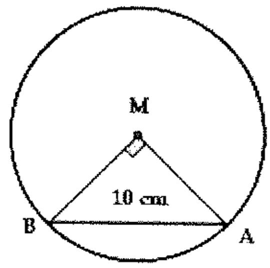
Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

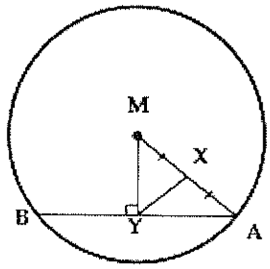
Ex 1 M circle is in each of the following figures. complete:

A


A B = ...
C D = ...

B


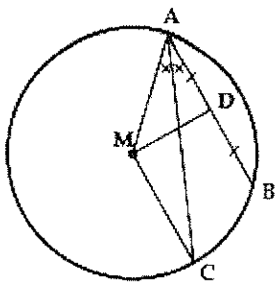
m (∠ A) = ...
M A = ...

C


XY = 7 cm, $\pi = \frac{22}{7}$
Area of the circle = ... cm²

Performance assessment

Ex 2 **In the figure opposite:** $\overline{AB}$ is a chord of circle M,
$\overrightarrow{AC}$ bisects ∠ B A M and intersects circle M at C.
IF D is the midpoint of $\overline{AB}$
Prove that : $\overline{DM} \perp \overline{CM}$

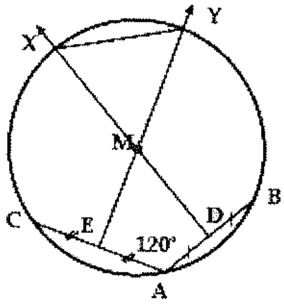


Ex 3 **In the figure opposite:** $\overline{AB}$ and $\overline{AC}$ are two chords in circle M that include an angle measuring 120°,

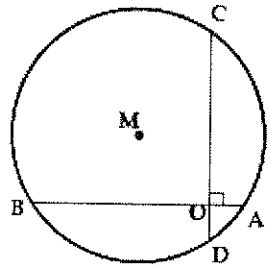
D, and E are the midpoints of $\overline{AB}$ and $\overline{AC}$ respectively.

$\overrightarrow{DM}$ and $\overrightarrow{EM}$ are drawn to intersect the circle at X and Y respectively.

Prove that the triangle X Y M is an equilateral triangle.



Ex 4 **In the figure opposite:** Circle M has a radius length of 7 cm, $\overline{AB}$ and $\overline{CD}$ are two perpendicular and intersecting chords at point O. If $\overline{AB}$ = 12 cm and C D = 10 cm, *Find* the length of $\overline{MO}$



Home work: schoolbook drill page 53

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Grade	Domain	Title	Time	Period	Date	Place
		Positions of a point and a straight Line with respect to a circle				

lesson objectives

At the end of this lesson The student should be able to :

1) Identifying the position of a point with respect to a circle.
2) Identifying the position of a straight line with respect to a circle

circle.

learning tools & resources

Colored pens, white board ,schoolbook ,....................

Previous experience

Basic Definitions and Concepts

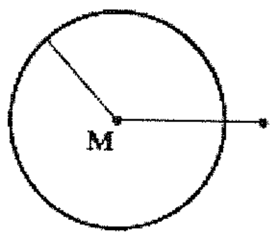
Teaching Strategy

Brain storming ☐ ***Self learning*** ☐ ***Cooperative learning*** ☐ ***Pairs learning*** ☐ ***Problem solving*** ☐ ***Games*** ☐

lesson activities

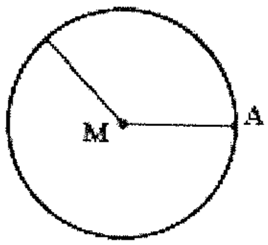
First: Position of a point with respect to a circle.

1 A is outside the circle



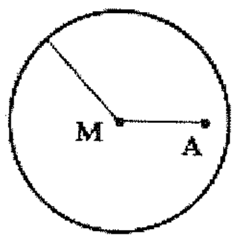
So: $MA > r$
and vise versa

2 A is on the circle



So: $MA = r$
and vise versa

3 A is inside the circle



So: $MA < r$
and vise versa

If M circle with radius length = 4 cm and A is a point in its plane, complete:

(1) *IF*: $MA = 4$ cm, then A is .... circle M , because ....
....

(2) *IF*: $MA = 2\sqrt{3}$ cm, then A is .... circle M , because ....
....

(3) *IF*: $MA = 3\sqrt{2}$ cm, then A is .... circle M , because ....
....

(4) *IF*: MA = zero, then A is .... circle M and represented

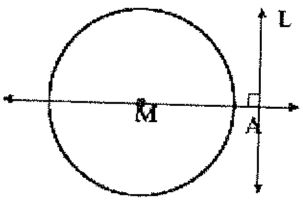
Performance assessment

Second: Position of a straight line with respect to a circle:

If M circle with radius length of r, L is a straight line on its plane, $\overleftrightarrow{MA} \perp L$ where $\overleftrightarrow{MA} \cap L = \{A\}$, Then:

1 the straight line L is located outside the circle M

$L \cap \text{circle } M = \phi$

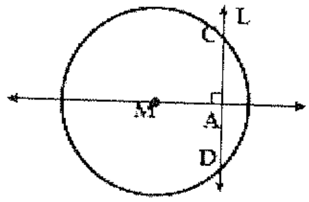


So: $MA > r$

and vise versa

2 the straight line L is a secant to the circle M

$L \cap \text{circle } M = \{C, D\}$

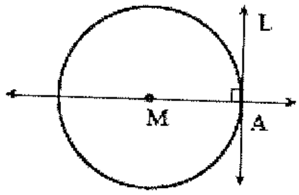


So: $MA < r$

and vise versa

3 the straight line is tangent to circle M

$L \cap \text{the circle} = \{A\}$



So: $MA = r$

and vise versa

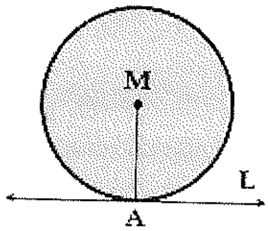
If M circle with radius length 7 cm and $\overline{MA} \perp L$ where $A \in L$: Complete the following:

1. *IF* $MA = 4\sqrt{3}$ cm Then the straight line L ....
2. *IF* $MA = 3\sqrt{7}$ cm Then the straight line L ....
3. *IF* $2\ MA - 5 = 9$ Then the straight line L ....
4. *IF* the straight line L intersects circle M and $MA = 3X - 5$ Then $X \in$ ....
5. *IF* the straight line L is tangent to circle M and $MA = X^2 - 2$ Then $X \in$ ....

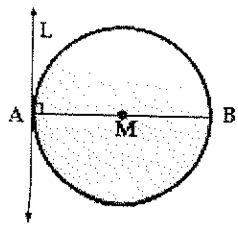
Enhancement activities

Important facts

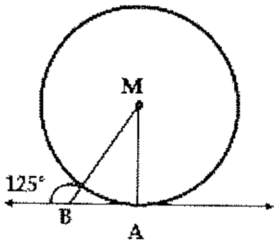
1. A tangent to a circle is perpendicular to the radius at its point of tangency



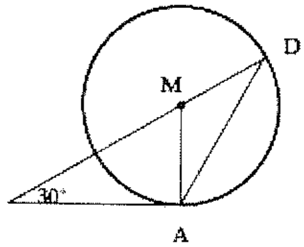
2. If a straight line is perpendicular to a diameter of a circle at one of its endpoints, then it is a tangent to the circle.



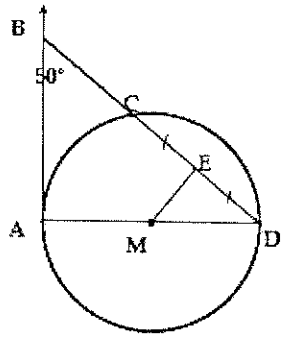
1 M circle is in each of the following figures and $\overleftrightarrow{AB}$ is a tangent: **Complete:**

A


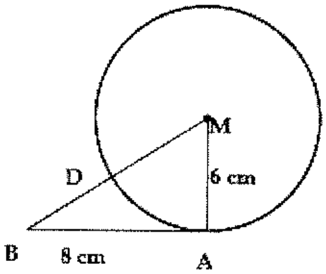
m (∠ A M B) = ...

B


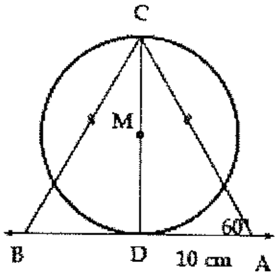
m (∠ A D B) = ...

C


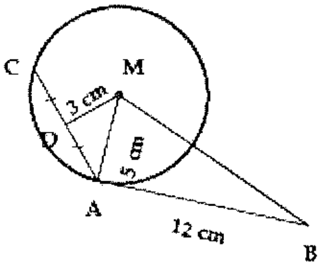
m (∠ A M E) = ...

D


D B = ... cm

E


Perimeter Δ A B C = ... cm

F


Perimeter of the figure A B M D = ... cm

Home work: schoolbook drill 2 page 59

Grade	Domain	Title	Time	Period	Date	Place
		Positions of a circle with respect to a circle				

lesson objectives

At the end of this lesson The student should be able to :

1) Identifying the Position of a circle with respect to another circle.
2) Identifying the relation of the tangent with the radius of a circle.

learning tools & resources

Colored pens, white board ,schoolbook ,.....................

Previous experience

Basic Definitions and Concepts

Teaching Strategy

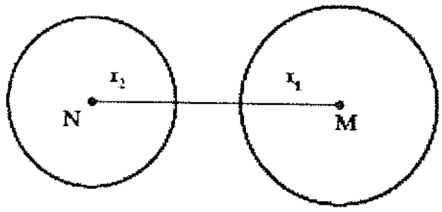
Brain storming ☐ ***Self learning*** ☐ ***Cooperative learning*** ☐ ***Pairs learning*** ☐ ***Problem solving*** ☐ ***Games*** ☐

lesson activities

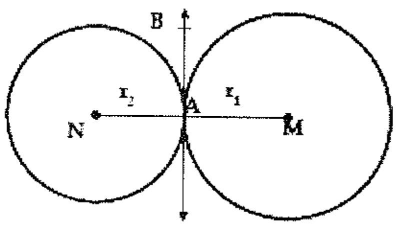
Third: Position of a circle with respect to another circle.

If M and N are two circles on the plane, their two radii are r_1 and r_2 respectively where $r_1 > r_2$ complete:

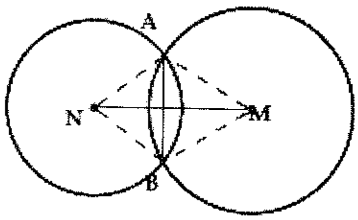
1. If $MN > r_1 + r_2$, then M ∩ N = ..., surface of circle M ∩ surface of circle N = ... and the two circles are distant.



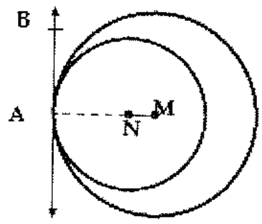
2. If $MN = r_1 + r_2$, then M ∩ N = ..., surface of circle M ∩ surface of circle N = ... and the two circles are touching externally.



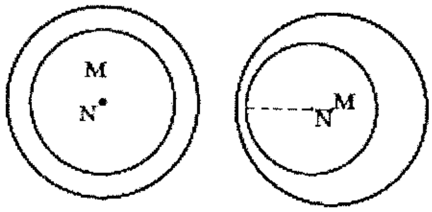
3. IF: $r_1 - r_2 < MN < r_1 + r_2$, then M ∩ N = ..., surface of circle M ∩ surface of circle N = the surface of the yellow area and the two circles are intersecting.



④ If: M N = $r_1 - r_2$, then M ∩ N = ...,
surface of circle M ∩ surface of circle N = ...
and the two circles are touching internally.



⑤ IF: M N < $r_1 - r_2$ and then M ∩ N = ...,
surface of circles M ∩ surface of circle N = ...
and the two circles are intersecting as in figure ....
when M N = zero, the two circles are concentric.
as in figure ....



Performance assessment

Corollaries

The line of centers of two touching circles passes through a point of tangency and is perpendicular to the common tangent.

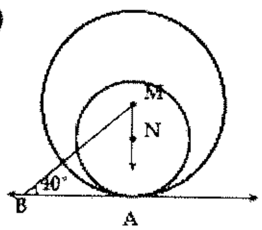
The line of centers of two intersecting circles is perpendicular to the common chord and bisects it.

Two circles M and N with radii length of 9 cm and 4 cm respectively.Show the position of each of them with respect to the other in the following cases:

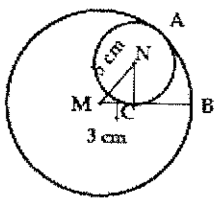
A. M N = 13 cm B. M N = 5 cm C. M N = 3 cm
D. M N = zero E. M N = 10 cm F. M N = 15 cm

Enhancement activities

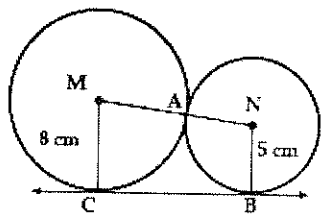
In each of the following figures the circles are touching two - by - two. Use the information of each figure and complete:

①


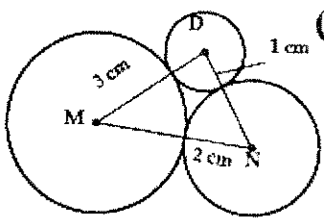
m (∠ B M N) = ...°

②


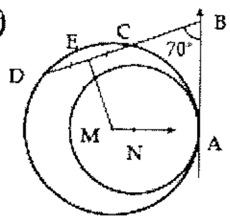
B C = ... cm

③


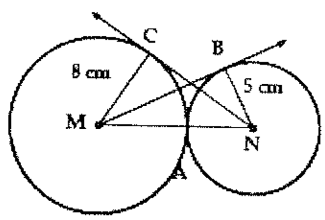
B C = ... cm

④


m (∠B D N) = ... °

⑤


m (∠ E M N) = ...°

⑥


M B = ... cm,
N C = ... cm

Home work: schoolbook *drill page 63*

Grade	Domain	Title	Time	Period	Date	Place
		EX. On Positions of a point, a straight Line and a circle with respect to a circle				

lesson objectives

At the end of this lesson The student should be able to :

1)solve exercise On Positions of a point, a straight Line and a circle with respect to a circle

learning tools & resources

Colored pens, white board, schoolbook,....................

Previous experience

The Positions of a point, a straight Line and a circle with respect to a circle

Teaching Strategy

Brain storming ☐ ***Self learning*** ☐ ***Cooperative learning*** ☐ ***Pairs learning*** ☐ ***Problem solving*** ☐ ***Games*** ☐

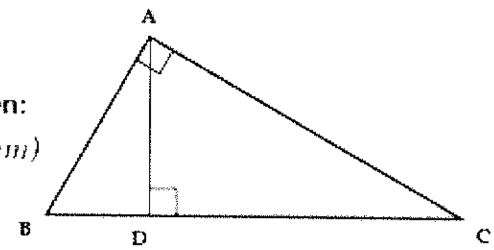
lesson activities

A B C is a right angled triangle at A. If $\overline{AD} \perp \overline{BC}$ **then:**

$(AB)^2 = BD \times BC$ *(Euclidean theorem)*

, $(AD)^2 = DB \times DC$ *(Corollary)*

, $AD \times BC = AB \times AC$ *Why?*

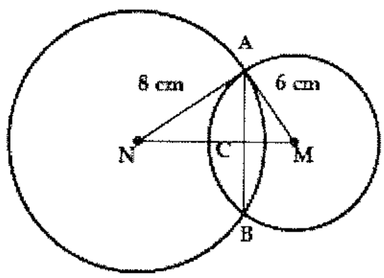


In the figure opposite: M and N are two intersecting circles at A ,

$\overline{MN} \cap \overline{AB} = \{C\}$, A M = 6 cm, A N = 8 cm and

$\overline{MA} \perp \overline{AN}$.

Find the length of $\overline{AB}$



Performance assessment

(1) **Complete to make the following statements correct:**

A If the radius length of the circle is 8 cm, the straight line L is distant from its center by 4cm, then L is ....

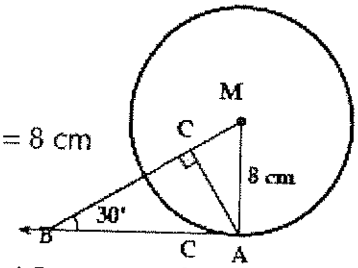
B If the surface of circle M ∩ surface of circle N = {A} then the two circles M and N are ....

C M and N are two intersecting circles. The two radii length are 3 cm and 4cm respectively then : M N ∈ ....

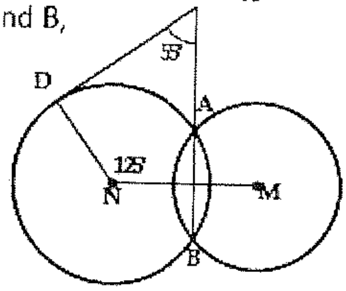
D If the area of the circle M = 16 π cm^2, A is a point on its plane where M A = 8 cm, then A is .... circle M.

E circle M with radius length of 6 cm , if the straight line L is outside the circle then the distance of the center of the circle from the straight line L ∈ ....

F A circle with diameter length (2X + 5)cm, the straight line L is distant from its center by (X + 2)cm then the straight is ....



In the figure opposite: $\overrightarrow{AB}$ is a tangent to the circle M at A and MA = 8 cm m (∠ A B M) = 30°. *Find* the length of each : $\overline{AB}$ and $\overline{AC}$



In the figure opposite: M and N are two intersecting circles at A and B, C and D ∈ $\overrightarrow{BA}$, D ∈ the circle at N and m(∠ MND) = 125° m(∠ B C D) = 55° *Prove that* $\overleftrightarrow{CD}$ is a tangent to circle N at D.

Enhancement activities

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$\overline{AB}$ is a diameter in circle M , $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$, are two tangents of the circle M, $\overrightarrow{CM}$ intersects the circle M at X and Y and intersects $\overleftrightarrow{BD}$ at E . *Prove that:* C X = Y E.

M and N are two intersecting circles at A and B
M A = 12cm, N A = 9 cm, and M N = 15 cm. *Find* the length of $\overline{AB}$.

Home work :schoolbook page 64 no 2

اكتب في جوجل
mozkratgahza

Grade	Domain	Title	Time	Period	Date	Place
		Identifying the circle				

lesson objectives

At the end of this lesson The student should be able to :

1) ***draw a circle passing through a given point***
2) ***draw a circle passing through a given two points***
3) ***draw a circle passing through a given 3 noncollinear points***

learning tools & resources

Colored pens, white board ,schoolbook

Previous experience

drawing circles

Teaching Strategy

Brain storming ☐ Self learning ☐ Cooperative learning ☐ Pairs learning ☐ Problem solving ☐ Games ☐

lesson activities

First: Drawing a circle passing through a given point:

1) *For each chosen point (center of the circle) it is possible to draw a circle passing through point A.*
2) *An infinite number of circles can be drawn passing through a given point as A.*

Second: Drawing a circle passing through two given points:

1)For each chosen point E to the axis of AB (center of the circle), it is possible to draw a circle passing through the two points A and B

Notes:

1) An infinite number of circles can be drawn to pass through two given points like A and B.
2) The radius length of the smallest circle can be drawn in order to pass through the two points A and B is equal to 1/2 A B.
3) Two circles cannot be intersected in more than two points.

Third: Drawing a circle passing through three given points:

1) *There is one and only one circle which passes through three noncollinear points.*
2) *A circle cannot be drawn passing through the three collinear points*

Drill

Using the geometric tools and draw the triangle A B C in which AB = 4 cm, BC = 5 cm and CA = 6 cm. Draw circle passing through the points A, B and C . What is the kind of triangle A B C with respect to the measures of its angles? Where is the center of the circle located with respect to the triangle?

Performance assessment

Corollaries

Corollary (1)

The circle which passes through the vertices of a triangle is called the circumcircle of this triangle.

Corollary (2)

The perpendicular bisectors of the sides of a triangle intersect at a point which is the center of the circumcircle of the triangle.

Complete to make the following statements correct:

A) The number of circles that pass through two given points is ....
B) Any three points do not belong to one straight line .... passes through them.
C) The circle passing through the vertices of a triangle is called a ....
D) The center of the circle passing through the vertices of a triangle is the point intersecting its ....
E) If the right angled triangle ABC at B, then the center of the circle passing through its vertices is ....
F) The number of circles that can pass through any three vertices of a parallelogram is ...

Enhancement activities

1) $\overline{AB}$ with length of 6 cm. Draw a circle passing through the two points A and B and the radius length of each is 4 cm. How many circles have you drawn ?

2) IF L is a straight line on a plane, A is a point where $A \in L$, Draw circle M where $M \in L$ radius length is 3 cm and passes through point A. What are the number of solutions ?

Home work :schoolbook page 68 no 1&2

اكتب في جوجل mozkratgahza

Grade	Domain	Title	Time	Period	Date	Place
		Ex . on Identifying the circle				

lesson objectives

At the end of this lesson The student should be able to :

1) Solve exercise on Identifying the circle *Define the properties of*

learning tools & resources

Colored pens, white board ,schoolbook ,.....................

Previous experience

Identifying the circle

Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

1) Draw three circles touching externally, two-by-two their radii length are 2 cm, 3 cm and 4 cm.

2) Draw the triangle ABC in which AB = 6 cm, m($\angle$ A) = 40° and the radius length of the circum scribed circle about the triangle ABC equals 5 cm. If D is the midpoint of $\overline{AB}$, then calculate the length of $\overline{MD}$ where M is the center of the circumscribed circle about the triangle.

Performance assessment

1) If L is a straight line on the plane, A $\notin$ L, draw circle M where M $\in$ L passes through the point A which its radius length is 3 cm. Discuss all the possible solutions and draw the figure in each case.

2) A is a given point inside a circle with center M. Show how to draw a chord in this circle where A becomes the midpoint of this chord.

Enhancement activities

Draw a circle with radius length of 2 cm a tangent to the straight line L. What is the number of possible solutions?

Home work :schoolbook page 68 no 3

اكتب في جوجل mozkratgahza

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Grade	Domain	Title	Time	Period	Date	Place
		The relation between the chords of a circle and its center				

lesson objectives

At the end of this lesson The student should be able to :

1) 1)Deducing the relation between the chords of a circle and its center..

learning tools & resources

Colored pens, white board ,schoolbook ,....................

Previous experience

Definitions and Concepts.

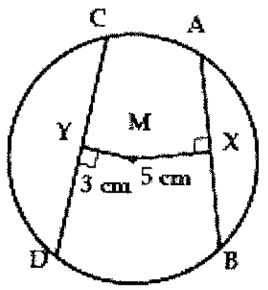
Teaching Strategy

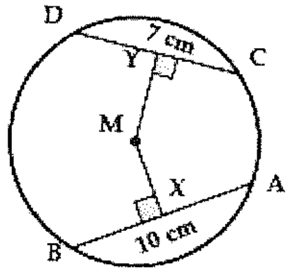
Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

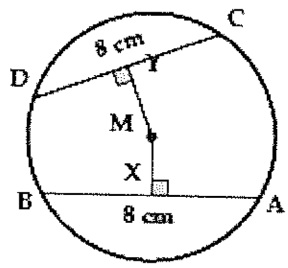
lesson activities

The closer the chord is from the center of the circle, the longer its length is and vice versa.

Drill(1) **Complete by using the relation (> , < and =):**







A B .... C D   M X .... M Y   M X .... M Y

Drill(2) **In the figure opposite M F < M E,** *complete:*

∵ M F < M E

∴ X + 1 > ....

∵ CD is a chord in circle M

∴ X ⩽ ....

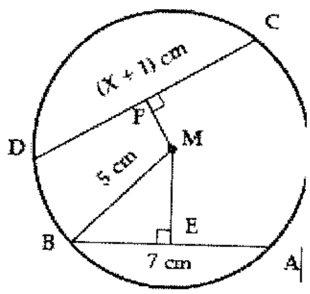
i.e: X ∈ ....

∴ C D > ....

X > ....

∴ C D ⩽ ....

Thus .... < X ⩽ ....



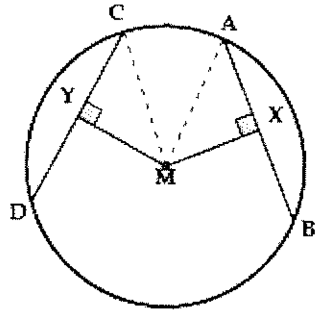
Theorem

If chords of a circle are equal in length, then they are equidistant from the center.

Given: $AB = CD$, $\overline{MX} \perp \overline{AB}$, $\overline{MY} \perp \overline{CD}$

R.T.P: Prove that $MX = MY$.

Construction: Draw $\overline{MA}$, $\overline{MC}$.



Proof: $\because \overline{MX} \perp \overline{AB}$ $\quad \therefore AX = \frac{1}{2} AB$.

$\because \overline{MY} \perp \overline{CD}$ $\quad \therefore CY = \frac{1}{2} CD$.

$\because AB = CD \quad \therefore AX = CY$.

$\because$ the two triangles AXM and CYM, both have :

$AM = CM$

$m(\angle AXM) = m(\angle CYM) = 90^\circ$

$AX = CY$ (Proof)

$\therefore \Delta AXM \equiv \Delta CYM$ We get: $MX = MY$ (Q.E.D.)

Corollary : ***In congruent circles, chords which are equal in length, are equidistant from the the centers***

Converse of the theorem

In the same circle (or in congruent circles) chords which areequidistant from the center (s) are equal in length

Performance assessment

Ex 1 Study the figure then complete:

A *If:*

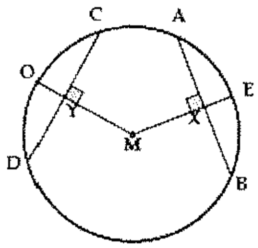
$AB = CD$

then:

$MX = ...$

$\because ME = ...$

$\therefore EX = ...$



B *If:*

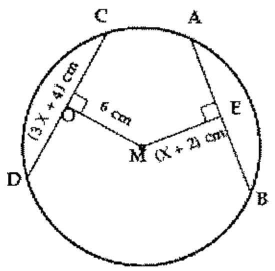
$AB = CD$

then:

$ME = ...$

$\therefore X = ...$ cm,

$CD = ...$ cm



C *If:*

$AB = CD$

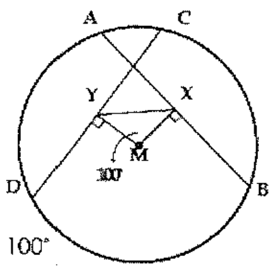
then:

$MX = ...$

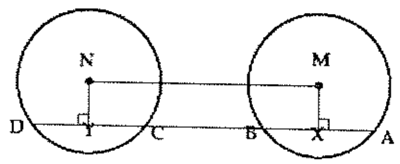
in ΔMXY:

$\because m(\angle XMY) = 100^\circ$

$\therefore m(\angle MXY) = ...^\circ$



D



If: M and N are two congruent circles $AB = CD$

then: $MX = ...$ and the figure $MXYN$ ....

Ex 2

Study the figure then complete:

(1)

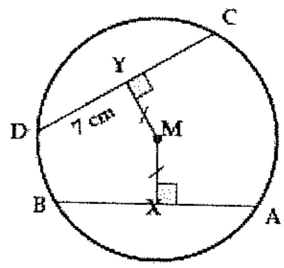
If:

M X = M Y,

Y D = 7 cm

Then:

A B = ... cm



(2)

If:

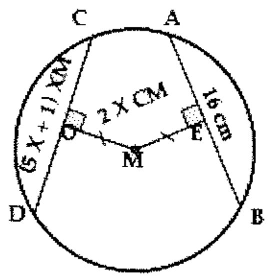
M E = M F

Then:

C D = ...

$\therefore$ X = ...,

E M = ... cm , A M = ... cm



(3)

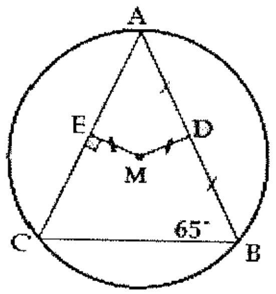
If:

M D = M E

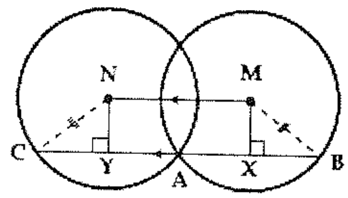
m ($\angle$ B) = 65°

Then:

m ($\angle$ A) = ...°



(4)



$\because$ $\overleftrightarrow{MN}$ // $\overleftrightarrow{BC}$ $\therefore$ M X = ...

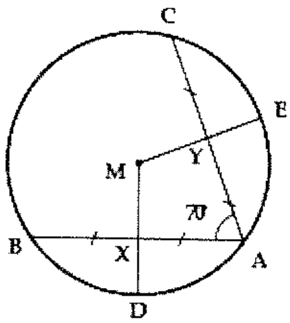
$\because$ the two circles M, and N ....,

A $\in$ $\overline{BC}$ $\therefore$ A B = ...

Enhancement activities

(1) **In the figure opposite:** $\overline{AB}$,and $\overline{AC}$ are two chords equal in length in circle M and X is, the midpoint of $\overline{AB}$, Y is the midpoint of $\overline{AC}$, m ($\angle$ C A B) = 70°.

A *Calculate* m ($\angle$ DME). B *Prove that:* X D = Y E.



(2) $\overline{AB}$ and $\overline{AC}$ are two chords equal in length in circle M, X and Y are the midpoints of $\overline{AB}$ and $\overline{AC}$, m ($\angle$ M X Y) = 30°.

Prove that: First: MXY is an isosceles triangle.

Second: AXY is an equilateral angle.

Home work :schoolbook page 74 no 3 - 8

اكتب في جوجل mozkratgahza

Grade	Domain	Title	Time	Period	Date	Place
		General Exercises				

lesson objectives

At the end of this lesson The student should be able to :

1) Solve exercise on this unit.

learning tools & resources

Colored pens, white board ,schoolbook ,....................

Previous experience

The relation between the chords of a circle and its center .

Teaching Strategy

Brain storming ☐ ***Self learning*** ☐ ***Cooperative learning*** ☐ ***Pairs learning*** ☐ ***Problem solving*** ☐ ***Games*** ☐

lesson activities

(1) Complete to make the statement correct:

A. The chord of the circle is the drawn line segment between ....

B. The straight line passing vertically on the center of the circle on any chord in it ....

C. The line of two centers of two circles touching internally pass ....

D. The center of the circumscribed circle about the triangle is the intersect on point of ....

E. The chords of equal length in circle ....

(2) Choose the correct answer:

A. A tangent to a circle of diameter length 6 cm is at a distance of .... cm from its center.

(6 or 12 or 3 or 2)

B. A circle can be drawn passing the vertices of a ....

(Rhombus or rectangle or trapezoid or parallelogram)

C. $\overline{AB}$ is a diameter in circle M, $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$ are two tangents to the circle, then $\overleftrightarrow{AC}$ .... $\overleftrightarrow{BD}$.

(intersects or perpendicular to or parallel to or congruent on)

D. A circle with a circumference of 6π cm, and the straight line L is distant from its center by 3 cm, then the straight line L is ....

(tangent to the circle or a secant or outside the circle or a diameter to the circle)

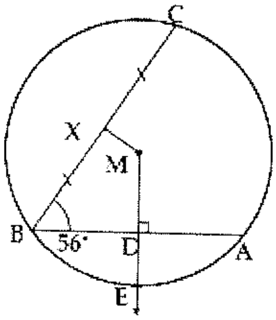
E. M and N are two intersecting circles, both their radii length are 3cm and 5 cm, then: $MN \in$ ....

( ]8 , ∞[or]2 , ∞[or]0, 2[or]2 , 8 [)

(3) **In the figure opposite:** $\overline{AB}$ and $\overline{BC}$ are two chords in circle M which has radius length of 5 cm, $\overrightarrow{MD} \perp \overline{AB}$ intersects $\overline{AB}$ at D and intersects the circle M at E, X is the midpoint of $\overline{BC}$.

AB = 8 cm, m (ABC) = 56°

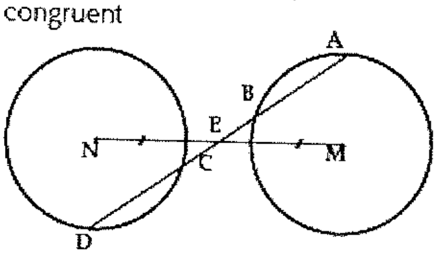
Find: (A) m ($\angle$ D M X) (B) Length of $\overline{DE}$



(4) **In the figure opposite:** M and N are two distant and congruent circles. E is the midpoint of $\overline{MN}$. Draw $\overleftrightarrow{AE}$ intersecting circle M at A and B intersects circle N at C and D.

Prove that: (A) A B = C D

(B) E is the midpoint of $\overline{AD}$.

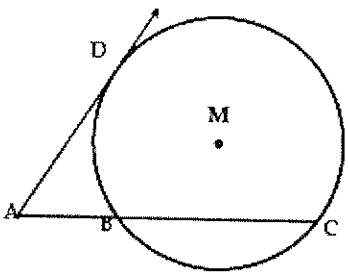


(5) **In the figure opposite:**

M circle with radius length of 5 cm, A is a point outside the circle, $\overrightarrow{AD}$ is a tangent to circle M at D, $\overrightarrow{AB}$ intersects the circle at B and C respectively where AB = 4 cm and AC = 12 cm.

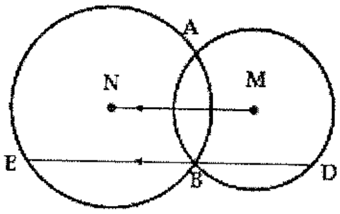
(A) Find the distance of the chord $\overline{BC}$ from the center of the circle.

(B) Calculate the length of $\overline{AD}$.



(6) **In the figure opposite:**

M and N are two intersecting circles at A and B. Draw $\overrightarrow{BD}$ // $\overrightarrow{MN}$ intersecting the two circles at D and E respectively. *Prove that:* DE = 2 MN



Home work: schoolbook page 78 no 7 , 8, 9 .

Grade	Domain	Title	Time	Period	Date	Place
		Unit test				

lesson objectives

At the end of this lesson The student should be able to :

1)Solve the unit test.

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

The relation between the chords of a circle and its center and Definitions and Concepts

Teaching Strategy

Brain storming ☐ ***Self learning*** ☐ ***Cooperative learning*** ☐ ***Pairs learning*** ☐ ***Problem solving*** ☐ ***Games*** ☐

lesson activities

(1) Complete to make the statement correct:

A. Any three points that do not belong to one straight line include ....

B. The axis of symmetry of the two circles M and N that are intersecting at A and B is ....

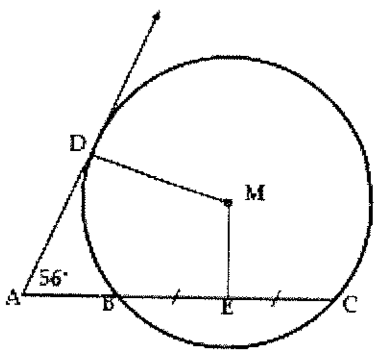
C. If AB = 7cm, then the area of the smallest circle passing through the two points A and B = ... cm^2 .

D. If M circle with circumference 8π cm, A is a point on the circle, then MA = ...

E. A chord with 8 cm length. The length of its radius is 5 cm, then it is distant from its center by .... cm.

(2) In the figure opposite:

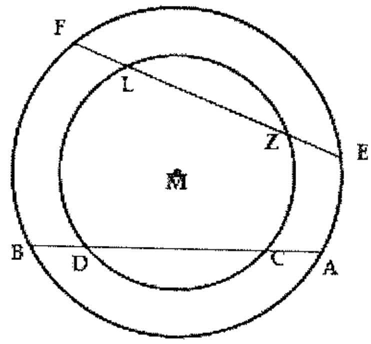
$\overrightarrow{AD}$ is a tangent to the circle M, $\overrightarrow{AC}$ intersects the circle M at B and C. E is the midpoint of $\overline{BC}$, m (∠ A) = 56°.
Find m (∠ D M E).



(3) In the figure opposite:

Two concentric circles M, $\overline{AB}$ is a chord in the larger circle and intersects the smaller circle at C and D. $\overline{EF}$ is a chord in the larger circle and intersects the smaller circle at Z and L where AB = EF.

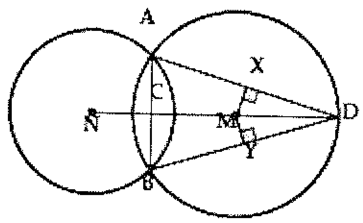
Prove that:
- A) $CD = ZL$
- B) $AD = ZF$



(4) In the figure opposite:

Circle M ∩ circle N = {A,B}, $\overleftrightarrow{AB} \cap \overleftrightarrow{MN} = \{C\}$, D ∈ $\overleftrightarrow{MN}$, $\overline{MX} \perp \overline{AD}$, $\overline{MY} \perp \overline{BD}$.

Prove that: MX = MY.



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Grade	Domain	Title	Time	Period	Date	Place
		Central Angles and Measuring Arcs				

lesson objectives

At the end of this lesson The student should be able to :

1)find the measure of an arc in a circle

2) find the length of an arc in a circle

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

Basic Definitions and Concepts

Teaching Strategy

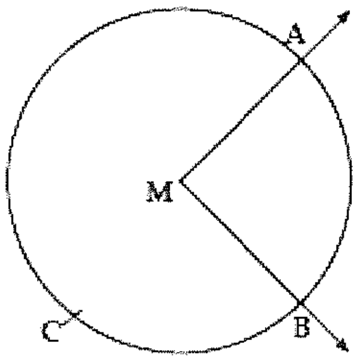
Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

The two sides of ∠ AMB divide the cicle M into two arcs:

(1) The minor arc AB and is denoted by $\overset{\frown}{AB}$.

(2) The major arc ACB and is denoted by $\overset{\frown}{ACB}$.



Central Angle: It is the angle whose vertex is the center of the circle and the two sides are radii in the circle.

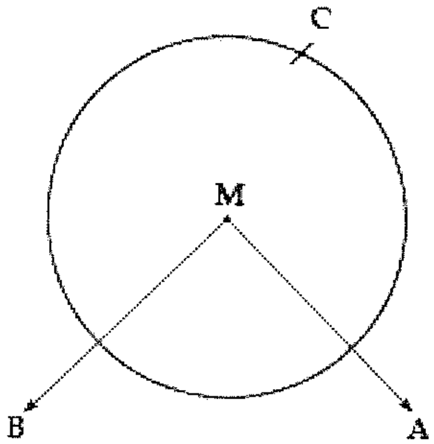
Measure of the arc :Is the measure of the central angle opposite to it.

Adjacent arcs : are two arcs in the same circle that have only one point in common.

In the opposite figure we notice that:

(1) $\overset{\frown}{AB}$ is opposite to the central angle $\angle$ AMB and $\overset{\frown}{ACB}$ is opposite to the central reflective angle $\angle$ AMB.

(2) If $\angle$ AMB is a straight angle ($\overline{AB}$ is a diameter in circle M) then $\overset{\frown}{AB}$ is congruent to $\overset{\frown}{ACB}$ and each is called "a semicircle"



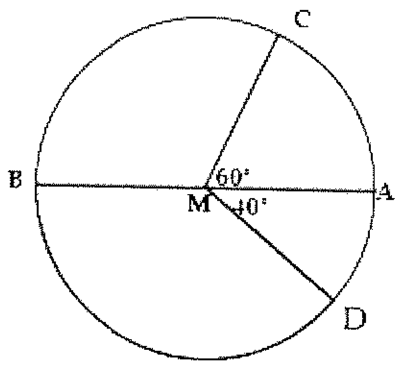
Performance assessment

Ex 1

In the opposite figure :

$\overline{AB}$ is a diameter in the circle M , m ($\angle$ AMC) = 60°, m ($\angle$ AMD)= 40°.

Complete :



(1) m ($\overset{\frown}{AD}$) = ...° , m ($\overset{\frown}{AC}$) = ...°

(2) m ($\overset{\frown}{CAD}$) = m ($\overset{\frown}{CA}$)+ ....

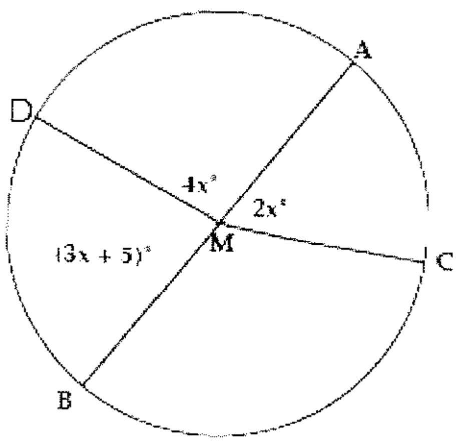
= .... + ... = ...°

(3) m ($\overset{\frown}{BC}$) = m ($\overset{\frown}{ACB}$) - m (   ) = 180° - .... = ...°

(Why?)

(4) m ($\overset{\frown}{DCB}$) = measure of circle - m($\overset{\frown}{\quad}$) = ... - .... = ...°

Ex 2



In the opposite figure : $\overline{AB}$ is a diameter of the circle M, study the figure , then complete :

(1) x = ...

(2) m ($\overset{\frown}{AC}$) = ...°

(3) m ($\overset{\frown}{AD}$) = ...

(4) m ($\overset{\frown}{BC}$) = ...°

(5) m ($\overset{\frown}{CAD}$) = ...

(6) m ($\overset{\frown}{CBD}$) = ...

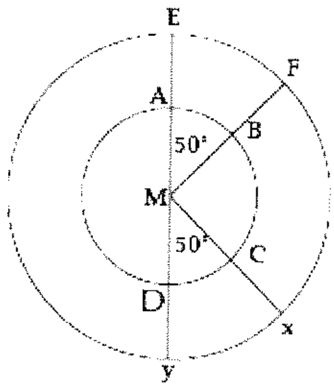
(7) m ($\overset{\frown}{ACD}$) = ...

(8) m ($\overset{\frown}{ADC}$) = ...

Arc length : **is a part of a circle's circumference proportional to with its measure**

In the opposite figure : Two concentric circles, the radius length of the minor circle is 7 cm and the radius length of the major circle is 14 cm ($\pi = \frac{22}{7}$)

Complete : In the minor circle:



$m(\overset{\frown}{AB}) = m(\overset{\frown}{\ldots\ldots}) = \ldots\ldots\ldots^\circ$

length of $\overset{\frown}{AB} = \frac{50}{360} \times 2 \times \frac{22}{7} \times \ldots\ldots = \ldots\ldots$ cm

length of $\overset{\frown}{CD} = \ldots\ldots \times \ldots\ldots = \ldots\ldots\ldots$cm

$\therefore$ $\overset{\frown}{AB}$ (congruent / not congruent) $\overset{\frown}{CD}$

In the major circle:

$m(\overset{\frown}{EF}) = m(\overset{\frown}{\ldots\ldots}) = \ldots\ldots^\circ$, length of $\overset{\frown}{EF} = \ldots\ldots\ldots \times \ldots\ldots\ldots = \ldots\ldots$ cm

length of $\overset{\frown}{xy} = \ldots\ldots \times \ldots\ldots\ldots = \ldots\ldots\ldots$cm

$\therefore$ $\overset{\frown}{EF}$ (congruent / not congruent) $\overset{\frown}{xy}$

- Is $\overset{\frown}{AB}$ congruent to $\overset{\frown}{EF}$? What do you deduce?

Home work :schoolbook page 87 no 1

Grade	Domain	Title	Time	Period	Date	Place
		Central Angles and Measuring Arcs (cont.)				

lesson objectives

At the end of this lesson The student should be able to :

1) Find the relation between chords of a circle and its arcs.

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

measure and length of an arc in a circle

Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

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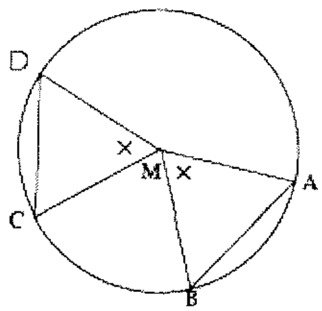
Corollary(1)

In the same circle (or in congruent circles), if the measures of arcs are equal, then the lengths of the arcs are equal , and conversely.



Corollary(2)

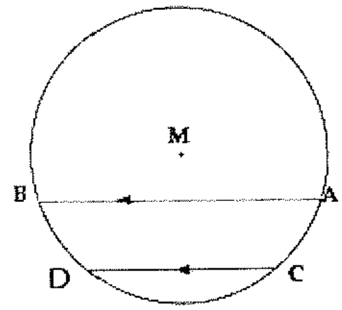
In the same circle (or in congruent circles), if the measures of arcs are equal, then their chords are equal in length, and conversely

Corollary(3)

If two parallel chords are drawn in a circle, then the measures of the two arcs between them are equal.

If $\overline{AB}$ and $\overline{CD}$ are two chords in circle M , $\overline{AB} // \overline{CD}$

then $m(\overset{\frown}{AC}) = m(\overset{\frown}{BD})$.

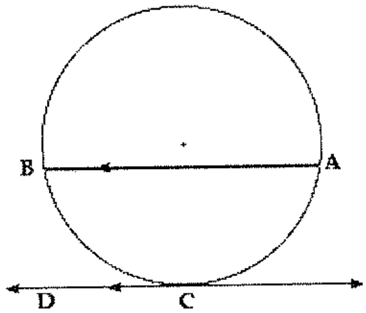


Corollary(4)

If a chord is parallel to a tangent of a circle, then the measures of the two arcs between them are equal

If $\overline{AB}$ is a chord of circle M, $\overleftrightarrow{CD}$ is a tangent at c, $\overline{AB} // \overleftrightarrow{CD}$

then $m(\overset{\frown}{AC}) = m(\overset{\frown}{BD})$.



Performance assessment

EX1

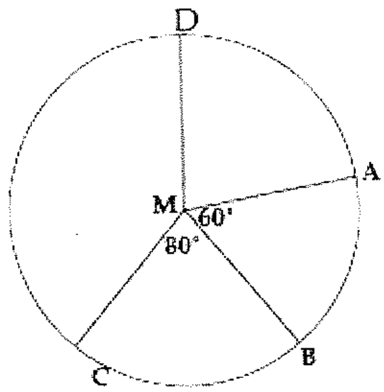
In the opposite figure :

$m(\overset{\frown}{AB}) = 60^\circ$, $m(\overset{\frown}{BC}) = 80^\circ$, $m(\overset{\frown}{AD}) : m(\overset{\frown}{DC}) = 4 : 7$

(1) Mention the arcs equal in measure .

(2) Mention the arcs equal in length.

(3) Draw the chords equal in length .



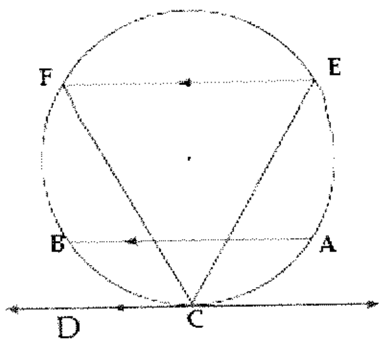
EX2

In the opposite figure :

M is a circle , $\overleftrightarrow{CD}$ is a tangent to the circle at C , $\overline{AB}$ and $\overline{EF}$ are two chords of the circle where :

$\overline{AB} // \overline{EF} // \overleftrightarrow{CD}$

Prove that CE = CF



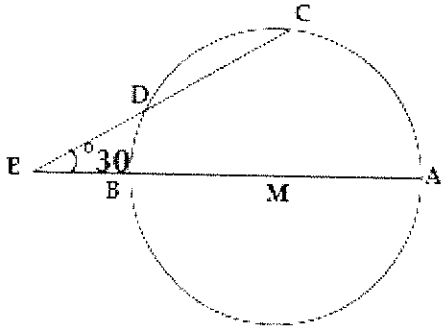
EX3

In the opposite figure :

$\overline{AB}$ is a diameter in a circle M, $\overrightarrow{AB} \cap \overrightarrow{CD} = \{E\}$.

$m(\angle AEC) = 30°$, $m(\overset{\frown}{AC}) = 80°$.

Find : $m(\overset{\frown}{CD})$



EX4

In the opposite figure :

ABCDE is a regular pentagon inscribed in the circle M,

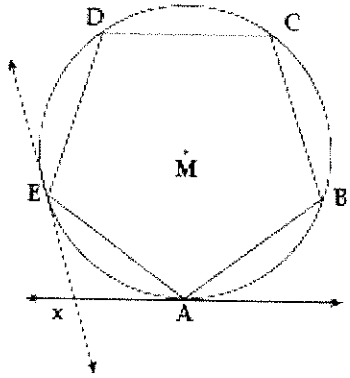
$\overleftrightarrow{AX}$ is a tangent to the circle at A, $\overleftrightarrow{EF}$ is a tangent to the circle at E

Where $\overleftrightarrow{AX} \cap \overleftrightarrow{EX} = \{X\}$.

Find:

A. $m(\overset{\frown}{AE})$

B. $m(\angle AXE)$.



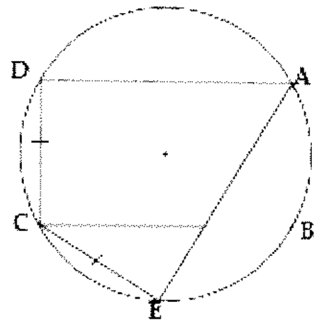
EX5

In the opposite figure :

ABCD is a rectangle inscribed in a circle.

Draw the chord $\overline{CE}$ where CE = CD .

Prove that : AE = BC .



Home work :schoolbook page 87&88 no 2 & 6

Grade	Domain	Title	Time	Period	Date	Place
		The relation between the inscribed and central angles subtended by the same arc				

lesson objectives

At the end of this lesson The student should be able to :

1) deduce relation between the inscribed and central angles subtended by the same arc

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

Central Angles and Measuring Arcs

Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

Inscribed angle

An angle the vertex of which lies on the circle and its sides contain two chords of the circle

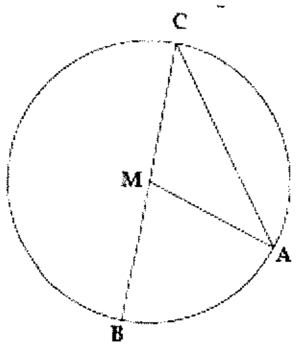
Theorem

The measure of the inscribed angle is half the measure of the central angle, subtended by the same arc.

Given: ∠ ACB is an inscribed angle , ∠ AMB is a central angle .

R.T.P. : Prove that m (∠ ACB) = $\frac{1}{2}$ m (∠ AMB).

Proof :



∵ ∠ AMB is outside Δ AMC ∴ m (∠ AMB) = m (∠ A) + m (∠ C)

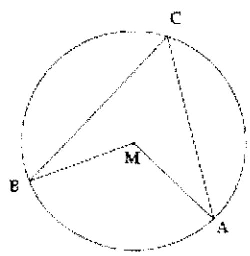
∵ AM = CM (radii lengths) ∴ m (∠ A) = m (∠ C)

From (1) and (2) we get : m (∠ AMB = 2 m (∠ C)

∴ m (∠ ACB) = $\frac{1}{2}$ m (∠ AMB) (Q.E.D)

Corollary(1)

The measure of an inscribed angle is half the measure of the subtended arc



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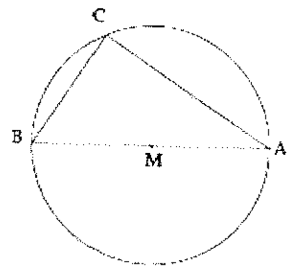
Corollary(2)

The inscribed angle in a semicircle is a right angle

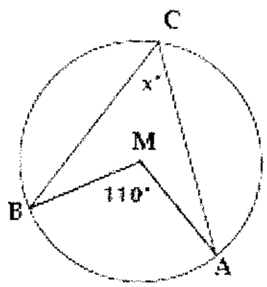


Performance assessment

EX1

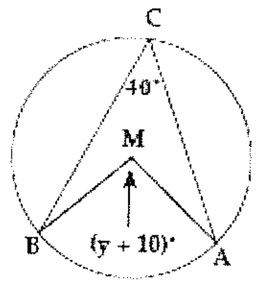
M is a circle. In each of the following figures, find the value of the symbol used in measuring:

(1)



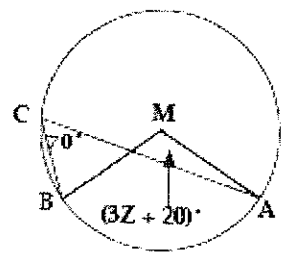
X = ...

(2)



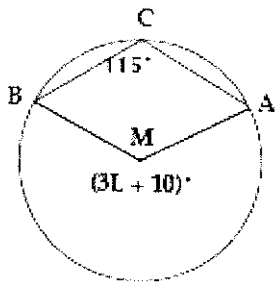
Y = ...

(3)



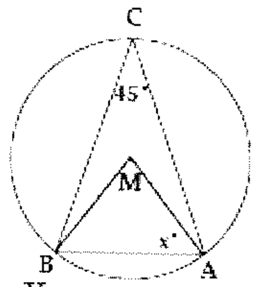
Z = ...

(4)



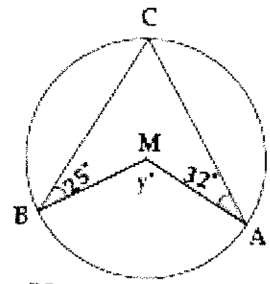
L = ...

(5)



X = ...

(6)

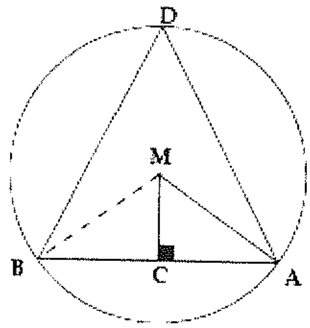


Y = ...

EX2

In the opposite figure : $\overline{AB}$ is a chord of circle M, $\overline{MC} \perp \overline{AB}$.

Prove that : m (∠ AMC) = m (∠ ADB)



Solution

Draw $\overline{BM}$, Complete : In Δ MAB :

∵ MA= MB , $\overline{MC} \perp \overline{AB}$

∴ m (∠ AMC) = m (∠ ....) = $\frac{1}{2}$ m (∠ ....) (1)

∵ inscribed ∠ ADB and central ∠ .... are subtended at $\frown$ ....

∴ m (∠ ....) = $\frac{1}{2}$ m (∠ ....) (2)

From (1) and (2) we get: m (∠ AMC) = m (∠ ....) .

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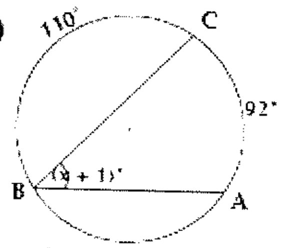
EX3

Study each of the following figures, then complete :

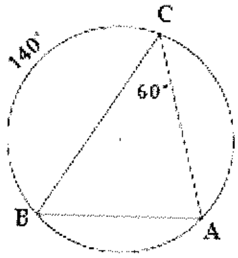
(1)



x = ...

m ($\overset{\frown}{AB}$) = ...

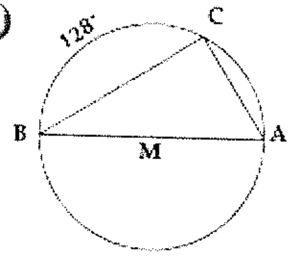
(2)



m (∠ A) = ...

m ($\overset{\frown}{AC}$) = ...

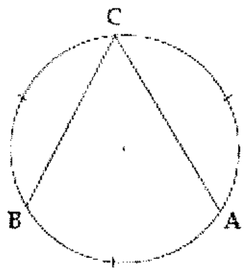
(3)



m (∠ C) = ...

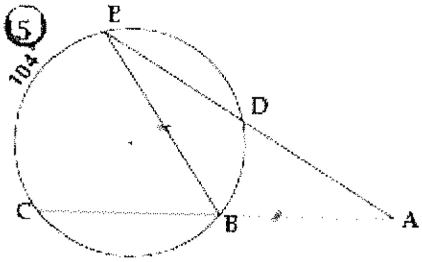
m (∠ B) = ...

(4)



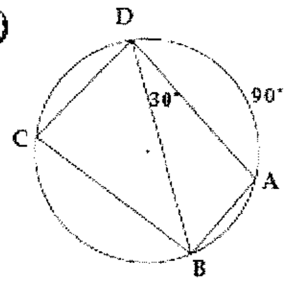
m (∠ C) = ...

(5)



m (∠ EAC) = ...

(6)

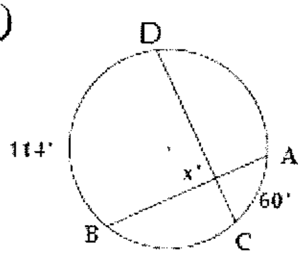


m (∠ DCB) = ...

EX4

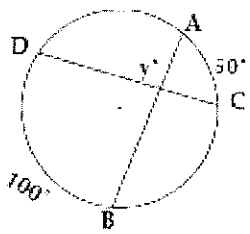
In each of the following figures, find the value of the symbol used in measuring:

(1)



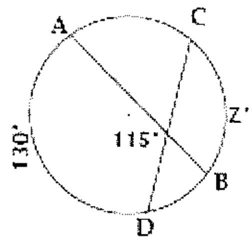
X = ...

(2)



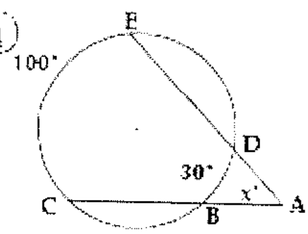
Y = ...

(3)



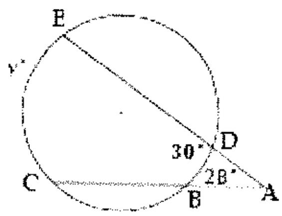
Z = ...

(4)



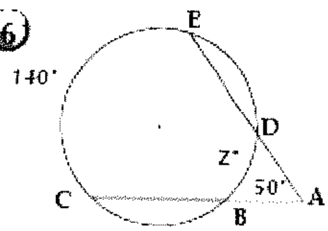
X = ...

(5)



Y = ...

(6)



Z = ...

Home work :schoolbook drills page 91 & 96

Grade	Domain	Title	Time	Period	Date	Place
		Exercise on inscribed and central angles				

lesson objectives

At the end of this lesson The student should be able to :

1) solve exercise on inscribed and central angles

learning tools & resources

Colored pens, white board, schoolbook ,......................

Previous experience

The relation between the inscribed and central angles subtended by the same arc_

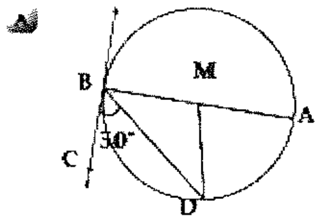
Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

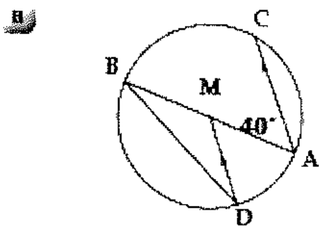
(1) M is a circle. In each of the following figures , study each figure, then complete:

a)



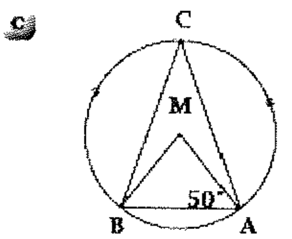
m (∠AMD) = ...°

b)



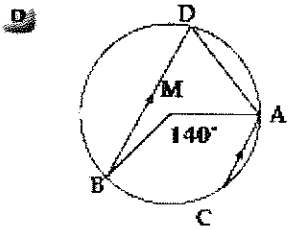
m (∠BDM) = ...°

c)



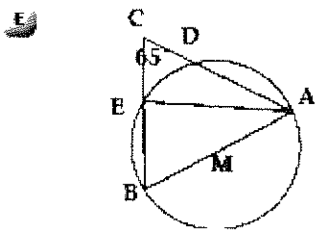
m (∠CAM) = ...°

d)



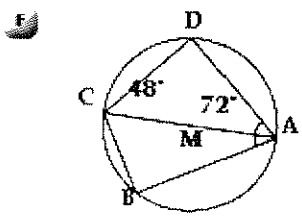
m (∠CAD) =..........°

e)



m (∠CAE) = ...°

f)

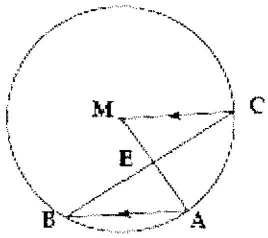


m (∠BAC) = ...°

(2) In the opposite figure :

$\overline{AB}$ is a chord in circle M , $\overrightarrow{CM} \parallel \overrightarrow{AB}$, $\overline{BC} \cap \overline{AM} = \{E\}$,

Prove that : BE > AE.

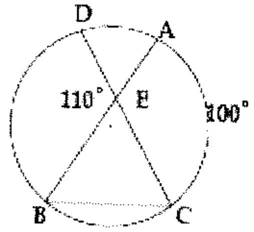


③ **In the opposite figure :**

$\overline{AB}$ and $\overline{CD}$ are two chords in the circle, $\overline{AB} \cap \overline{CD} = \{E\}$

m ($\angle$ DEB) = 110° , m ($\overset{\frown}{AC}$) = 100°,

Find: m ($\angle$ DCB)

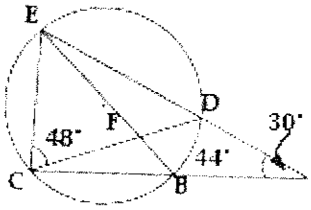


④ **In the opposite figure :**

$\overrightarrow{CB} \cap \overrightarrow{ED} = \{A\}$, $\overline{BE} \cap \overline{CD} = \{F\}$, if:

m ($\angle$ A) = 30° , m ($\overset{\frown}{BD}$) = 44° , m ($\angle$ DCE) = 48°

Find: **A** m ($\overset{\frown}{CE}$) **B** m ($\overset{\frown}{BC}$)



Home work :schoolbook page 97 no 5

Grade	Domain	Title	Time	Period	Date	Place
		Inscribed Angles Subtended by the Same Arc				

lesson objectives

At the end of this lesson The student should be able to :

1) Deduce the relation between the inscribed angles that include equal arcs in measure

learning tools & resources

Colored pens, white board, schoolbook ,....................

Previous experience

The measure of an inscribed angle is half the measure of the subtended arc

Teaching Strategy

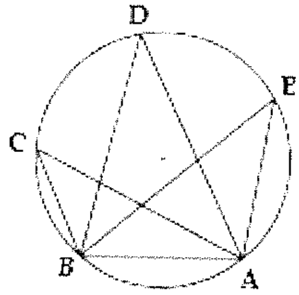
Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

Theorem(2)

In the same circle, the measures of all inscribed angles subtended by the same arc are equal

Given: $\angle C$, $\angle D$ and $\angle E$ are common inscribed angles at $\overset{\frown}{AB}$.



R.T.P.: $m(\angle C) = m(\angle D) = m(\angle E)$

Proof: $\because m(\angle C) = \frac{1}{2} m(\overset{\frown}{AB})$

$, m(\angle D) = \frac{1}{2} m(\overset{\frown}{AB})$

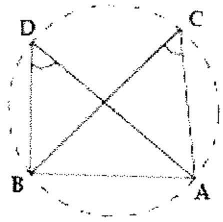
$, m(\angle E) = \frac{1}{2} m(\overset{\frown}{AB})$

$\therefore m(\angle C) = m(\angle D) = m(\angle E)$ *Q.E.D.*

Corollary *In the same circle or in congruent circles, the measures of the inscribed angles subtended by arcs of equal measures are equal*

The converse of theorem (2)

If two angles subtended to the same base and on the same side of it, have the same measure, then their vertices are on an arc of a circle and the base is a chord of it

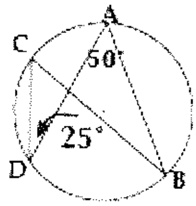


Performance assessment

EX1

Study each of the following figures, then complete :

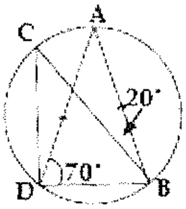
(1)



m (∠C) = ... °

m (∠B) = ... °

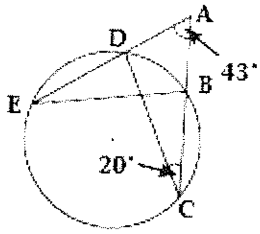
(2)



m (∠C) = ... °

m (∠BDC) = ... °

(3)



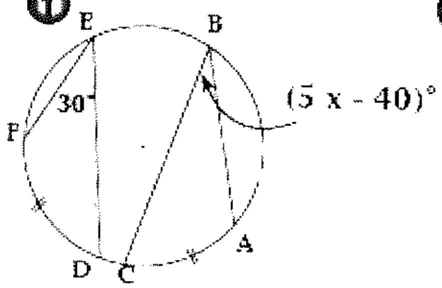
m (∠BED) = ... °

m (∠ABE) = ... °

EX2

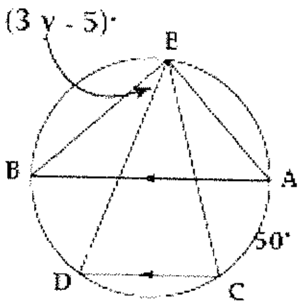
In each of the following figures, find the value of the symbol used in measuring:

(1)



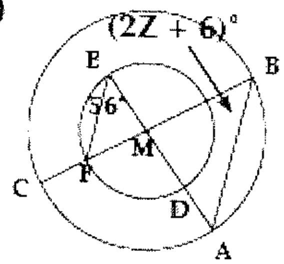
X = ...

(2)



Y = ...

(3)



Z = ...

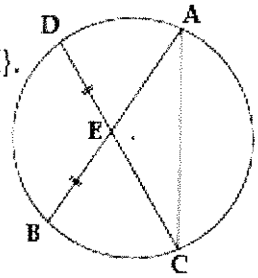
Enhancement activities

EX3

In the opposite figure:

$\overline{AB}$ and $\overline{CD}$ are two equal chords in length in the circle , $\overline{AB} \cap \overline{CD} = \{E\}$.

Prove that: the triangle ACE is an isosceles triangle .

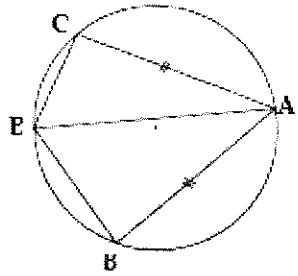


EX4

In the opposite figure :

$AB = AC$, $E \in \overset{\frown}{BC}$

Prove that: $m(\angle AEB) = m(\angle AEC)$



Home work :schoolbook drill page 99

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Grade	Domain	Title	Time	Period	Date	Place
		Exercise on Inscribed Angles Subtended by the Same Arc				

lesson objectives

At the end of this lesson The student should be able to :

1) Solve Exercise on Inscribed Angles Subtended by the Same Arc

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

Inscribed Angles Subtended by the Same Arc

Teaching Strategy

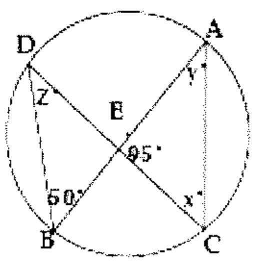
Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

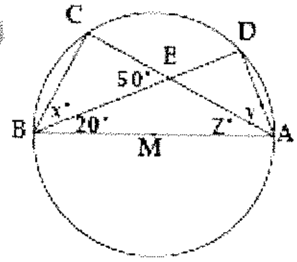
EX1

In each of the following figures, find the value of the symbol used in measuring :

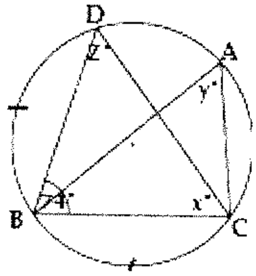
A



B



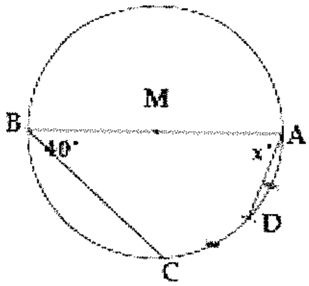
C



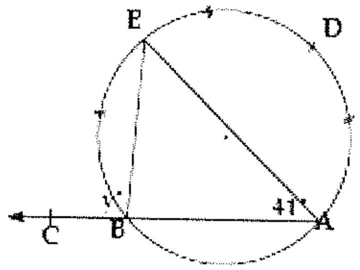
EX2

In each of the following figures, find the value of the symbol used in measuring .

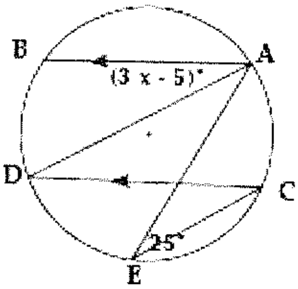
A



B



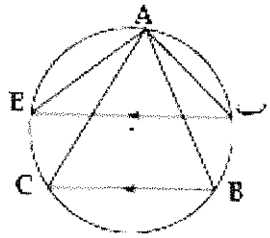
C



EX3 **In the opposite figure :**

ABC is an inscribed triangle inside a circle , $\overline{DE} \parallel \overline{BC}$.

Prove that : m (∠ DAC) = m (∠BAE) .



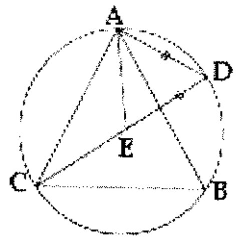
EX4 $\overline{AB}$ is a diameter in circle M, m (∠ ABC) = 40° , D ∈ $\overset{\frown}{BC}$.

Find m (∠CDB)

EX5 ABC is an equilateral triangle drawn inside a circle,

D ∈ $\overset{\frown}{AB}$, E ∈ $\overline{DC}$ where AD = DE.

prove that : The triangle ADE is equilateral .



EX6

ABC is an isosceles triangle which has AB = AC , D is the midpoint of $\overline{BC}$, draw $\overrightarrow{BE} \perp \overline{AC}$ where $\overrightarrow{BE} \cap \overline{AC}$ = {E} .**Prove that :** the points A, B, D and E have one circle passing through them .

Home work: schoolbook drill page 102

Grade	Domain	Title	Time	Period	Date	Place
		Cyclic Quadrilaterals				

lesson objectives

At the end of this lesson The student should be able to :

1) Identifying when the shape is cyclic quadrilateral.

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

The measure of an inscribed angles of a circle

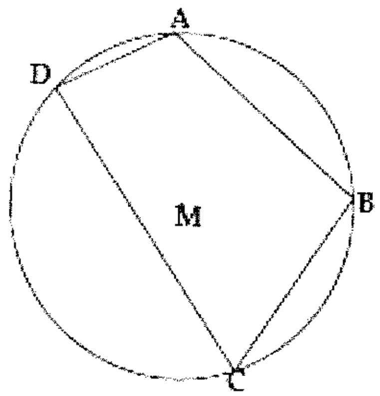
Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

Cyclic quadrilateral
is a quadrilateral figure whose four vertices belong to one circle.

The figure ABCD is a cyclic quadrilateral because its vertices A, B, C and D belong to the circle M.



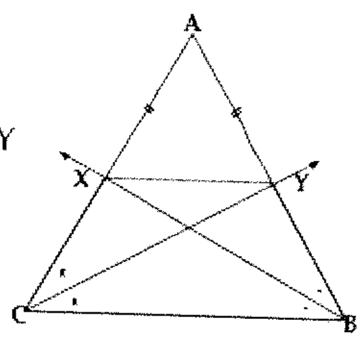
EX1

In the opposite figure:

ABC is a triangle in which has AB = AC and $\overrightarrow{BX}$ bisects ∠ B and intersect $\overline{AC}$ at X , $\overrightarrow{BY}$ bisects ∠ C and intersect $\overline{AB}$ at Y

Prove that : First: BCXY is a cyclic quadrilateral.

Second: $\overleftrightarrow{XY} // \overleftrightarrow{BC}$.

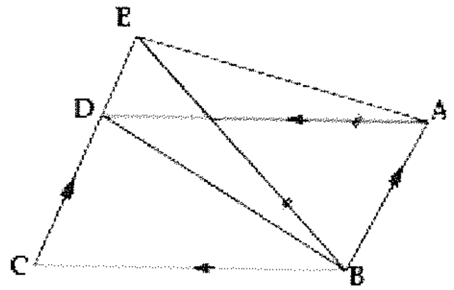


EX2

In the opposite figure:

ABCD is a parallelogram $E \in \overrightarrow{CD}$ where $BE = AD$

Prove that : ABDE is a cyclic quadrilateral .



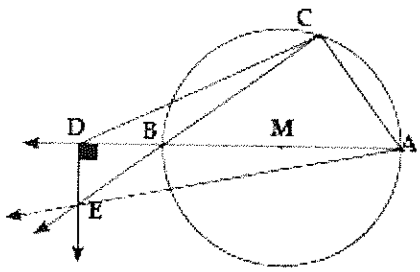
EX3

In the opposite figure :

$\overline{AB}$ is a diameter at circle M , $D \in \overrightarrow{AB}$, $D \notin \overline{AB}$,

draw $\overrightarrow{DE} \perp \overrightarrow{AB}$, $C \in \overset{\frown}{AB}$ and $\overrightarrow{CB} \cap \overrightarrow{DE} = \{E\}$

Prove that : ACDE is a cyclic quadrilateral .



Enhancement activities

EX4

ABCD is a square , $\overrightarrow{AX}$ bisects $\angle$ BAC and intersects $\overrightarrow{BD}$ at X and $\overrightarrow{DY}$ bisects $\angle$ CDB and intersects $\overline{AC}$ at Y .

Prove that: First: AXYD is a cyclic quadrilateral

Second: $m \angle (AYX) = 45^\circ$

Home work :schoolbook page 107 no 5

Grade	Domain	Title	Time	Period	Date	Place
		Properties of Cyclic Quadrilaterals				

lesson objectives

At the end of this lesson The student should be able to :

1) recognize the Properties of Cyclic Quadrilaterals

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

Cyclic Quadrilaterals

Teaching Strategy

Brain storming ☐ ***Self learning*** ☐ ***Cooperative learning*** ☐ ***Pairs learning*** ☐ ***Problem solving*** ☐ ***Games*** ☐

lesson activities

Theorem(3)

In a cyclic quadrilateral, each two opposite angles are supplementary

Given: ABCD is a cyclic quadrilateral .

R.T.P: **Prove that :** (1) $m(\angle A) + m(\angle C) = 180^\circ$

(2) $m(\angle B) + m(\angle D) = 180^\circ$

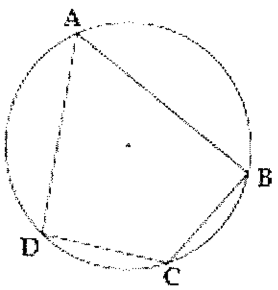
Proof: $\because m(\angle A) = \frac{1}{2} m(\overset{\frown}{BCD})$

$, m(\angle C) = \frac{1}{2} m(\overset{\frown}{BAD})$

$\therefore m(\angle A) + m(\angle C)$

$= \frac{1}{2} [m(\overset{\frown}{BCD}) + m(\overset{\frown}{BAD})]$

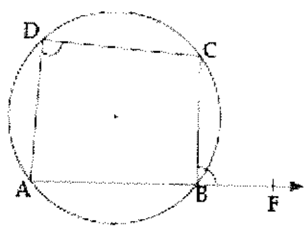
$= \frac{1}{2} \times 360^\circ = 180^\circ$



Similarly : $m(\angle B) + m(\angle D) = 180^\circ$ *(Q.E.D.)*

Corollary

The measure of the exterior angle at a vertex of a cyclic quadrilateral is equal to the measure of the interior angle at the opposite vertex



The converse of theorem (3)

If two opposite angles of a quadrilateral are supplementary, then the quadrilateral is cyclic.

Corollary

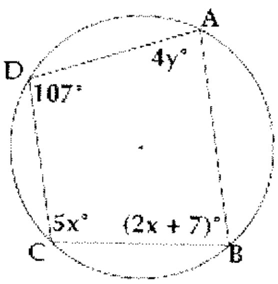
If the measure of the exterior angle at a vertex of a quadrilateral figure is equal to the measure of the interior angle at the opposite vertex, then the figure is cyclic quadrilateral.

Performance assessment

EX1

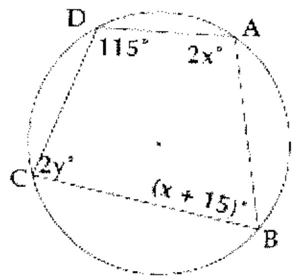
In each of the following figures, find the value of the symbol used in measuring.

(1)



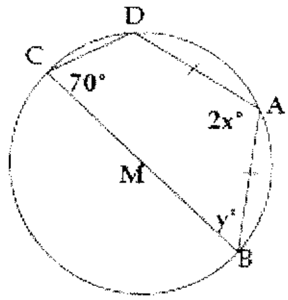
X = ... , Y = ...

(2)



X = ... , Y = ...

(3)

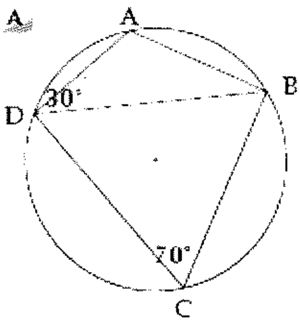


X = ... , Y = ...

EX2

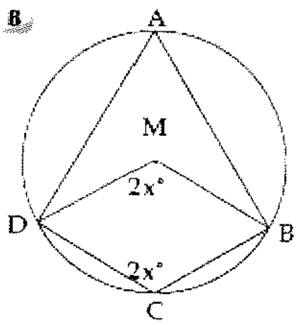
With the assistance of the given figures, find with proof :

A



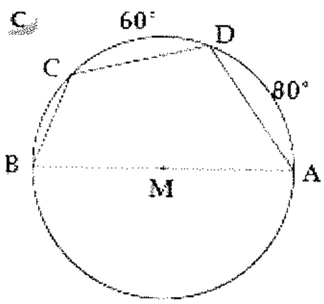
m (∠ABD)

B



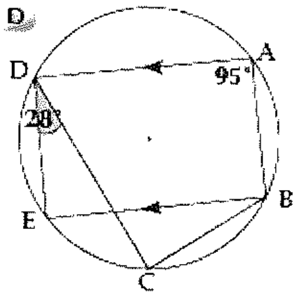
m (∠A)

C



measures of figure's angles ABCD

D

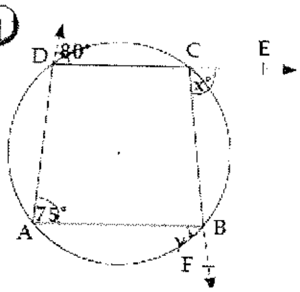


measures of figure's angles ABCD

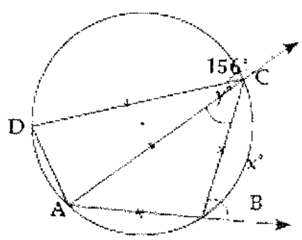
Enhancement activities

EX3 In each of the following figures, find the value of the symbol used in measuring .

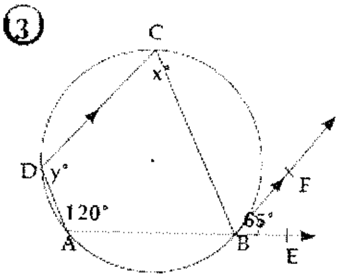
(1)



(2)



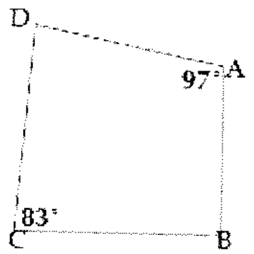
(3)



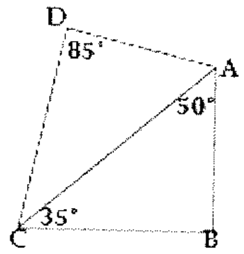
EX4

In each of the folowing figures, prove that ABCD is a cyclic quadrilateral:

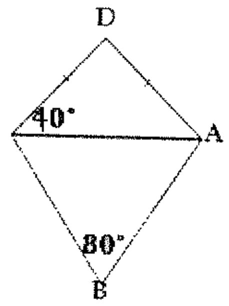
(1)



(2)



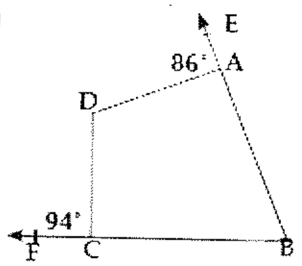
(3)



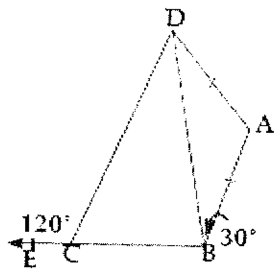
EX5

Prove that each of the following figures is a cyclic quadrilateral:

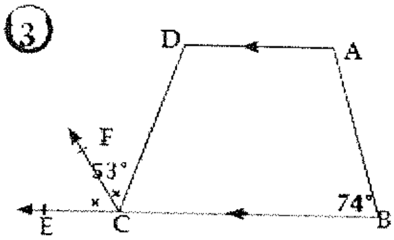
(1)



(2)



(3)



Home work :schoolbook drill page 112

Grade	Domain	Title	Time	Period	Date	Place
		Exercise on Properties of Cyclic Quadrilaterals				

lesson objectives

At the end of this lesson The student should be able to :

1) solve exercise on Properties of Cyclic Quadrilaterals

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

Properties of Cyclic Quadrilaterals

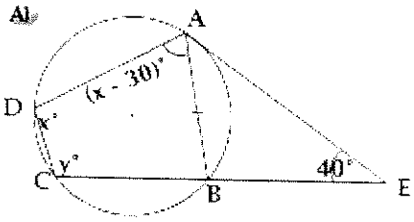
Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

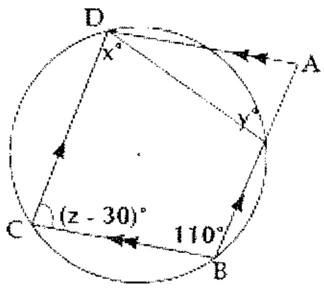
lesson activities

(1) In each of the following figures, find the value of the symbol used in measuring .

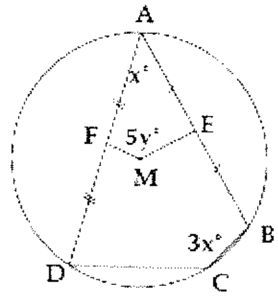
A)



B



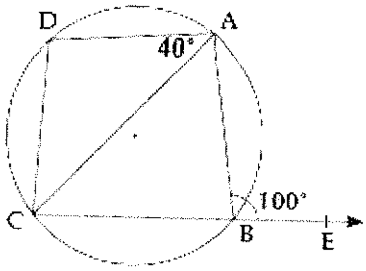
C



(2) In the opposite figure:

m (∠ ABE) = 100° , m (∠ CAD) = 40°

Prove that : m $(\overset{\frown}{CD})$ = m $(\overset{\frown}{AD})$.

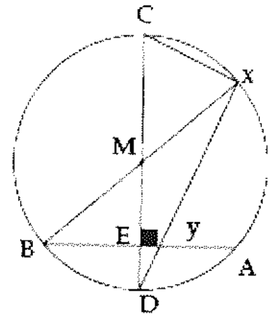


(3) In the opposite figure :

$\overline{AB}$ is a chord in circle M and $\overline{CD}$ is a perpindicular diameter on $\overline{AB}$ and intersects it at E, $\overrightarrow{BM}$ intersects the circle at X and $\overline{XD} \cap \overline{AB} = \{Y\}$

Prove that : First: XYEC is a cyclic quadrilateral .

Second: m (∠ DYB) = m (∠ DBX)

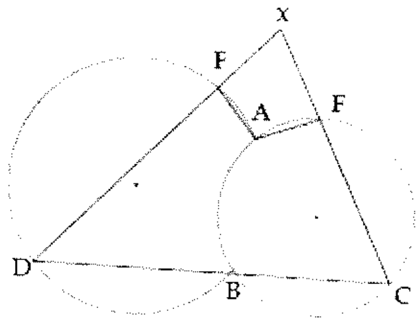


(4) In the opposite figure :

Two intersecting circles at A and B , $\overline{CD}$ passes through point B and intersect the two circles at C and D,

$\overrightarrow{CE} \cap \overrightarrow{DF} = \{X\}$.

Prove that : AFXE is a cyclic quadrilateral .



Home work :schoolbook page 113 no 5

اكتب في جوجل
mozkratgahza

Grade	Domain	Title	Time	Period	Date	Place
		The relation between the tangents of a circle				

lesson objectives

At the end of this lesson The student should be able to :

1) Deduce the relation between the two tangent segments drawn from a point outside the circle.
2) Recognize the concept of a circle inscribed in a polygon

learning tools & resources

Colored pens, white board, schoolbook ,......................

Previous experience

Basic Definitions and Concepts

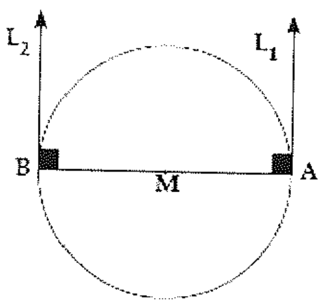
Teaching Strategy

Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

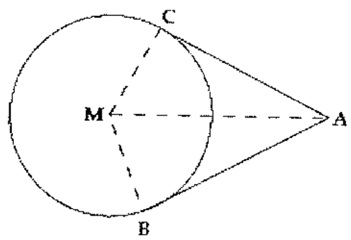
The two tangents drawn at the two ends of a diameter in a circle are parallel .



Theorem (4)

The two tangents -segments drawn to a circle from a point outside it are equal in length

Given: A is a point outside the circle M, $\overline{AB}$ and $\overline{AC}$ are two tangent segments of the circle at B and C.



R.T.P: Prove that : AB = AC

Construction:

Draw $\overline{MB}$, $\overline{MC}$ and $\overline{MA}$

Proof: $\because$ $\overline{AB}$ is a tangent segment to circle M

$\therefore$ m ($\angle$AMB) = 90°

$\because$ $\overline{AC}$ is a tangent segment to circle M

$\therefore$ m ($\angle$ACM) = 90°

اكتب في جوجل mozkratgahza

∵ The two triangles ABM and ACM have :

m(∠ B) = m (∠ C) = 90° *(Proof)*

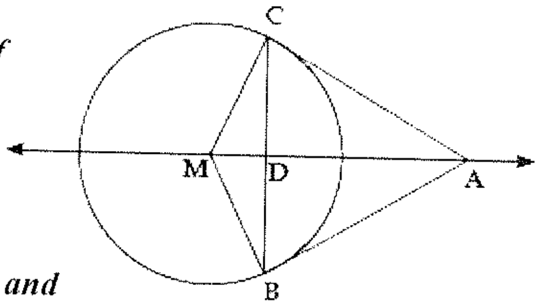
MB = MC *(Lengths of radii)*

$\overline{AM}$ is a common side . ∴ △ ABM ≡ △ ACM

We get : $\overline{AB} \equiv \overline{AC}$ ∴ AB = AC *(Q.E.D.)*

Corollary (1)

The straight line passing through the center of the circle and the intersection point of the two tangent is an axis of symmetry to the chord of tangency of those two tangents.

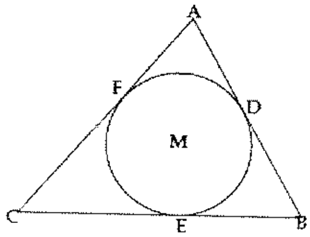


Corollary (2)

The straight line passing through the center of the circle and the intersection point of its two tangents bisects the angle between these two tangents. It also bisects the angle between the two radii passing through the two points of tangency.

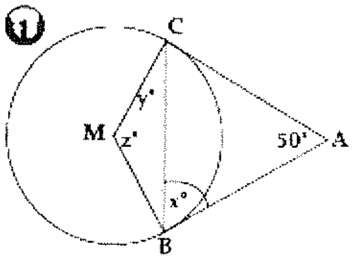
Definition

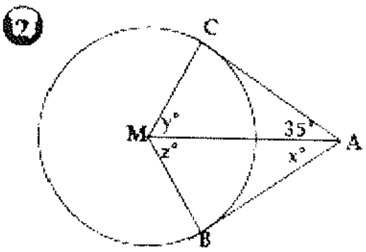
The inscribed circle of a polygon is the circle which touches all of its sides internally.

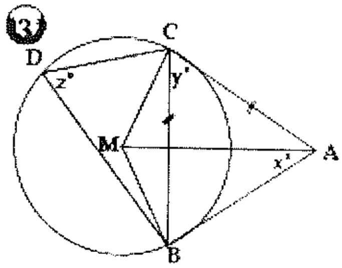


Performance assessment

EX1 In each of the following figures, $\overline{AB}$ and $\overline{AC}$ are two tangent segments to the circle M. Find the value of the symbol used in measuring:



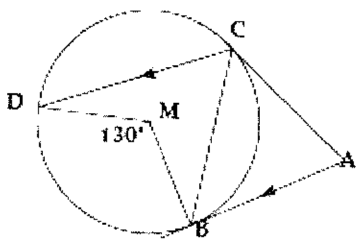




EX2 In the opposite figure :

$\overline{AB}$ and $\overline{AC}$ are two tangent segments to the circle M,

$\overline{AB}$ // $\overline{CD}$, m (∠ BMD) = 130° .



(1) Prove that : $\overrightarrow{CB}$ bisects ∠ ACD (2) *Find* m (∠ A) .

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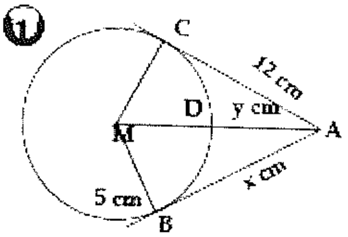
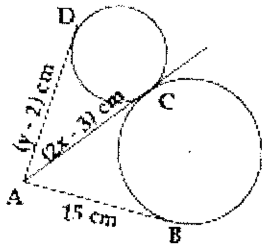
EX3

Find the value of the symbol used in measuring :

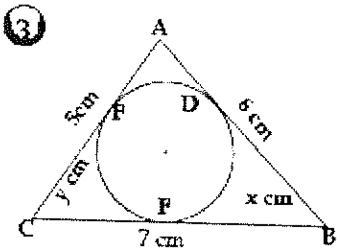
(1)



(2)



(3)



Home work :schoolbook drill page 118

اكتب في جوجل mozkratgahza

Grade	Domain	Title	Time	Period	Date	Place
		The relation between the tangents of a circle (cont)				

lesson objectives

At the end of this lesson The student should be able to :

1) solve problems on the relation between the tangents of a circle.

learning tools & resources

Colored pens, white board, schoolbook ,......................

Previous experience

The relation between the tangents of a circle

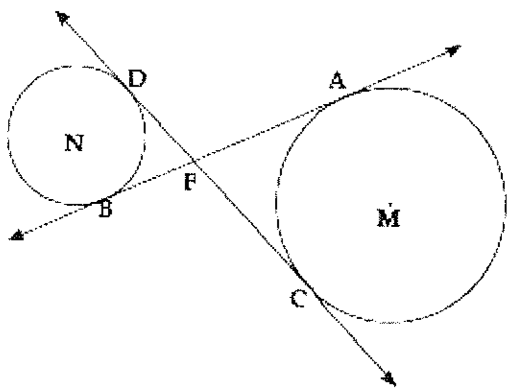
Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

Common tangents of two distant circles :

A. $\overleftrightarrow{AB}$ is called a common internal tangent to the two circles M and N because the two circles M and N are located at two different sides of $\overleftrightarrow{AB}$, Also $\overleftrightarrow{CD}$ is an internal tangent to the two circles .



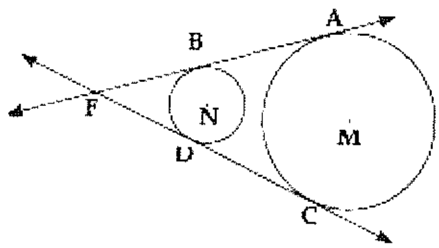
Notice that : $\overleftrightarrow{AB} \cap \overleftrightarrow{CD} = \{E\}$

In the opposite figure: Prove that : AB = CD

B. $\overleftrightarrow{AB}$ is called a common external tangent to the two circles M and N because the two circles M and N are located in the same side of , $\overleftrightarrow{AB}$, also $\overleftrightarrow{CD}$ is an external tangent to the two circles

Notice that : $\overleftrightarrow{AB} \cap \overleftrightarrow{CD} = \{F\}$

In the opposite figure: Prove that AB = CD



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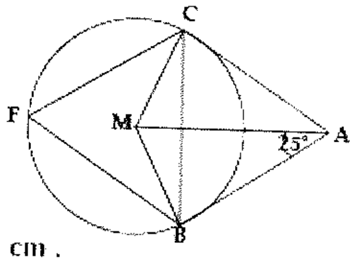
Performance assessment

(1) In the opposite figure:



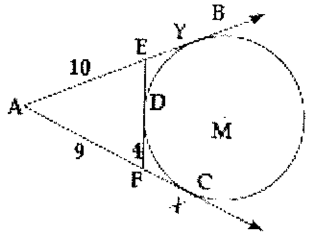
$\overline{AB}$ and $\overline{AC}$ are two tangent segments to the circle M.

m (∠BAM) = 25°, E ∈ $\overset{\frown}{BC}$ the major.

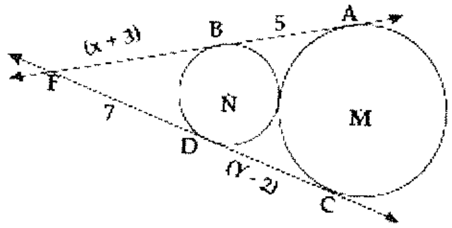
Find : First: m (∠ACB)   Second: m (∠BEC).

(2) In each of the following figures: Find the value of X and Y in cm.

A

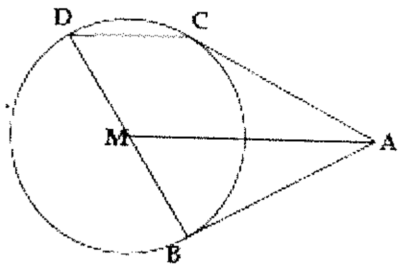


B



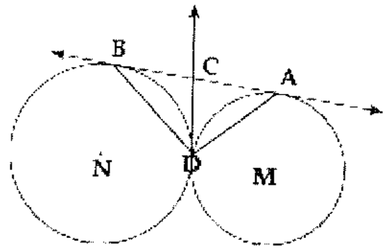
Enhancement activities

(3) In the opposite figure:



$\overline{AB}$ and $\overline{AC}$ are two tangent segments to the circle M and, $\overline{BD}$ is a diameter of the circle. Prove that $\overline{AM} // \overline{CD}$

(4) M and N are two circles touching externally at D and, $\overleftrightarrow{AB}$ is a common tangent to them at A and B, $\overrightarrow{DC}$ is a common tangent to the two circles at D.



Where $\overrightarrow{DC} \cap \overleftrightarrow{AB} = \{C\}$.

Prove that : First: C is the midpoint of $\overline{AB}$.

Second: $\overline{AD} \perp \overline{BD}$.

Home work :schoolbook page 120 no5

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Grade	Domain	Title	Time	Period	Date	Place
		Angles of Tangency				

lesson objectives

At the end of this lesson The student should be able to :

1) Recognize the angle of tangency
2) Deduce the relation between the angle of tangency and the inscribed angle subtended by the same arc

learning tools & resources

Colored pens, white board, schoolbook ,....................

Previous experience

The inscribed angle and the central angle

Teaching Strategy

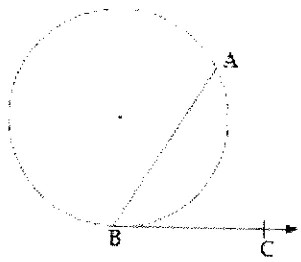
Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

Angle of Tangency

The angle which is composed of the union of two rays, one is a tangent to the circle and the other contains a chord of the circle passing through the point of tangency.

i.e. : $m(\angle ABC) = \frac{1}{2} m(\overset{\frown}{AB})$



Theorem (5)

The measure of the angle of tangency is equal to the measure of the inscribed angle subtended by the same arc.

Given: $\angle ABC$ is an angle of tangency and , $\angle D$ is an inscribed angle .

R.T.P.: Prove that: $m(\angle ABC) = m(\angle D)$

Proof: $\because$ $\angle ABC$ is an angle of tangency

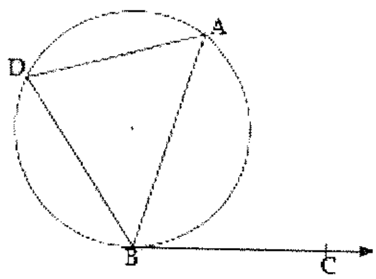
$\therefore m(\angle ABC) = \frac{1}{2} m(\overset{\frown}{AB})$ (1)

$\because$ $\angle D$ is an inscribed angle

$\therefore m(\angle D) = \frac{1}{2} m(\overset{\frown}{AB})$ (2)

From (1) and (2) we get :

$m(\angle ABC) = m(\angle C)$



Q.E.D.

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Corollary

The measure of the angle of tangency is half the measure of the central angle subtended by the same arc.

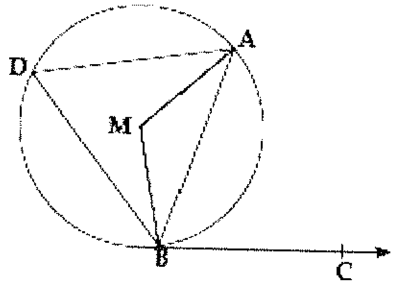
In the opposite figure:

$\overrightarrow{BC}$ is tangent to circle M, $\overline{AB}$ is a chord of tangency

$\therefore m(\angle ABC) = m(\angle D)$

$\because m(\angle D) = \frac{1}{2} m(\angle AMB)$

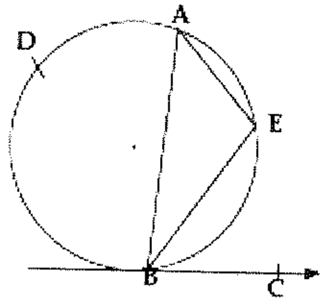
$\therefore m(\angle ABC) = \frac{1}{2} m(\angle AMB)$



Important notice :

The angle of tangency is supplementary to the drawn inscribed angle on the chord of the angle of tangency and in one side of it.

i.e. : $\angle$ ABC is supplementary to $\angle$ AEB .

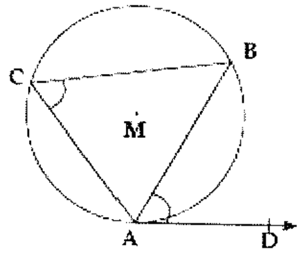


The converse of theorem (5)

If a ray is drawn from one end of a chord of a circle so that the angle between this ray and the chord is equal in measure to the inscribed angle subtended by the chord in the alternate side, then this ray is a tangent to this circle.

If we draw $\overrightarrow{AD}$ from one end of the chord $\overline{AB}$ in circle M and:

$m(\angle DAB) = m(\angle C)$ then: $\overrightarrow{AD}$ is a tangent to circle M .

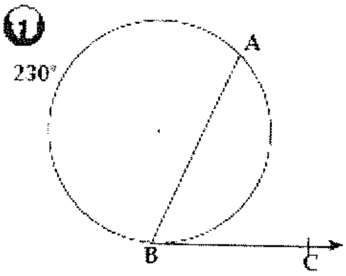


Performance assessment

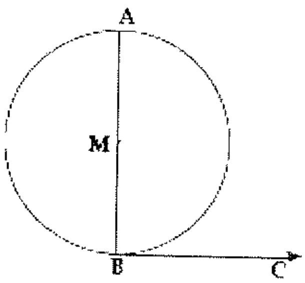
EX1

In each of the following figures, calculate m ($\angle$ABC) .

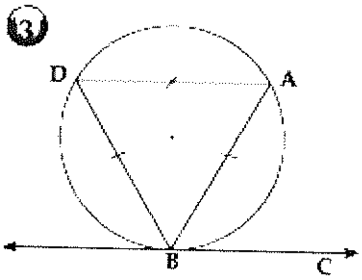
(1)



(2)



(3)



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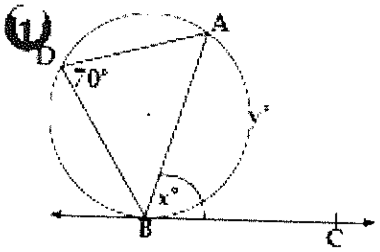
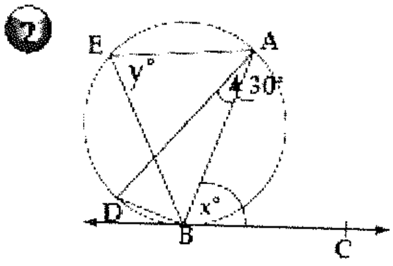
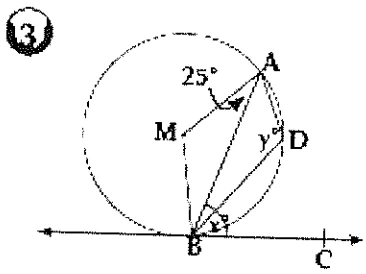
EX2

In each of the following figures: $\overleftrightarrow{BC}$ is tangent to the circle.
Find the value of the symbol used in measuring .



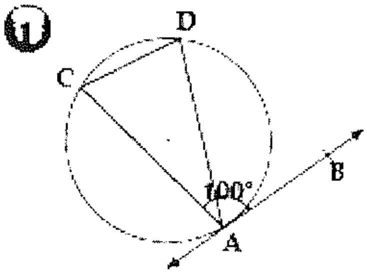


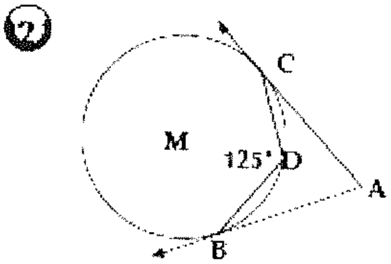


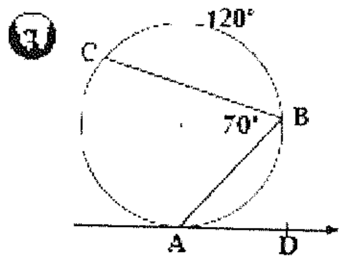
Enhancement activities

EX3

With the assistance of the given figures, complete:



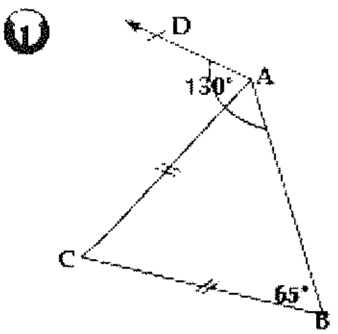


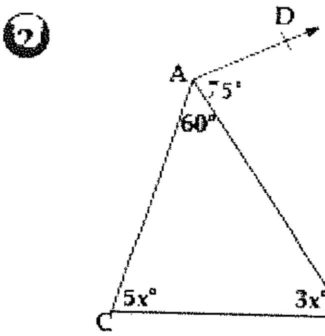


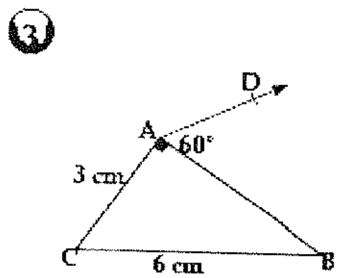
m (∠ADC) = ... ° m (∠BAC) = ... ° m (∠BAD) = ... °

EX4

In each of the following shapes show that $\overleftrightarrow{AD}$ is a tangent to the circle passing through the vertices of the triangle ABC.







Home work :schoolbook page 125

Grade	Domain	Title	Time	Period	Date	Place
		General Exercises				

lesson objectives

At the end of this lesson The student should be able to :

1) Solve problems on angels of tangency inscribed angles and central angles.

learning tools & resources

Colored pens, white board, schoolbook ,.....................

Previous experience

The angels of tangency , the inscribed angle and the central angle

Teaching Strategy

Brain storming ☐ *Self learning* ☐ *Cooperative learning* ☐ *Pairs learning* ☐ *Problem solving* ☐ *Games* ☐

lesson activities

(1) $\overline{AB}$ is a diameter in circle M, m (∠BAC) = 65°, D ∈ $\overset{\frown}{BC}$

Calculate m (∠ACB), m (∠CDB)

(2) $\overline{MA}$ and $\overline{MB}$ are two perpendicular radii in circle M, $\overline{AC}$ and $\overline{BD}$ are two perpendiculat and intersecting chords at E .

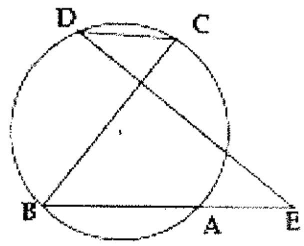
A. *Find* m (∠CBD)

B. Prove that : $\overleftrightarrow{AD}$ // $\overleftrightarrow{BC}$

(3) In the opposite figure:

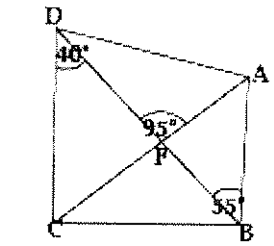
E is a point outside the circle.

prove that : m (∠E) < m (∠BCD)

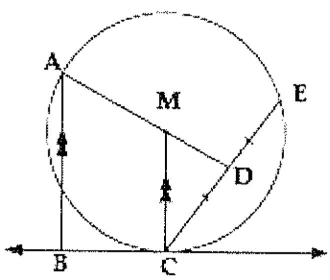


(4) In each of the following shapes, prove that ABCD is a cyclic quadrilateral:

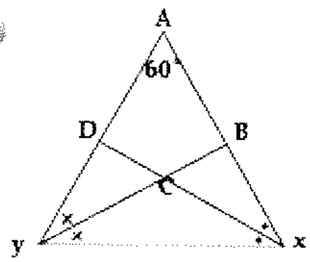
A.



B.

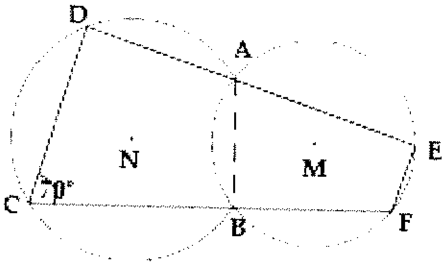


C.



5. ABCD is a paralelogram the circle passing through the points A, B and D intersects $\overline{BC}$ in E. **Prove that:** CD = ED

6. M and N are two intersecting circles at A and B, $\overleftrightarrow{AD}$ is drawn to intersect circle M at E and circle N at D. $\overleftrightarrow{BC}$ is drawn to intersect circle M at F and circle N at C, m(∠C) = 70° .

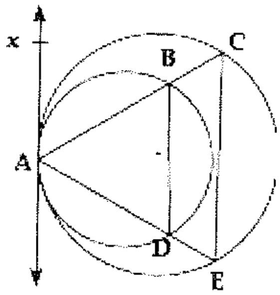


   A. *Find* m (∠ F)

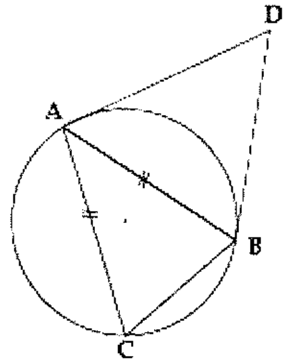
   B. **Prove that** $\overleftrightarrow{CD}$ // $\overleftrightarrow{EF}$.

7. **Use the given data to prove that :**

   A. $\overline{BD}$ // $\overline{CE}$



   B. $\overline{AC}$ is a tangent to the circle passing through the vertices of the triangle ABD



Home work :schoolbook page 128 &129

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