

LESSON PLAN CLASS 9[2019 -2020]



Class	Subject	Time Slot	Lesson	Topic
IX	Mathematics	35 mins Period 1	Lines and Angles	- Introduction - Basic terms and Definitions

Expected Learning Outcome :The learners will be able to :
Define intersecting and non- intersecting lines, pair of angles formed by them, types of angles, non- collinear points.
Identify linear pair of angles, adjacent angles, complementary angles
Prove that the vertically opposite angles are equal

Expected skill development:

- Developing connection skills while relating formation of different angles.
- Procedural thinking while finding the angles.

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

Pedagogy	Content
(5 Min) Warm Up learners are paired and are asked to discuss the meaning/ definitions of some basic terms. They will also discuss one by one with the class.	1. Ray - 2. Line - 3. Types of Angles: (i) acute angle : $0^\circ < x < 90^\circ$ (ii) right angle : $y = 90^\circ$ (iii) obtuse angle : $90^\circ < z < 180^\circ$ (iv) straight angle : $s = 180^\circ$ (v) reflex angle : $180^\circ < t < 360^\circ$ 4. (i) Intersecting lines (ii) Non-intersecting (parallel) lines

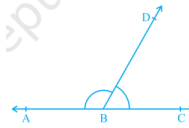


Fig. 6.3 : Linear pair of angles

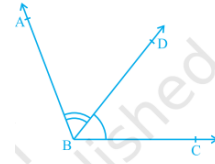


Fig. 6.2 : Adjacent angles

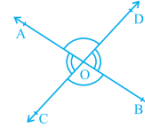


Fig. 6.4 : Vertically opposite angles

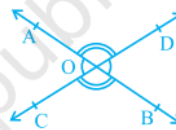
(20 mins) Demonstration by facilitator on Black Board

The facilitator reinforces the terms discussed and present them in the form of following axioms:

- A. If a ray stand on a line, the the sum of two adjacent angles is 180.
- B. If the sum of two adjacent angles is 180, then the non common arms of the angles forms a line.

With the help of above axioms, Learners observe the following theorem:

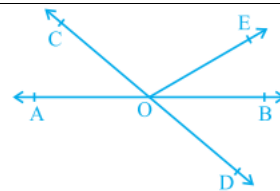
Theorem: if two lines intersect each other, then the vertically opposite angles are equal.



(5 mins) : Closure

The facilitator will ask the learner to solve Question 1 of ex – 6.1

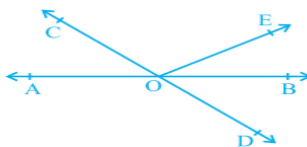
1. In Fig. 6.13, lines AB and CD intersect at O. If $\angle AOC + \angle BOE = 70^\circ$ and $\angle BOD = 40^\circ$, find $\angle BOE$ and reflex $\angle COE$.



Learners will attempt in their note books, one of them will solve on blackboard.

- a) Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)

1. In Fig. 6.13, lines AB and CD intersect at O. If $\angle AOC + \angle BOE = 70^\circ$ and $\angle BOD = 40^\circ$, find $\angle BOE$ and reflex $\angle COE$.



- b) Evaluation/Assessment: Peer discussion will be done. Teacher will assess the children randomly and also through student teacher interaction.

Learners on the way

If one angle of a triangle is equal to the sum of the other two angles, then the triangle is

- a) An isosceles triangle
- b) An obtuse angled triangle
- c) An equilateral triangle
- d) A right angled triangle.

Advanced Learners

If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 2 : 3, then the greater of the two angles is

- (A) 54° (B) 108° (C) 120° (D) 136°

Materials needed/Resources: Chalk, blackboard, duster, NCERT Text Book

Common Misconceptions:

- ❖ Wrong detection of adjacent angles

Addressing the Misconceptions:

Explanation by drawing various diagrams.

HOME ASSIGNMENTS: Do Q-2 of Ex – 6.1 of NCERT Text Book Class 9

2. In Fig. 6.14, lines XY and MN intersect at O. If $\angle POY = 90^\circ$ and $a : b = 2 : 3$, find c .

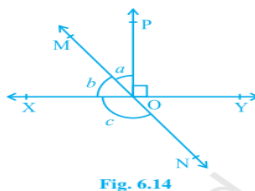


Fig. 6.14

LESSON PLAN CLASS 9 [2019 -2020]



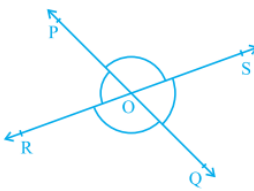
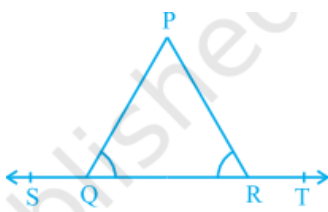
DLF Public School

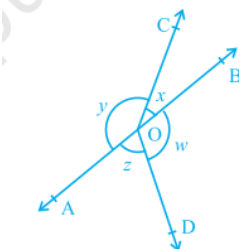
THE LEARNING ACADEMY

Managed By Darbari Lal Foundation

Class	Subject	Time Slot	Lesson	Topic
IX	Mathematics	35 Mins Period 2	Lines and Angles	• Ex - 6.1 contd.
Expected Learning Outcome :The learners will be able to : • Apply the concept to find angles. • Prove the various relation between the angles.				
Expected skill development: • Developing connection skills while relating different angles formed. • Procedural thinking while finding the angles.				

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

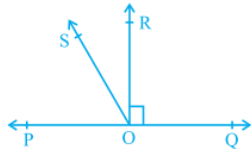
Pedagogy	Content
(10 mins) Warm up Demonstration by Facilitator on Black Board Facilitator takes up some questions and discuss it with the learners based on previous day knowledge.	In Fig. 6.9, lines PQ and RS intersect each other at point O. If $\angle POR : \angle ROQ = 5 : 7$, find all the angles.  Fig. 6.9
(20 mins) Demonstration by Facilitator on Board	In Fig. 6.15, $\angle PQR = \angle PRQ$, then prove that $\angle PQS = \angle PRT$.  The facilitator tell the learners the exact way to write solution of a problem or to prove whatever is asked. The method is:

Learners will be called on Black Board to solve the question.	Step 1: Given: (write the information provided in the question) Step 2: to find/ prove (write the things that are to be proved) Step 3: Constructions (write if there is any construction) Step 4: Solution (write the steps of solution) The facilitator explains and writes the solution of the above question on the board; learners follow it and are advised to do all the questions likeways. In Fig. 6.16, if $x + y = w + z$, then prove that AOB is a line.  Fig. 6.16
(5 mins) in class exercise: Closure The facilitator will reinforce all the concept done in class like vertically opposite angles, linear pair, adjacent angles.	

Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)

It is given that $\angle XYZ = 64^\circ$ and XY is produced to point P. Draw a figure from the given information. If ray YQ bisects $\angle ZYP$, find $\angle XYQ$ and reflex $\angle QYP$.

Evaluation/Assessment: Learners will do the calculation and write their observations in their note books. Teacher will take rounds and assess the children randomly.

Learners on the way It is given that angle XYZ = 64 and XY is produced to point P. Draw a figure from the given information.	Advanced Learners In Fig. 6.17, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that $\angle ROS = \frac{1}{2} (\angle QOS - \angle POS).$  Fig. 6.17
Materials needed/Resources: Chalk, blackboard, duster, NCERT Text Book.	
Common Misconceptions:	Addressing the Misconceptions:

HOME ASSIGNMENTS: Attempt Q- 4, 5 of Ex – 6.1 from NCERT Text Book Class 9

LESSON PLAN CLASS 9[2019 -2020]



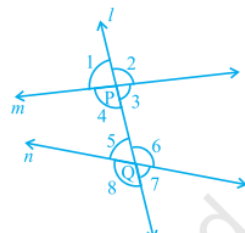
DLF Public School

THE LEARNING ACADEMY

Managed By Darbari Lal Foundation

Class	Subject	Time Slot	Lesson	Topic
IX	Mathematics	35 mins Period 3	Lines and Angles	- Parallel lines and a transversal - Lines parallel to the same line
Expected Learning Outcome :The learners will be able to : - Identify different angles when a transversal intersects two distinct lines. - Apply the fact that if a transversal intersects two parallel lines then, - Each pair of corresponding angles are equal - Each pair of alternate interior angles are equal. - Each pair if interior angles in the same side of transversal is supplementary. - Use the fact, lines parallel to the same line are parallel to each other.				
Expected skill development: - Developing connection skills while relating formation of different angles. - Procedural thinking while finding the angles.				

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

Pedagogy	Content
(5 mins) Warm up Learners are paired up and are asked to discuss the meaning/ definitions of some basic terms and give answers. - Pair of corresponding angles - Pair of alternate angles - Pair of co – interior angles - A transversal - Supplementary angles They will also share the knowledge with the class.	
(20 min) Demonstration by facilitator on Black Board The facilitator makes a conclusion by combining all the right answers and explains all the terms on the board.	The facilitator will draw the diagram to give clear idea of various angles formed when a transversal cut two intersecting lines and the relationship between the angles if the lines are parallel. 

(a) Corresponding angles :

(i) $\angle 1$ and $\angle 5$

(ii) $\angle 2$ and $\angle 6$

(iii) $\angle 4$ and $\angle 8$

(iv) $\angle 3$ and $\angle 7$

(b) Alternate interior angles :

(i) $\angle 4$ and $\angle 6$

(ii) $\angle 3$ and $\angle 5$

(c) Alternate exterior angles:

(i) $\angle 1$ and $\angle 7$

(ii) $\angle 2$ and $\angle 8$

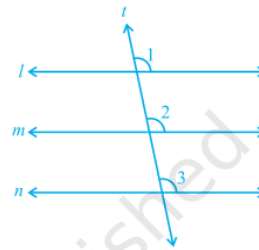
(d) Interior angles on the same side of the transversal:

(i) $\angle 4$ and $\angle 5$

(ii) $\angle 3$ and $\angle 6$

the facilitator will present them in the form of different axioms and theorems

1. If a transversal intersects two parallel lines, then each pair of corresponding angles are equal and vice – versa.
2. If a transversal intersects two parallel lines, then each pair of alternate interior angles are equal and vice – versa.
3. If a transversal intersects two parallel lines, then each pair of interior angles on the same side of the transversal is supplementary and vice – versa.



Theorem 6.6 : Lines which are parallel to the same line are parallel to each other.

Proof : Let us draw a line t transversal for the lines l , m and n . it is given that line m parallel to line l and line n parallel to line l .

Therefore, $1 = 2$ and $1 = 3$

(corresponding angle axiom)

But $2 = 3$ (corresponding angles)

Therefore, you can say that the line m is parallel to line n .

Think line:

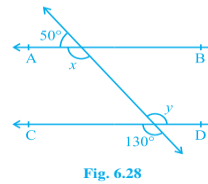
The property discussed above can be extended to more than two lines?

Different response by learners and then facilitator will show them by drawing the diagram on board.

(5 mins) In class Exercise: closure

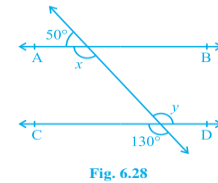
Learners will attempt Q – 1 of Ex – 6.2 in note book.

In Fig. 6.28, find the values of x and y and then show that $AB \parallel CD$.



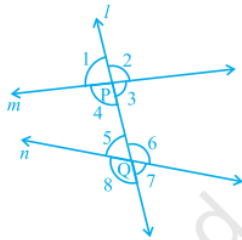
Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)

In Fig. 6.28, find the values of x and y and then show that $AB \parallel CD$.

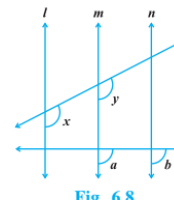


Evaluation/Assessment: Learners will do the calculation in their notebook. Teacher will take rounds and assess the children randomly.

Learners on the way
Identify different angles when a transversal intersects two distinct lines.



Advanced Learners
Sample Question 2 : In Fig.6.8, $x = y$ and $a = b$.
Prove that $l \parallel n$.



Materials needed/Resources: Chalk, blackboard, duster NCERT Text Book, NCERT Exemplar

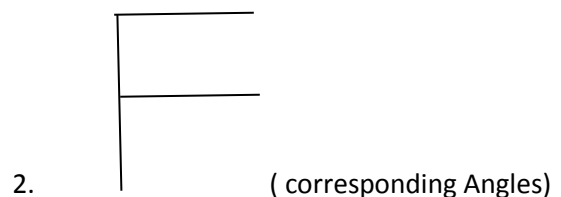
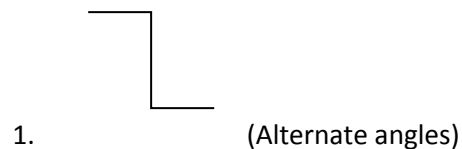
Common Misconceptions :

1. To differentiate between alternate interior/exterior angles, corresponding angles ..etc and their applications
2. Lack of assimilation of the angles in parallel lines such as alternate and corresponding angles.

Addressing the Misconceptions:

Explanation

By using English Alphabets for eg.



	 3. (co – interior angels)
--	--

HOME ASSIGNMENTS: Complete rest parts of Ex – 4.3 of NCERT text book class 9.



LESSON PLAN CLASS 9 [2019 -2020]

Class	Subject	Time Slot	Lesson	Topic
IX	Mathematics	35 mins Period 4	Lines and Angles	- Parallel lines and transversal - Ex – 6.2 contd.
Expected Learning Outcome :The learners will be able to : - Recapitulate the form of different axioms and theorems based on parallel lines and transversal. - Apply the knowledge in solving the question.				
Expected skill development: - Developing connection skills while relating formation of different angles. - Procedural thinking while finding the angles.				

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

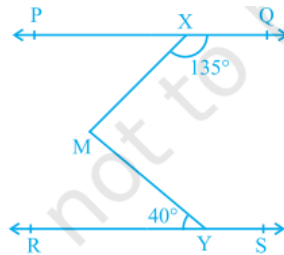
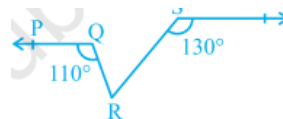
Pedagogy	Content
(5 mins) Warm up Facilitator will recall the previous day knowledge. She takes up some questions and ask the learners to solve on board.	In Fig. 6.24, if $PQ \parallel RS$, $\angle MXQ = 135^\circ$ and $\angle MYR = 40^\circ$, find $\angle XMY$.  Fig. 6.24
(20 min) Demonstration by Facilitator on Board The facilitator writes and explains the solution of Q-4 and 6 of Ex – 6.2 on the board; the learners follow it and are advised to do all the questions likeways.	4. In Fig. 6.31, if $PQ \parallel ST$, $\angle PQR = 110^\circ$ and $\angle RST = 130^\circ$, find $\angle QRS$.  6. In Fig. 6.33, PQ and RS are two mirrors placed parallel to each other. An incident ray AB strikes the mirror PQ at B, the reflected ray moves along the path BC and strikes the mirror RS at C and again reflects back along CD. Prove that $AB \parallel CD$.

	Fig. 6.33
(5 mins) Inclass Exercise: closure One student will be called to solve the given problem	In Fig. 6.9, OD is the bisector of $\angle AOC$, OE is the bisector of $\angle BOC$ and $OD \perp OE$. Show that the points A, O and B are collinear. Fig. 6.9

Proposed Questions (must include the questions asked in the classroom <u>and</u> the ones given as class-work in the notebook) In Fig. 6.9, OD is the bisector of $\angle AOC$, OE is the bisector of $\angle BOC$ and $OD \perp OE$. Show that the points A, O and B are collinear. Fig. 6.9	
Evaluation/Assessment: Learners will do the calculation in their notebook. Teacher will take rounds and assess the children randomly.	
Learners on the way Two adjacent angles are equal. Is it necessary that each of these angles will be a right angle? Justify your answer.	Advanced Learners Two lines are respectively perpendicular to two parallel lines. Show that they are parallel to each other.
Materials needed/Resources: NCERT Text Book NCERT Exemplar, Chalk, blackboard, duster	
Common Misconceptions : In identification of alternate and corresponding angles.	Addressing the Misconceptions: Learners will be addressed by explaining them with the help of various diagrams.

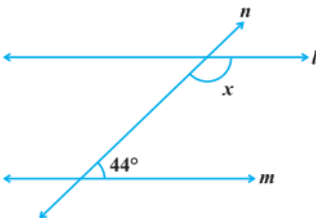
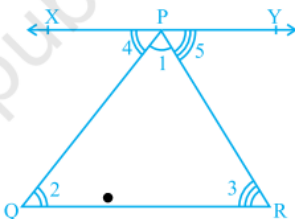
HOME ASSIGNMENT: Do Q – 3 and 5 of Ex – 6.2 in note book of NCERT text book of class 9 .

LESSON PLAN CLASS 9 [2019 -2020]



Class	Subject	Time Slot	Lesson	Topic
IX	Mathematics	35 mins + 35 mins Period 5 and 6	Lines and Angles	- Angle sum property of Triangle - Ex – 6.3
Expected Learning Outcome :The learners will be able to : - State and prove the angle sum property of Triangle. - Show that the exterior angle of a triangle is equal to the sum of the two interior opposite angles and apply in day to day life.				
Expected skill development: - Developing connection skills while relating formation of different angles. - Procedural thinking while finding the angles.				

FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

Pedagogy	Content
(5 mins)Warm up Facilitator will draw a diagram on black board and learners will respond. Facilitator will give the proof of ASP of triangle and take up questions from the Ex – 6.3	In Fig. 6.5, find the value of x for which the lines l and m are parallel.  Fig. 6.5 Theorem 6.7 : The sum of the angles of a triangle  Fig. 6.35

We need to prove that $\angle 1 + \angle 2 + \angle 3 = 180^\circ$. Let us draw a line XPY parallel to QR through the opposite vertex P, as shown in Fig. 6.35, so that we can use the properties related to parallel lines.

Now, XPY is a line.

Therefore, $\angle 4 + \angle 1 + \angle 5 = 180^\circ$ (1)

But XPY $\parallel$ QR and PQ, PR are transversals.

So, $\angle 4 = \angle 2$ and $\angle 5 = \angle 3$
(Pairs of alternate angles)

Substituting $\angle 4$ and $\angle 5$ in (1), we get

$$\angle 2 + \angle 1 + \angle 3 = 180^\circ$$

That is, $\angle 1 + \angle 2 + \angle 3 = 180^\circ$

Think line:

Is exterior angle of a triangle is greater than either of its interior opposite angles?

(20 mins) Demonstration by Facilitator on Board

Theorem 6.8 : *If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles.*

Therefore, an exterior angle of a triangle is greater than either of its interior opposite angles

In Fig. 6.40, $\angle X = 62^\circ$, $\angle XYZ = 54^\circ$. If YO and ZO are the bisectors of $\angle XYZ$ and $\angle XZY$ respectively of $\triangle XYZ$, find $\angle OZY$ and $\angle YOZ$.

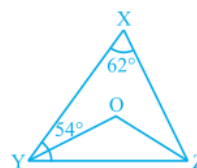


Fig. 6.40

(5 mins) in class exercise: Closure

Facilitator will demonstrate the question on board.

In Fig. 6.44, the side QR of $\triangle PQR$ is produced to a point S. If the bisectors of $\angle PQR$ and $\angle PRS$ meet at point T, then prove that $\angle QTR = \frac{1}{2} \angle QPR$.

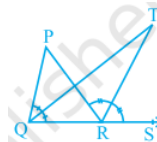


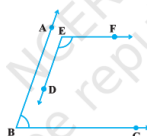
Fig. 6.44

Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)

Sample Question 1 : If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 2 : 3, then the greater of the two angles is

- (A) 54° (B) 108° (C) 120° (D) 136°

6. In Fig. 6.13, $BA \parallel ED$ and $BC \parallel EF$. Show that $\angle ABC + \angle DEF = 180^\circ$



In Fig. 6.17, $\angle Q > \angle R$, PA is the bisector of $\angle QPR$ and $PM \perp QR$. Prove that

$$\angle APM = \frac{1}{2} (\angle Q - \angle R).$$

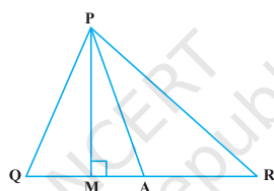


Fig. 6.17

Evaluation/Assessment: Learners will do the calculation in their notebook. Teacher will take rounds and assess the children randomly.

Learners on the way

If one angle of a triangle is equal to the sum of the other two angles, then the triangle is

- An isosceles triangle
- An obtuse angled triangle
- An equilateral triangle
- A right angled triangle.

Advanced Learners

In Fig. 6.44, the side QR of $\triangle PQR$ is produced to a point S. If the bisectors of $\angle PQR$ and $\angle PRS$ meet at point T, then prove that

$$\angle QTR = \frac{1}{2} \angle QPR.$$



Fig. 6.44

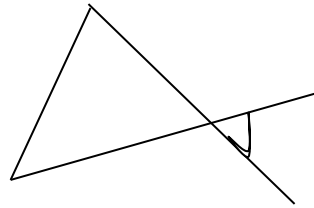
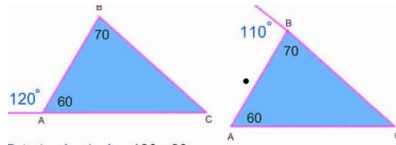
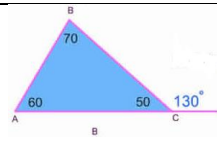
Materials needed/Resources: NCERT Text Book NCERT Exemplar, Chalk, blackboard, duster

Common Misconceptions :

Wrong detection of exterior angle in a triangle.

Addressing the Misconceptions:

- Learners will be addressed by explaining them with the help of various diagrams.



(not an exterior angle)

HOME ASSIGNMENT: Q 1, 3, 4 and 5 of Ex – 6.3