

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

SUMMARY SHEET	
Learner Previous Knowledge	Introduction to the tools used in construction of geometrical shapes- ruler, protractor, set squares, compasses, divider; Constructing a line segments using a ruler, ruler and compass, ruler and divider; Construction of a circle of a given radius through a ruler and compass Construction of a perpendicular through a given point on a line through set squares, ruler and compass; Construction of a perpendicular to a line from given point not on the line through ruler and set squares, ruler and compasses Construction of a perpendicular bisector of a line segment through paper folding and through compass Construction of an angle of known measure through a protractor and through a ruler and compass (60, 30, 120, 90, 45).
Target Knowledge for this Topic	Construction of a line parallel to a given line through a point not on the line using ruler and compass; Recap the properties of a triangle. Construct a triangle when the length of its three sides are given (SSS Criterion); Construct a triangle when the lengths of two sides and the measure of the angle between them are known (SAS Criterion) along with the steps of

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

		construction; Construct a triangle when the lengths of two angles and the length of the side included between them is given (ASA Criterion) along with the steps of construction; Construct a right-angled triangle when the length of one side and hypotenuse is given. (RHS criterion) along with steps of construction
Learning Goals		
<i>More Complex Learning Goal- Students will be able to identify the errors and rectify them using the built knowledge.</i>		
Target Learning Goal – Students will be able to construct parallel lines & triangles using various tools and describe the steps of construction.		
<i>Simpler Learning Goal- Students will be able to state the criterion for construction of triangles.</i>		
Period No.	Lesson Objectives	Teaching Learning Materials Required
1	Construction of a line parallel to a given line through a point not on the line using ruler and compass	Worksheet-1 (1 per student); ruler and compass (1 per student) Discussion: Textbook (1 per class); Big ruler and compass (1 for the teacher)
2 & 3 <i>Note: this plan will take 2 days</i>	- Recap the all properties of triangles - Construct a triangle when the length of its three sides are given (SSS Criterion)	Properties of Triangles: Worksheet-2 (1 per student); projector (1 per class); Construction: Worksheet-3 (1 per student)
4 and 5	Construct a triangle	Brainstorm: A4 sheet (1 Per

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

<i>Note: this plan will take 2 days</i>	when the lengths of two sides and the measure of the angle between them are known (SAS Criterion) along with the steps of construction; Construct a triangle when the lengths of two angles and the length of the side included between them is given (ASA Criterion) along with the steps of construction;	student of the group); Protractor, compass & ruler (1 set per student) <u>Create your own measurements: Worksheet-4</u> (1 per student); Protractor & ruler (1 per student)
6	Construct a right-angled triangle when the length of one side and hypotenuse is given. (RHS criterion) along with steps	<u>Worksheet-5</u> (1 per student);

Period-1

Lesson Objectives

At the end of this lesson students will be able to:

Construction of a line parallel to a given line through a point not on the line using ruler and compass

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Teaching Learning Materials required

- **Worksheet-1** (1 per student); ruler and compass (1 per student)

Discussion: Textbook (1 per class); Big ruler and compass (1 for the teacher)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 to 6

Lesson Beginning <u>Time:</u> 10 mins . <u>Purpose:</u> Activate prior knowledge To introduce the topic	<u>Brainstorm/groups</u> • Ask: ○ Which property of parallel lines can be used to construct a line parallel to a given line through a point not on the line? (Note- Draw the diagram on the board for clarity) • Give them 5 mins time to discuss and think of the solutions. • Discuss the properties suggested by groups. <i>(Note- The properties are- If two parallel lines are cut by transversal, each pair of corresponding angles are equal in measure & If two parallel lines are cut by transversal, each pair of alternate interior angles are equal in measure).</i>
Lesson Middle <u>Time:</u> 15 minutes <u>Purpose:</u> Develop the conceptual understanding Consolidate students learning	<u>Discussion group /Whole Class</u> • Introduce the method used in the video as ‘angle copy method’ • Distribute the Worksheet-1 to each student. • Ask the students to work as group but complete their individual sheets • Give them 15 mins to complete the task.
Lesson End	<u>Whole class-discussion</u> • Project Worksheet-1.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

<u>Time:</u> 15 minutes <u>Purpose:</u> Develop conceptual understanding	• At random call different groups in front to share the steps of construction used for the challenge question. • Ask the following questions from the representative group: ○ How you used ruler and a compass to draw a parallel line through a point, which is not on the line. (Using the alternate interior angle property) ○ How can you prove that the lines are parallel? ○ How you used those tools to prove or check the statement said above? ○ Explain the steps of construction. • Build the consensus on all the steps. <i>Note: Students may come up with incorrect steps of construction and justification. In this case, ask other students who may have the correct explanation with justification. It is important to build consensus on all steps – this will help eradicate any errors..</i> <u>Home assignment</u> • Tell the students to complete the Exercise 10.1 given on page 198 of the textbook at home.
---	---

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

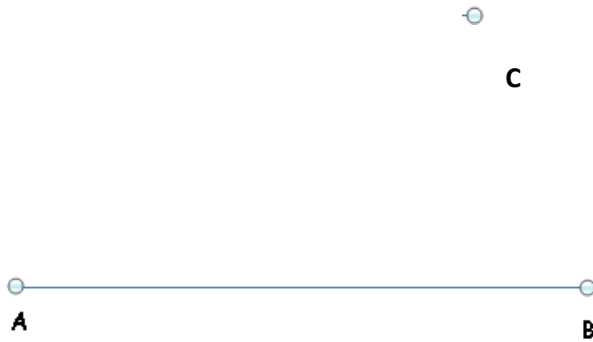
Name: _____

Worksheet-1
Solving

Skill: Problem

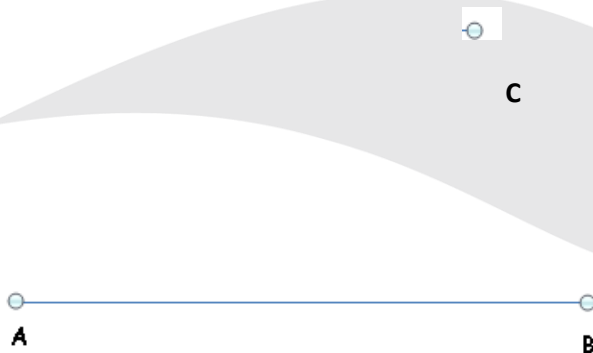
Topic- Construction of Parallel line

1. Using ruler and compass construct a line parallel to the line AB through the point C.
(Use the method shown in video)



Challenge Question

2. Modify the above construction to use the idea of equal alternate interior angle instead of equal corresponding angle and show the construction.



Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Write the steps used for construction

A large, light gray, stylized graphic of a lowercase letter 'l' is positioned on the right side of the page. The letter is formed by a thick, curved stroke that starts from the bottom left, curves upwards and to the right, and then curves back down to the bottom right. The background is white with horizontal lines. There are two small horizontal dashes on the left side of the page, one near the top and one near the bottom.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Period 2 & 3

Lesson Objectives

At the end of this lesson students will be able to:

- Recap the all properties of triangles
- Construct a triangle when the length of its three sides are given (SSS Criterion).

Teaching Learning Materials required

- **Properties of Triangles: Worksheet-2**(1 per student); projector (1 per class);
- **Construction: Worksheet-3** (1 per student)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 to 6

Lesson Beginning <u>Time:</u> 25 mins. <u>Purpose:</u> Generate interest in the topic	<u>Properties of Triangles /groups</u> • Distribute each student Worksheet-2. • Give them time to complete the task. <i>Note: Students may be discussing in their groups but they will record the steps in their individual sheet.</i>
--	--

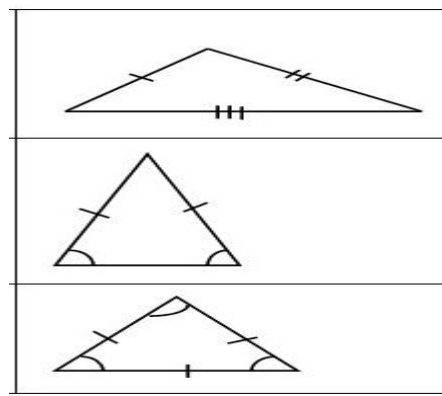
Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Activate prior knowledge	
Lesson Middle <u>Time</u>: 35 mins <u>Purpose</u>: Develop conceptual understanding	<u>Whole class-discussion</u> • Project Worksheet-2. • At random call different groups in front to share the answers • Ask the following questions from the representative group: ○ What are the names of the triangles on the basis of Sides / Angles? ○ Give reason behind the name ○ What are the properties of triangles? State them (Angle sum property, Triangle Inequality Property, Pythagoras theorem, Exterior angle of a triangle & its property) ○ What are the criteria of congruence? (SSS, SAS, ASA, RHS) (Note- Refer chapter 7 of the textbook- Congruence of triangles for the criteria of congruence & sets of measurements required for construction of triangle) <u>Construction /groups</u> • Distribute the Worksheet-3 & a compass and ruler to each student • Ask them to discuss the steps but work in individual sheets • Tell them to visualize and draw a rough sketch first since it will give an idea as to how to proceed further • Give them a hint that they have attempted construction of line segment using compass & ruler in earlier classes. The same concept is to be extended further • Let the groups complete the task.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Lesson End <u>Time:</u> 20 minutes <u>Purpose:</u> Consolidate students learning	<u>Discussion- Whole Class</u> • Once they are done with it, then at random call volunteers in front to share the steps of construction. • Encourage them to explain the steps and demonstrate the same on the board using the compass. • Make sure they can share the following steps: ○ To draw a triangle ABC, first draw a rough sketch. ○ Draw a line segment BC of length 7cm (Base of triangle) ○ Place the compass on point B; draw an arc of radius 5 cm. ○ Next place the compass on point C; draw an arc of radius 6 cm. (make sure that this 6cm arc intersects the 5cm arc drawn earlier. ○ Mark the point of intersection of arcs as A. ○ Using a ruler join AB & AC ○ So, $\triangle ABC$ is the required triangle. <i>Note: Students may come up with incorrect answers and justification. In this case, ask other students who may have the correct explanation with justification. It is important to build consensus on all answers – this will help eradicate any errors. Also, make sure that the students understand that there is a possibility of construction of more than one type of triangle with these measurements.</i> <u>Discussion Group/ Whole Class</u> • If time permits, ask the students to construct an equilateral triangle of side 6.5 cm. <u>Home Assignment</u> ☐ Ask the students to complete the Exercise 10.2 on page 199 of the textbook.
--	---

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------



Name: _____

Worksheet-2

Solving Topic- Properties of Triangles

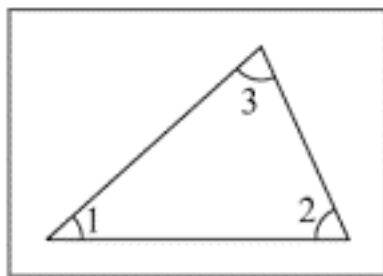
Skill: Problem

Name the triangles based on sides

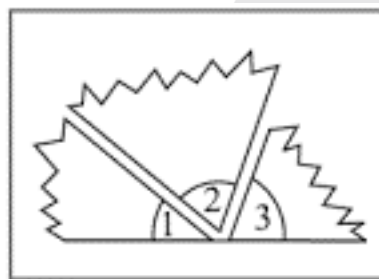
Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Name the triangles based on angles

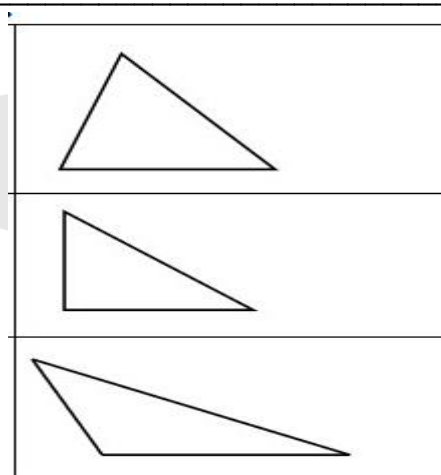
Identify and state the properties of triangles

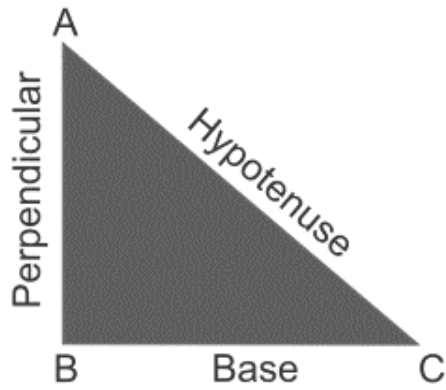


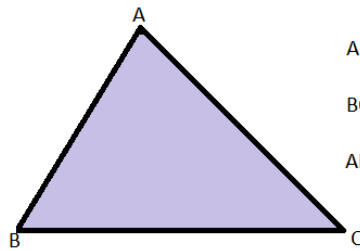
(i)



(ii)





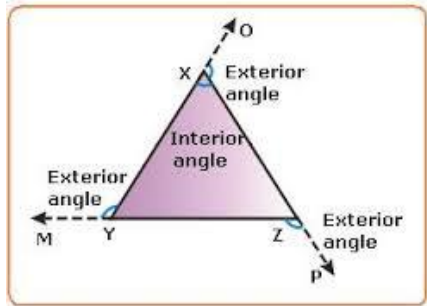


$$AB + BC > AC$$

$$BC + AC > AB$$

$$AB + AC > BC$$

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------



Name the criterion of congruence

As per the criterion of congruence, write the sets of measurements that will help in drawing a triangle even if only one of the sets of measurement is given.
(Hint- Discussed in chapter- Congruence of triangles)

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Name: _____

Worksheet-3
Solving

Skill: Problem

Topic- Construction of triangle using SSS criterion

Directions- Construct a triangle ABC, given that $AB = 6\text{ cm}$, $BC = 5\text{ cm}$ and $AC = 7\text{ cm}$ (using compass & ruler)

(Hint- Draw a rough sketch first and follow the steps required to construct a line segment with the help of compass & ruler)

Write the steps of construction.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. In the bottom right corner, there is a light gray, curved graphic element that resembles a stylized wave or a piece of paper being folded over. The overall appearance is clean and minimalist, typical of a notebook or a template for writing.

Period 4 & 5

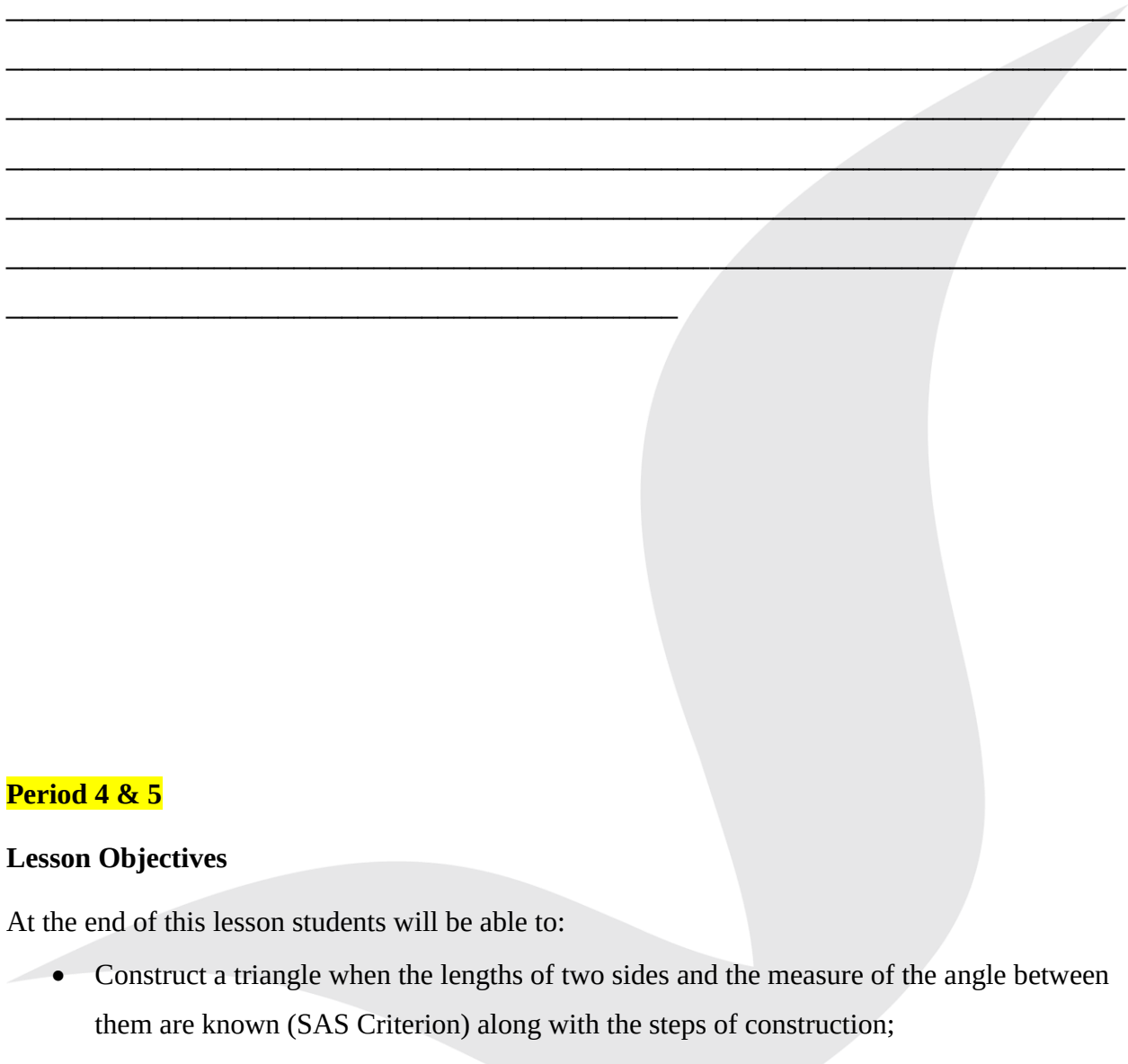
Lesson Objectives

At the end of this lesson students will be able to:

- Construct a triangle when the lengths of two sides and the measure of the angle between them are known (SAS Criterion) along with the steps of construction;
- Construct a triangle when the lengths of two angles and the length of the side included between them is given (ASA Criterion) along with the steps of construction.

Teaching Learning Materials required

- **Brainstorm:** A4 sheet (1 Per student of the group); Protractor, compass & ruler (1 set per student)



Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

- **Create your own measurements: Worksheet-4** (1 per student); Protractor & ruler (1 per student)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 to 6

Lesson Beginning <u>Time:</u> 35 mins <u>Purpose:</u> Activate prior knowledge Generate interest to the topic Introduce the topic Develop conceptual understanding Consolidate students learning	<u>Brainstorm/groups</u> • Share the following construction: Construct a triangle ABC given that $AB = 8$ cm, $BC = 10$ and $\angle ABC = 40^\circ$ • Distribute a protractor, compass, ruler & A4 sheet to each student • Ask them to discuss with group and work in individual sheet • If required, guide the students to draw a rough sketch first and use the steps as learnt in earlier grades for drawing an angle using protractor • Give the students time to complete the construction. • Once they are done with it then at random call volunteers in front to share the steps of construction. • Encourage them to explain the steps and demonstrate the same on the board using the protractor, compass & ruler. • Make sure they can share the following steps: ○ <i>To draw a triangle ABC, first draw a rough sketch.</i> ○ <i>Draw a line segment BC of length 10 cm (Base of triangle)</i> ○ <i>Place the protractor such that the baseline coincides with BC and B coincides with the center of the baseline.</i> ○ <i>Starting from BC, count the number of degrees and Put a point with the pencil at the 40° mark on the edge of protractor.</i> ○ <i>Remove the protractor.</i>
--	--

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

	○ Draw a line segment from B through this point. • Name the point as X. • So, $\angle XBC$ is the required angle. • Place the compass on point B; draw an arc of radius 8 cm and intersecting the line BX. • Mark the point of intersection of as A. • Using a ruler join AC • So, $\triangle ABC$ is the required triangle. ○ Note: Students may come up with incorrect answers and justification. In this case, ask other students who may have the correct explanation with justification. It is important to build consensus on all answers – this will help eradicate any errors.
Lesson Middle <u>Time:</u> 30 mins <u>Purpose:</u> Activate prior knowledge Introduce the topic Develop the conceptual understanding	<u>Create your own measurements/ Groups</u> • Ask the groups: ○ What should be the next criterion for construction of triangle? ○ What do you understand by ASA criterion? (ASA- Where measure of 2 angles and one side is given) • Give a Worksheet-4 to each student • Tell the groups to: ○ Discuss and frame a question on construction of a triangle where ASA criterion is followed. ○ Construct the triangle using compass, protractor and ruler ○ Write the steps of construction. ○ Work as a group but write in your individual sheets • Ask the groups to share their questions after 5- 8 minutes. Let the groups point out the error in the questions and suggest corrections giving justification.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

	• Correct the questions, if required. • Give them 15 mins to complete the construction.
Lesson End <u>Time:</u> 15 mins <u>Purpose:</u> Develop conceptual understanding Consolidate students learning	<u>Whole class-discussion</u> • At random call different groups in front to share the steps of construction on which they arrived. • Project Worksheet-4 of the representing group. • Ask the following questions from the representative group: ○ Explain the rough sketch ○ How did you construct angles using protractor? Explain the steps. ○ What is the measure of your base line? Explain the steps. ○ Can you use the given measure of the side for any side or it should be the measure of the base only? Justify ○ Which all tools did you use? ○ Did you use a compass? Why/ Why not? • Build consensus on all the stapes shared by different groups for the construction of all kinds of angles. <i>Note: Students may come up with incorrect answers and justification. In this case, ask other students who may have the correct explanation with justification. It is important to build consensus on all answers – this will help eradicate any errors</i> • They need to rectify the errors if they are left with any after the discussion. <u>Home Assignment</u> • Ask the students to complete the Exercise 10.3 & 10 .4 of the textbook

Name: _____

Worksheet-4

Skill: Logical

Reasoning Topic- Construction of Triangle

- 1. Frame a question on constructing a triangle based on ASA criterion.**

Write the steps of construction.

A large, light gray, stylized graphic of a lowercase letter 'j' is positioned on the right side of the page. The letter is formed by a thick, rounded stroke that curves upwards and then drops down into a long, straight tail that extends towards the bottom of the page. The background is white with horizontal ruling lines.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Period 6

Lesson Objectives

At the end of this lesson students will be able to:

- Construct a right-angled triangle when the length of one side and hypotenuse is given. (RHS criterion).

Teaching Learning Materials required

- **Worksheet-5** (1 per student);
- **Discussion:** projector (1 per class);

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 to 6

Lesson Beginning <u>Time:</u> 20 mins	<u>Worksheet/Pairs</u> • Give a Worksheet-5 to each student
---	---

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

<u>Purpose:</u> Activate prior knowledge Generate interest to the topic Introduce the topic	• Give the following instructions: ○ Read the questions and work out the solution along with your partner ○ Each student has to complete his/ her own worksheet • Give the students 20 minutes to complete the task
Lesson Middle <u>Time:</u> 15 mins <u>Purpose:</u> Develop the conceptual understanding Consolidate students learning <u>Purpose:</u> Develop conceptual understanding	<u>Whole class-discussion</u> • Project Worksheet-5. • At random call different groups in front to share the steps of construction on which they arrived. • Ask the following questions from the representative group: ○ What is the criterion? Justify (RHS, since one angle is 90 degrees) ○ What is the measure of hypotenuse and base? (Hypotenuse = 7cm & Base = 6 cm) ○ How did you create an angle of 90° using ruler and compass? Explain the steps. ○ How did you construct the triangle? Explain the steps. ○ Is there any easier way to construct the given triangle? Explain it. (Use protractor instead of compass) • Build consensus on all the steps shared by different groups for the construction of all kinds of angles. <i>Note: Students may come up with incorrect answers and justification. In this case, ask other students who may have the correct explanation with justification. It is important to build consensus on all answers – this will help eradicate any errors.</i>
Lesson End <u>Time:</u> 5 minutes	<u>Home assignment</u> • Ask the students to complete the Exercise 10.5 of the textbook

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

<u>Purpose:</u> Recap student understanding	Select a few different types of questions from the miscellaneous questions given on page 204 of the textbook for practice at home
---	---

Name: _____

Worksheet-5

Skill: Estimation

Topic- Construction of triangle

1. Construct the triangle PQR, given that $\angle PQR = 90^\circ$, $PR = 6$ cm and $QR = 7$ cm

a. What criterion is the construction based on? Justify your answer.

b. Visualize and draw a rough sketch.

c. What is the measure of the hypotenuse and base?

d. Construct the triangle using ruler and compass only.

e. Write the steps of construction.

Class: 7	Subject: Math	Topic: Practical Geometry
-----------------	----------------------	----------------------------------

Can you construct the given triangle without using compass? What is the other tool that you will need?

