

Collegedunia NCERT Notes

NCERT Notes for Class 7 Mathematics Part 2 (2026-27 Syllabus)

Chapter 6: Constructions and Tilings

These notes explain exact ruler-compass constructions, arches, regular hexagons, tangrams and tiling checks from Ganita Prakash Class 7 Part 2.

Also see: [NCERT Book PDF](#) [NCERT Solutions](#) [Handwritten Notes](#)

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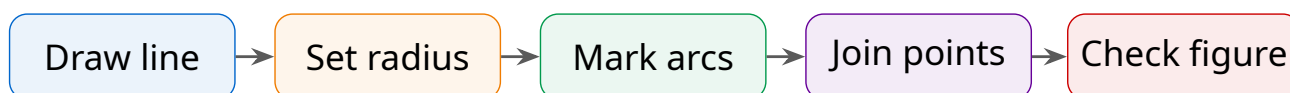
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1 Construction Tools and Accuracy

The chapter begins by shifting students from freehand drawing to exact construction. A ruler draws straight support lines, while a compass transfers equal distances without using a scale.

Ruler and compass construction flow



1.1 Why constructions use support lines

Support lines help us draw a final design accurately. The support line may disappear from the final figure, but it controls symmetry, equal distance and angle position.

Key idea

Support lines are working lines. Draw them lightly, use them carefully, and darken only the final figure.

Construction Tip

Keep the compass opening fixed until all equal arcs for that step are complete.

Common Mistake

Do not erase support lines before checking equal lengths, angle position and final symmetry.

1.2 Unmarked ruler and compass roles

An unmarked ruler gives a straight line but not a measured length. A compass creates arcs, circles and equal lengths. Together they replace guessing.

Key idea

Compass distance stays fixed until changed. This is why equal arcs can prove equal lengths.

Common Mistake

Do not erase support lines before checking equal lengths, angle position and final symmetry.

1.3 Construction accuracy habits

Sharp pencil points, steady compass width and clear labels prevent most construction errors. A small slip in the first arc can shift the entire figure.

Key idea

Label every centre and intersection point before moving to the next step.

Item	Chapter use	Check
Construction or topic	Construction Tools and Accuracy	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

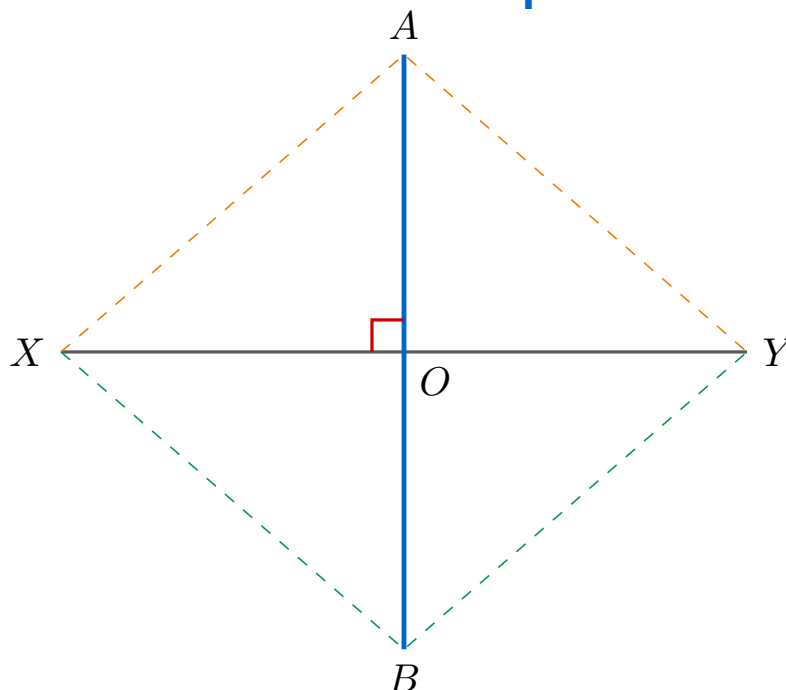
Where It Appears

The same ideas appear in floor patterns, arches, grills, school rangoli designs, map layouts and honeycomb cells.

2 Perpendicular Bisector

The eye construction leads to the perpendicular bisector of a segment. The central idea is simple: points that are equally far from both endpoints lie on one straight line.

Perpendicular bisector from equal-distance points



2.1 Equal distance idea

If $AX = AY$, point A is equally far from X and Y. If $BX = BY$ also holds, then A and B lie on the same perpendicular bisector of XY.

Key idea

The condition is distance from endpoints, not visual balance.

Common Mistake

Do not erase support lines before checking equal lengths, angle position and final symmetry.

2.2 Construction steps

Draw equal-radius arcs from X and Y above the segment. Repeat below the segment. Join the two intersection points. The joining line bisects XY at right angles.

Key idea

The radius must be long enough for the arcs to meet clearly.

Construction Tip

Keep the compass opening fixed until all equal arcs for that step are complete.

2.3 Congruence proof

Triangles AOX and AOY become congruent after using equal sides and the common side. Therefore $OX = OY$ and the two angles at O are right angles.

Key idea

Corresponding parts of congruent triangles justify both midpoint and perpendicular facts.

Construction Tip

Keep the compass opening fixed until all equal arcs for that step are complete.

Common Mistake

Do not erase support lines before checking equal lengths, angle position and final symmetry.

Item	Chapter use	Check
Construction or topic	Perpendicular Bisector	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

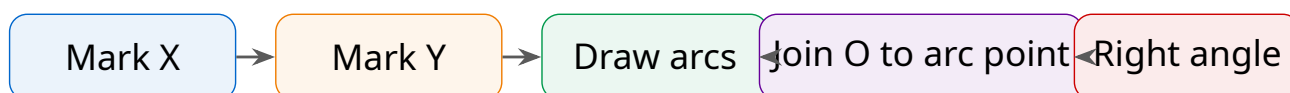
Memory Aid

E-A-J: equal arcs, accurate join, check before tracing.

3 Constructing a 90 Degree Angle

A right angle at a point on a line can be constructed by first creating a segment whose midpoint is that point. Its perpendicular bisector gives the required right angle.

Constructing 90 degrees at a point



3.1 Choose equal points around O

Mark points X and Y on the given line such that $OX = OY$. Then O is the midpoint of XY.

Key idea

This changes a point-on-line problem into a perpendicular-bisector problem.

3.2 One extra arc point is enough

Since O is already on the perpendicular bisector, only one more point on that bisector is needed. Draw equal arcs from X and Y on one side and join the intersection to O.

Key idea

Two points determine a line, so O and the arc intersection fix the perpendicular.

Construction Tip

Keep the compass opening fixed until all equal arcs for that step are complete.

3.3 Common construction checks

The line through O must meet the original line at 90 degrees. If it looks slanted, recheck whether X and Y were marked equally from O.

Key idea

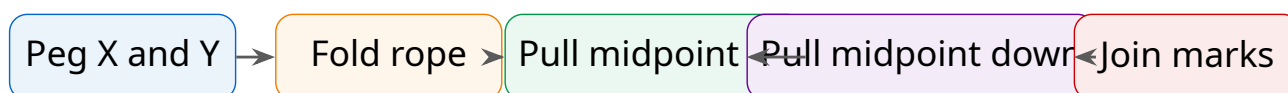
Unequal OX and OY is the usual source of error.

Item	Chapter use	Check
Construction or topic	Constructing a 90 Degree Angle	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

4 Sulba Sutra Rope Constructions

The chapter connects compass constructions with rope methods from the Sulba Sutras. A rope with two loops can work like a large compass on the ground.

Rope method for perpendicular bisector



4.1 Rope as a compass

A stretched rope can form straight lines. When its midpoint is pulled above or below a fixed segment, both rope halves are equal.

Key idea

Equal stretched rope parts mean equal distances from the endpoints.

Common Mistake

Do not erase support lines before checking equal lengths, angle position and final symmetry.

4.2 Rope perpendicular bisector

Fix the rope ends at X and Y. Pull the rope midpoint above XY and mark A. Pull it below XY and mark B. The line AB is the perpendicular bisector.

Key idea

A and B are equally far from X and Y, so both lie on the perpendicular bisector.

4.3 Why the historical method matters

The method shows that exact geometry was useful for real layouts, not only for notebook diagrams. Large constructions need rope, pegs and repeated distance checks.

Key idea

Construction logic stays the same even when the tool changes.

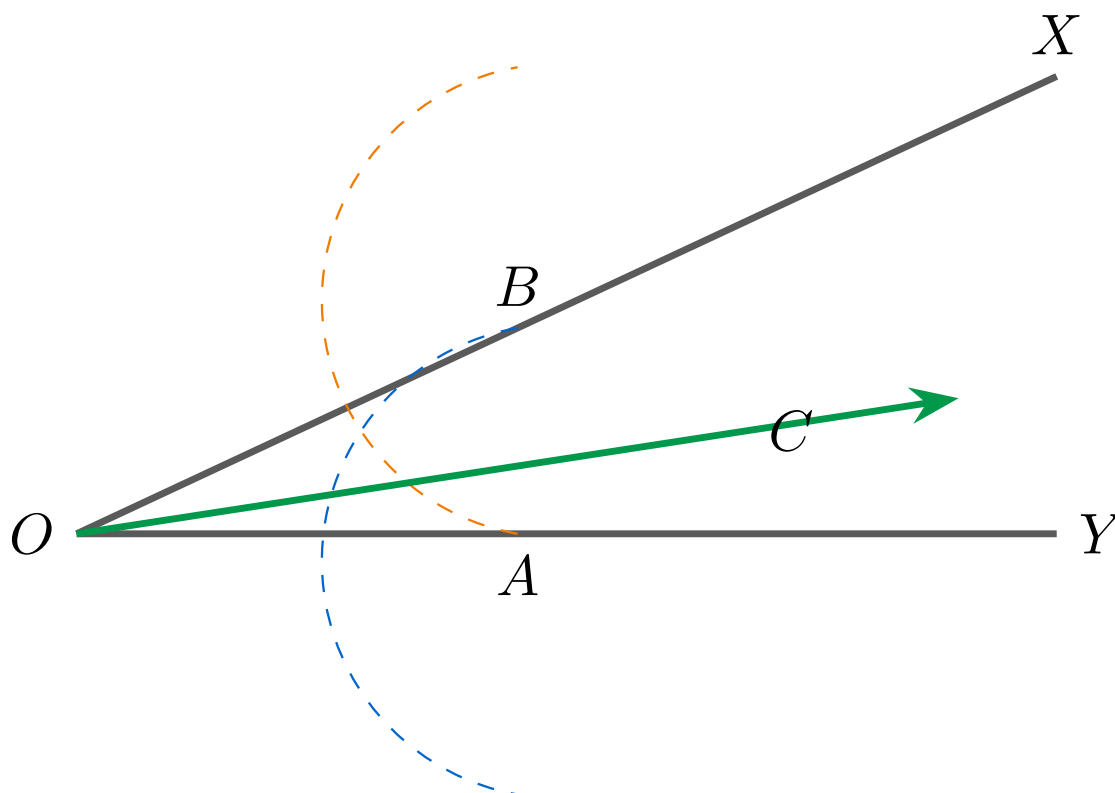
Item	Chapter use	Check
Construction or topic	Sulba Sutra Rope Constructions	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

Where It Appears

The same ideas appear in floor patterns, arches, grills, school rangoli designs, map layouts and honeycomb cells.

5 Angle Bisection

Angle bisection divides an angle into two equal parts. The construction uses equal distances on both arms and equal arcs between those marked points.



5.1 Mark equal points on arms

From vertex O, mark A and B so that $OA = OB$. These points start two triangles with matching side lengths.

Key idea

The compass must not change while marking A and B.

Construction Tip

Keep the compass opening fixed until all equal arcs for that step are complete.

5.2 Find the bisector point

Draw equal-radius arcs from A and B. Their intersection C lies at equal distance from A and B. Join O to C.

Key idea

OC becomes the angle bisector because the two triangles match by SSS.

Construction Tip

Keep the compass opening fixed until all equal arcs for that step are complete.

5.3 Constructing 45 degrees

First construct a 90 degree angle. Then bisect it to get two 45 degree angles. This supports eight-petalled designs.

Key idea

Repeated bisection can also give 30 degrees after making 60 degrees, and 15 degrees after bisecting 30 degrees.

Item	Chapter use	Check
Construction or topic	Angle Bisection	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

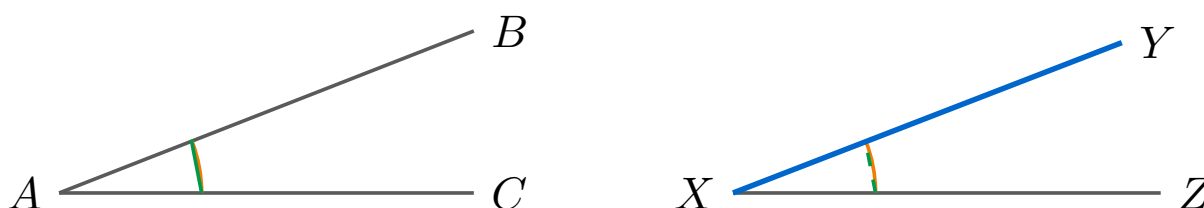
Memory Aid

E-A-J: equal arcs, accurate join, check before tracing.

6 Copying Angles and Parallel Lines

To make repeated designs, students need exact angle copies. The chapter uses a chord-transfer method to copy an angle without measuring it in degrees.

Copy an angle by transferring a chord



6.1 Copy an angle

Draw an arc cutting the original angle at two points. Draw the same arc from the new vertex. Transfer the chord length between the original arc points to the new arc.

Key idea

Equal radius and equal chord create congruent triangles.

6.2 Corresponding angles and parallels

A copied corresponding angle can create a line parallel to a given line. A transversal helps place the same angle at the new point.

Key idea

If corresponding angles are equal, the two lines are parallel.

6.3 Design use

Repeated units need matching arm lengths and matching angles. Copying an angle is the construction skill behind many repeated geometric designs.

Key idea

Do not rely on eye judgment when the design repeats around a centre.

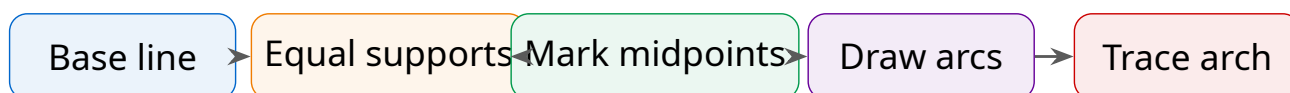
Item	Chapter use	Check
Construction or topic	Copying Angles and Parallel Lines	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

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7 Arch Designs

The construction ideas are applied to trefoil and pointed arches. These designs use equal lengths, equal angles, midpoints and arcs to build symmetry.

Arch design construction map



7.1 Trefoil arch supports

For a symmetric trefoil arch, support lines can have $AB = CD$ and equal base angles at A and D. The arcs then use those supports.

Key idea

Equal supports keep the left and right sides balanced.

7.2 Pointed arch supports

A pointed arch can be built from two equal line segments. Their midpoints help place arcs that meet at a sharp top.

Key idea

Changing the arc radius changes the style of the arch.

7.3 Aesthetic adjustment

Construction gives the skeleton. A designer may adjust arc radii while preserving symmetry and equal support lengths.

Key idea

The final boundary can be traced after the support lines are checked.

Item	Chapter use	Check
Construction or topic	Arch Designs	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

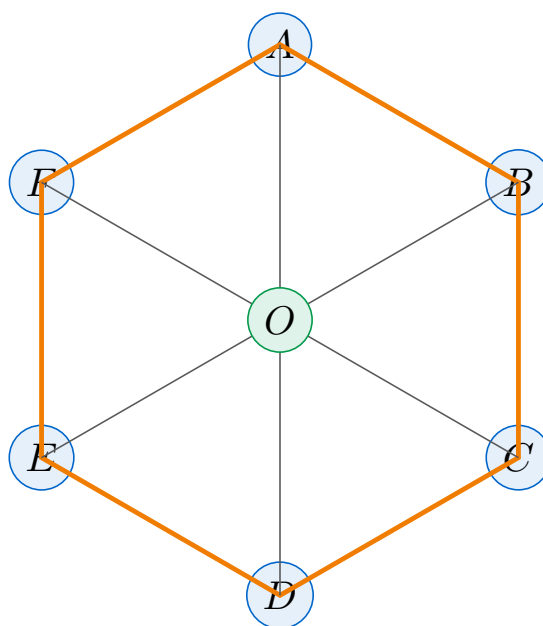
Where It Appears

The same ideas appear in floor patterns, arches, grills, school rangoli designs, map layouts and honeycomb cells.

8 Regular Hexagons and Stars

A regular hexagon is reachable with Class 7 tools because it is made from six congruent equilateral triangles around one point.

Regular hexagon from six equilateral triangles



8.1 Why six triangles fit

Each angle in an equilateral triangle is 60 degrees. Six such angles add to 360 degrees, so they exactly fill the space around a point.

Key idea

No gap remains because $6 \times 60 \text{ degrees} = 360 \text{ degrees}$.

8.2 Constructing 60 degrees

Draw an arc from A to mark B on a line. With the same radius, draw an arc from B meeting the first arc at C. Triangle ABC is equilateral.

Key idea

The angle CAX is 60 degrees because all three sides of triangle ABC are equal.

8.3 Six-pointed star

A six-pointed star can be studied through a regular hexagon and equilateral triangles placed on its sides.

Key idea

Look for 60 degree and 120 degree angles before drawing the star.

Item	Chapter use	Check
Construction or topic	Regular Hexagons and Stars	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

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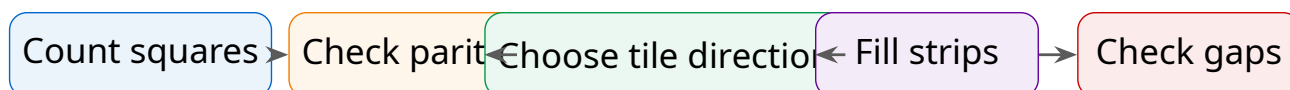
Memory Aid

E-A-J: equal arcs, accurate join, check before tracing.

9 Tangrams and Tiling Regions

The second part of the chapter begins with tangrams and moves to tiling. Tiling means covering a region with shapes without gaps or overlaps.

Domino tiling strategy



9.1 Tangram rearrangement

Seven pieces from a square can be rearranged into arrows and many other figures. The area stays the same because the same pieces are used.

Key idea

Rotation and flipping are allowed, but pieces must not overlap.

9.2 Domino tiles

A 2×1 tile covers exactly two unit squares. A grid with an odd number of unit squares cannot be tiled by dominoes.

Key idea

Area parity is the first quick test for domino tiling.

9.3 Even and odd grids

If both dimensions are even, tile each column with vertical dominoes. If one dimension is even, arrange dominoes along the even direction.

Key idea

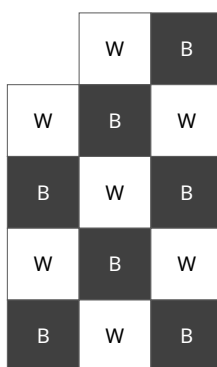
If both dimensions are odd, the total number of squares is odd, so domino tiling is impossible.

Item	Chapter use	Check
Construction or topic	Tangrams and Tiling Regions	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

10 Checkerboard Argument

Some regions have an even number of squares but still cannot be tiled. The checkerboard colouring argument catches these cases.

Checkerboard parity check



A domino covers one black and one white square.

10.1 Colour the grid

Colour unit squares black and white so that neighbouring squares have opposite colours. Every 2 x 1 domino covers one black and one white square.

Key idea

A tileable region must have equal black and white counts.

10.2 Missing-square test

In the chapter example, the coloured region has 8 white squares and 6 black squares. Since the counts differ, domino tiling is impossible.

Key idea

Even area alone is not enough for tiling.

10.3 Plane tilings

Squares, equilateral triangles and regular hexagons can tile the plane. Designs can also use more than one shape or non-regular shapes.

Key idea

Tiling links classroom geometry with floors, walls, art and honeycomb patterns.

Item	Chapter use	Check
Construction or topic	Checkerboard Argument	Main check
Distance	equal compass arcs	same radius
Angle	copy or bisect	matching sides or arcs
Tiling	cover region	no gaps and no overlaps

Where It Appears

The same ideas appear in floor patterns, arches, grills, school rangoli designs, map layouts and honeycomb cells.

Memory Aid

E-A-J: equal arcs, accurate join, check before tracing.

11 Quick Reference Summary

Use this final page to revise the exact construction tests before solving the Figure it Out tasks.

Skill	Core rule	Why it works
Perpendicular bisector	Points equally distant from X and Y lie on one line	Congruent triangles prove midpoint and right angle
Right angle at O	Make O the midpoint of XY	Perpendicular bisector of XY passes through O
Angle bisector	Use equal arm marks and equal arcs	SSS congruence gives equal angles
Copy angle	Transfer the chord on equal arcs	Congruent triangles copy the angle
Regular hexagon	Use six 60 degree angles	Six equilateral triangles meet around O
Domino tiling	Check area and black-white count	Each domino covers one black and one white square

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