Unit 9 · Spatial Thinking Cheat Sheet

Unit 9 focus: points, lines, planes, angle pairs, parallel lines and polygons

1 KEY VOCABULARY

point, line, plane	Location; straight path with no ends; flat surface.	A, line AB, plane P
segment	Part of a line with two endpoints.	segment CD
ray	One endpoint, extends one way.	ray EF
congruent	Same size and shape.	△ABC ≅ △DEF

2 ANGLE PAIRS

Pair	Relationship
Complementary	sum to 90°
Supplementary	sum to 180°
Vertical	equal
Adjacent	share a side and vertex

3 FINDING MISSING ANGLES

Use the angle pair relationship to write an equation.

Example: Two supplementary angles: one is 3 times the other.
Equation: $x + 3x = 180$

Answer: 45° and 135°

4 PARALLEL LINES AND A TRANSVERSAL

Angle pair	Relationship
Corresponding	equal
Alternate interior	equal
Same-side interior	sum to 180°

5 POLYGON ANGLE SUM

Sum = $(n - 2) \cdot 180°$.

Example: Each angle of a regular hexagon
Sum: $(6 - 2)180 = 720°$
Divide by 6: 120°

Answer: 120°

6 QUICK REMINDERS & COMMON MISTAKES

✓ Do remember

- Complementary → corner (90°); supplementary → straight (180°).
- Mark congruent sides and angles with matching ticks.
- A regular polygon has equal sides AND angles.

✗ Common mistakes

- Vertical angles add to 180°: they are equal
- Hexagon sum = $6 \cdot 180°$: $(6 - 2) \cdot 180°$
- Calling a ray a line: a ray has one endpoint

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More practice: congruence, circles, constructions, translations, symmetry and rotations

1 CIRCLES

Measure	Formula
Diameter	d = 2r
Circumference	$C = \pi d = 2\pi r$
Central angles	sum to 360°

A circle with r = 5 cm has C ≈ 31.4 cm.

2 CONSTRUCTIONS (COMPASS AND STRAIGHTEDGE)

Copy a segment	**measure with the compass, mark the same length**
Bisect a segment	**equal arcs from both ends, connect the crossings**
Bisect an angle	**arc across both sides, equal arcs, draw the ray**

3 TRANSLATIONS

Slide every point the same distance: (x, y) → (x + a, y + b).

Example: Translate (−2, 5) by 4 right, 3 down.
Rule: (x + 4, y − 3)
Answer: (2, 2)

4 ROTATIONS ABOUT THE ORIGIN

Use the rules for 90°, 180° and 270° counterclockwise.

Example: Rotate (3, 1) 90° counterclockwise.
Rule: (x, y) → (−y, x)
Answer: (−1, 3)

5 SYMMETRY

Figure	Symmetry
Square	4 lines; rotational 90°
Equilateral triangle	3 lines; rotational 120°
Rectangle	2 lines; rotational 180°

6 CHECK YOURSELF

- Did I label the angle pair correctly?
- Did I move every vertex by the same rule?
- Did I rotate counterclockwise unless told otherwise?
- Does my answer make sense in the picture?