Simple Constructions: Quadrilaterals

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Worked Demonstration

Goal: Construct trapezoid $ABCD$ with

$$AB = 9 \text{ cm}, \quad BC = 5 \text{ cm}, \quad CD = 4.2 \text{ cm}, \quad \angle ABC = 60^\circ, \quad \angle BCD = 120^\circ, \quad \text{and } CD \parallel AB.$$

Steps (ruler + protractor + compass)

Step 1: Draw base $AB = 9$ cm.

Step 2: At B, measure $\angle ABC = 60^\circ$ and draw a ray (mark the angle).

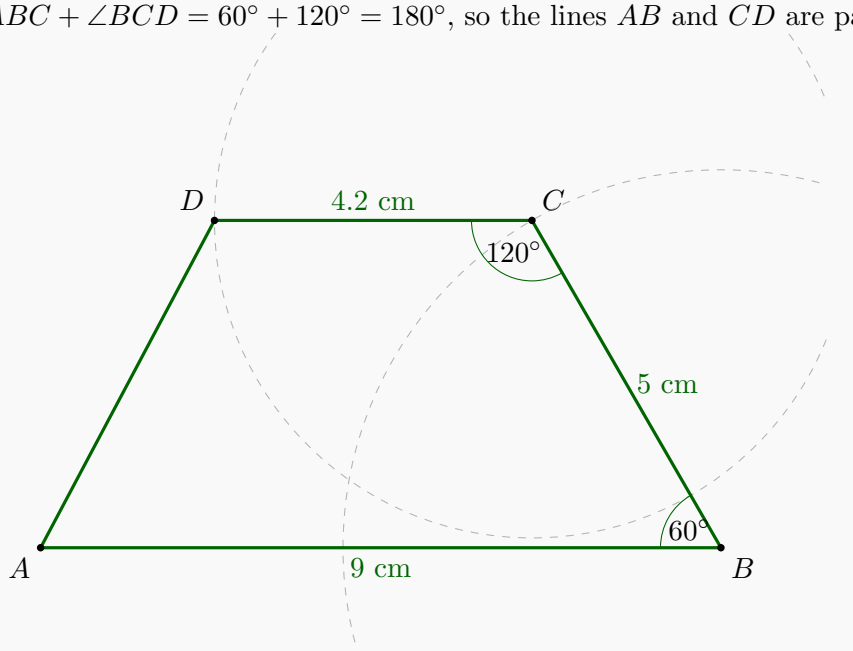
Step 3: Set the compass to 5 cm. With center B, draw an arc to hit the ray. Label that point C.

Step 4: At C, measure $\angle BCD = 120^\circ$ (using segment CB as one side) and draw a ray for CD.

Step 5: Set the compass to 4.2 cm. With center C, mark point D on the ray.

Step 6: Draw segment AD to finish the trapezoid.

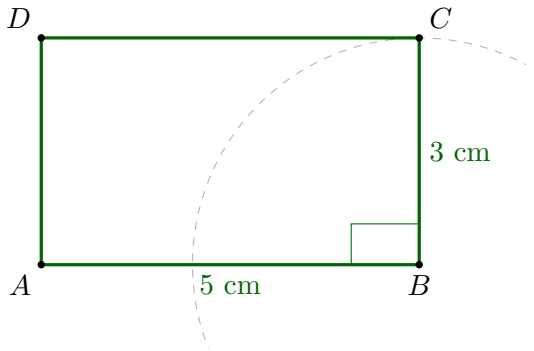
Step 7: *Check:* $\angle ABC + \angle BCD = 60^\circ + 120^\circ = 180^\circ$, so the lines AB and CD are parallel.



Now You Try: Construct each quadrilateral

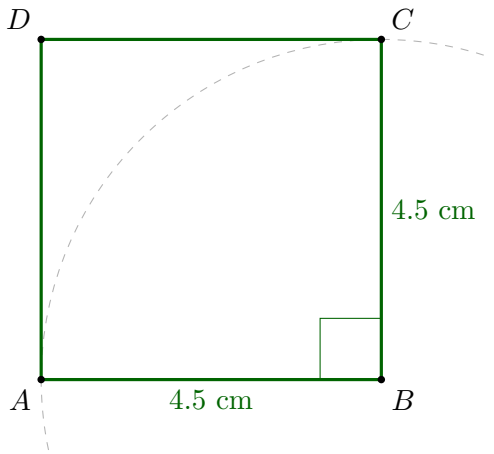
(1) Rectangle $ABCD$

$$AB = 5 \text{ cm}, \quad BC = 3 \text{ cm}, \quad \angle ABC = 90^\circ$$



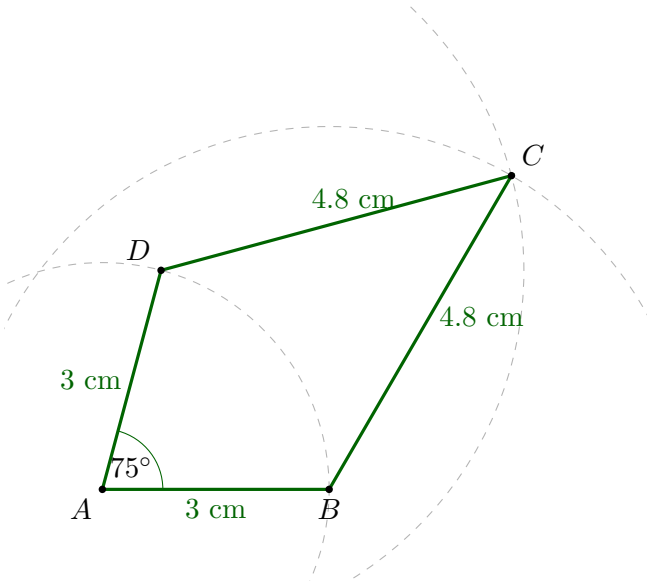
(2) Square $ABCD$

$$AB = 4.5 \text{ cm}, \quad \angle ABC = 90^\circ, \quad AB = BC$$



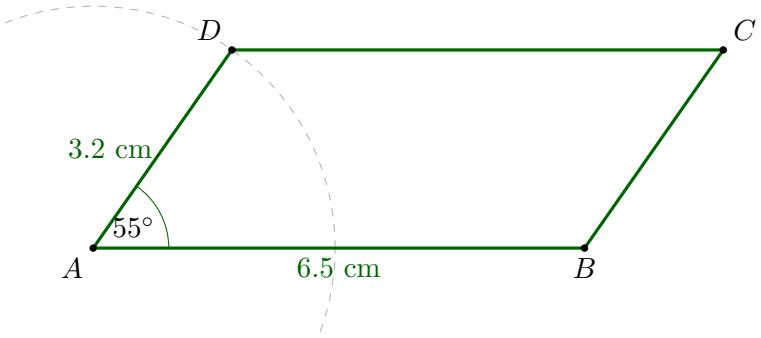
(3) Kite $ABCD$

$AB = AD = 3$ cm, $\quad BC = CD = 4.8$ cm, $\quad \angle BAD = 75°$



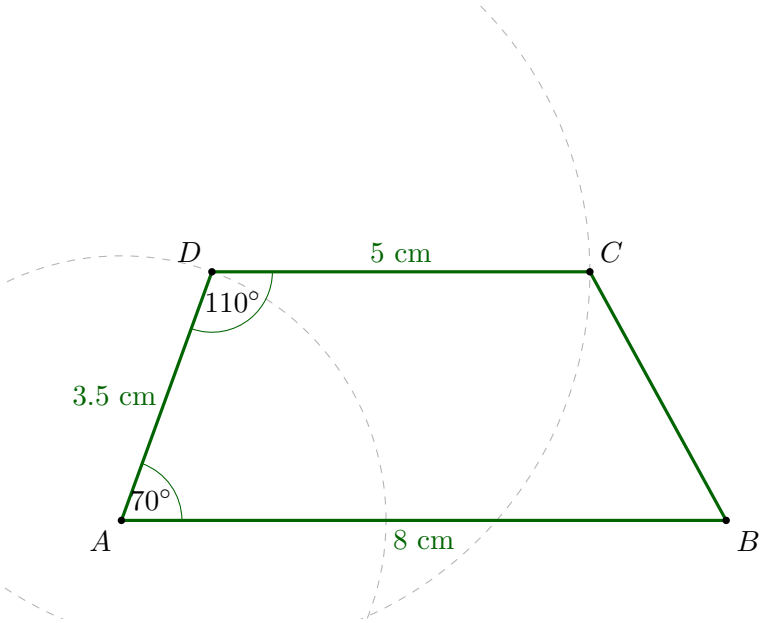
(4) Parallelogram $ABCD$

$$AB = 6.5 \text{ cm}, \quad AD = 3.2 \text{ cm}, \quad \angle DAB = 55^\circ$$



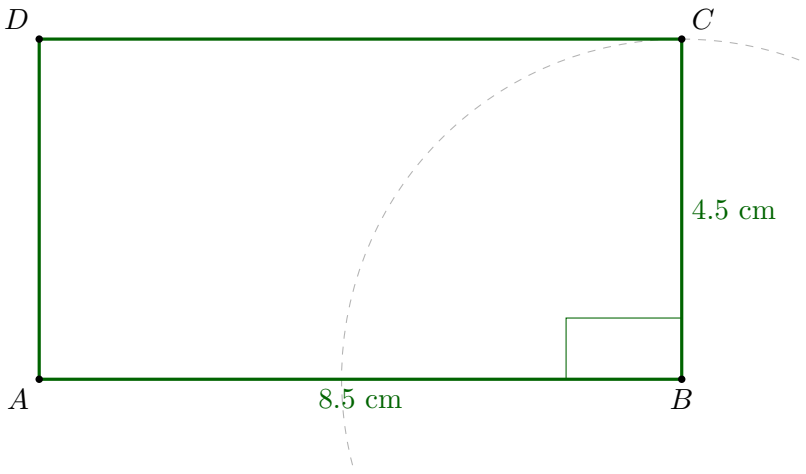
(5) Trapezoid $ABCD$

$AB = 8$ cm, $AD = 3.5$ cm, $CD = 5$ cm, $\angle DAB = 70°$, $\angle ADC = 110°$, and $CD \parallel AB$



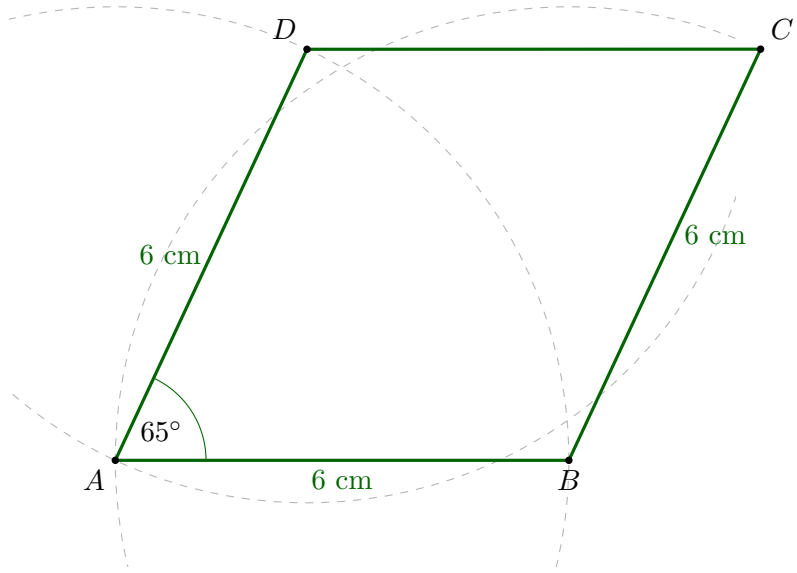
(6) Rectangle $ABCD$

$AB = 8.5$ cm, $BC = 4.5$ cm, $\angle ABC = 90°$



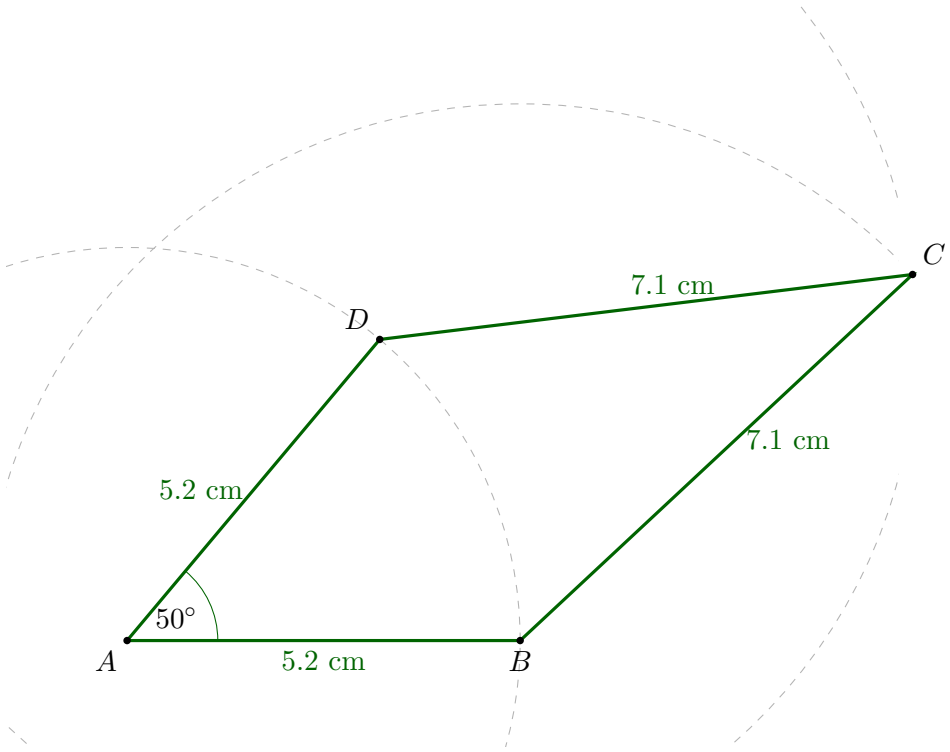
(7) Rhombus $ABCD$

$$AB = BC = CD = DA = 6 \text{ cm}, \quad \angle DAB = 65^\circ$$



(8) Kite $ABCD$

$AB = AD = 5.2$ cm, $\quad BC = CD = 7.1$ cm, $\quad \angle BAD = 50°$



(9) Parallelogram $ABCD$

$$AB = 7.8 \text{ cm}, \quad AD = 4.6 \text{ cm}, \quad \angle DAB = 35^\circ$$