LESSON 4

Constructing Figures

Figures can be combined to make another figure.

Explore

You will need a tangram and a protractor.

Choose 2 or more tans.
Arrange the tans to make a quadrilateral with two angles that each measure 135°.
How many different quadrilaterals with two 135° angles can you make?
Sketch or trace each quadrilateral.

Show and Share

Share your quadrilaterals with another pair of students.
Describe the quadrilaterals.
How did you decide which tans to use?

LESSON FOCUS | Use a protractor, a ruler, and a compass to construct figures.

Connect

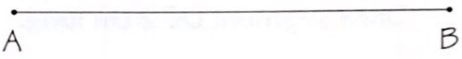
Another way to construct a figure is to use a ruler and a compass or a protractor.

➤ Construct △ABC with sides AB = 6 cm, AC = 5 cm, and BC = 4 cm.

The △ symbol means triangle.

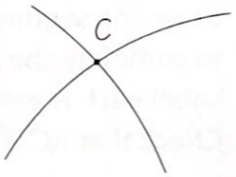
Step 1

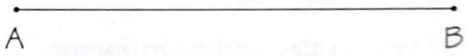
Use the ruler to draw segment AB 6 cm long.



Step 2

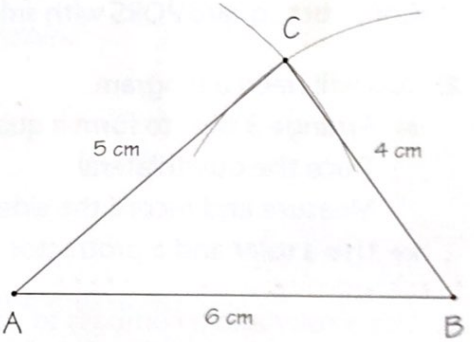
Set the compass so the pencil and the compass point are 5 cm apart.
Place the compass point on A.
Draw an arc.
Set the compass so the pencil and the compass point are 4 cm apart.
Place the compass point on B.
Draw an arc so the two arcs intersect.
Label the point C where the arcs intersect.





Step 3

Draw segments AC and BC to complete the triangle.
Label each segment with its length.

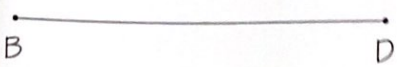


When an angle is identified by three letters, the middle letter indicates the vertex of the angle. For example, ∠A is also ∠CAB.

➤ Use a ruler and a protractor to construct parallelogram BACD, with AC = BD = 5 cm, BA = DC = 2 cm, ∠ABD = 120°, and ∠BDC = 60°.

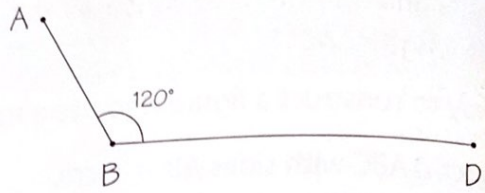
Step 1

Use a ruler to draw segment BD 5 cm long.

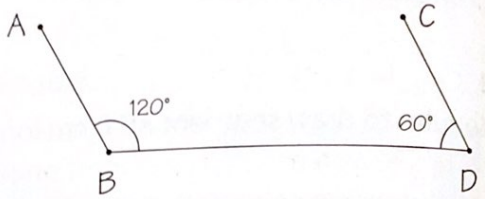


Since I know the measures of the angles at B and at D, I draw BD first.

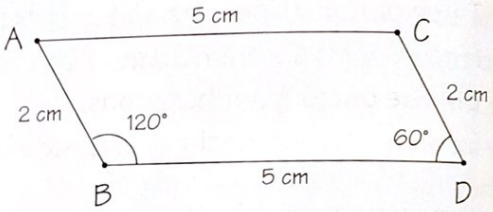
Step 2
At B, use the protractor
to measure 120°.
Draw segment BA 2 cm long.



Step 3
Use the protractor
to measure 60° at D.
Draw segment DC 2 cm long.



Step 4
Draw line segment AC
to complete the parallelogram.
Label each measure.
Check that AC is 5 cm long.

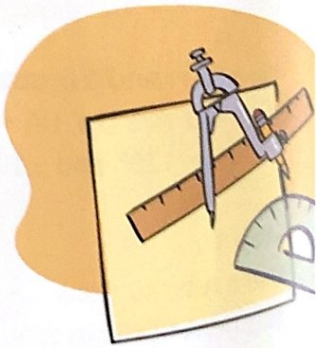


Practice

1. Use a ruler and a protractor.
Construct square PQRS with side length 8 cm.

2. You will need a tangram.
a) Arrange 3 tans to form a quadrilateral.
Trace the quadrilateral.
Measure and record the side lengths and the angles.
b) Use a ruler and a protractor to construct the quadrilateral from part a.

3. Use a ruler and a compass to construct each triangle:
a) △PQR with side lengths
PQ = 6 cm, QR = 8 cm, and PR = 10 cm
b) △CDE with all sides 65 mm long
c) △LMN with two sides 7 cm long
and one side 4 cm long
In each case, how many different triangles are possible?
How do you know?
Classify each triangle by sides and by angles.



4. Construct △FGH with ∠HFG = 50°,
∠FGH = 60°, and ∠GHF = 70°.
Compare your triangle with that of another student.
Are the triangles congruent? How do you know?

5. Use a ruler and a compass to construct △BCD.
The side lengths are:
BD = 85 mm
CD = 80 mm
BC = 43 mm
Measure the angles.

6. Use triangular dot paper.
   a) Construct a concave hexagon.
   The hexagon must have at least one angle with each measure: 60°, 240°
   Three or more sides must be 3 units long.
   How many different hexagons can you draw?
   b) Choose one of your hexagons.
   Explain how you decided each side length and angle measure.

7. Construct quadrilateral CDEF with these angle measures:
∠C = 110°
∠D = 130°
∠F = 50°
   a) What is the measure of ∠E?
   b) Can you draw a different quadrilateral CDEF? Explain.

8. Use a ruler and a protractor.
Construct trapezoid STUV with sides TU = 8 cm, TS = VU = 3 cm, and with ∠STU = ∠TUV = 70°.
What is the length of SV?

9. Construct two different pentagons MNPQR with these measures:
RQ = QP = PN = 6 cm; RM = MN = 4 cm; ∠RQP = ∠QPN = 90°
   a) In each pentagon, find the measures of ∠QRM, ∠RMN, and ∠MNP.
   b) Why is it possible to draw two different pentagons?

Reflect

Describe how you could construct a concave pentagon with 3 equal sides and one angle that measures 240°.
Use diagrams to explain.

Numbers Every Day

Number Strategies

Find each quotient.

1530 ÷ 9
8575 ÷ 25
6344 ÷ 52
2136 ÷ 12