

Geometry - Geometric Constructions - Worksheet

Common Core G-CO.D.12, G-CO.D.13 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

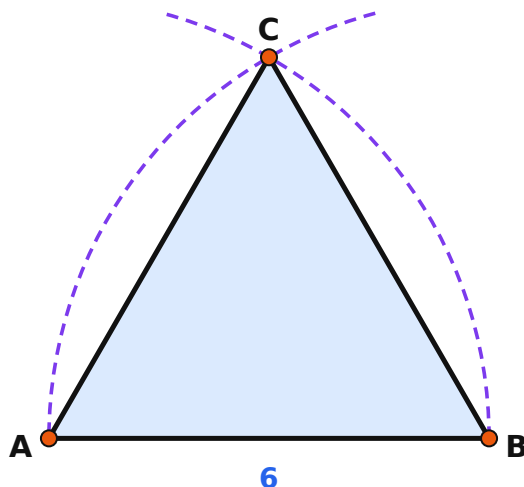
These 20 problems practice constructions with a compass and straightedge (Common Core G-CO.D.12, G-CO.D.13). The first problems are quick one-step checks of the definitions and formulas from the lesson. The middle problems ask for diagrams, equations and careful reasoning in the style of a high school Geometry class. The last six problems are applications with benches, pavers, rugs and coordinates.

Geometry · Common Core State Standards: **G-CO.D.12, G-CO.D.13**

Exercise 1 - Compass and straightedge

State what each tool does in a construction: the compass and the straightedge.

Exercise 2 - Equilateral triangle sides



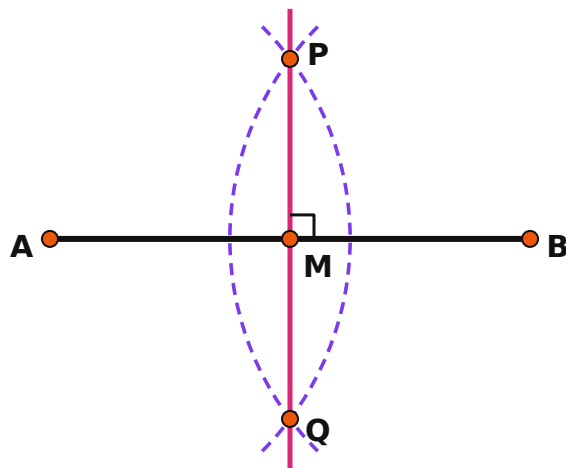
Triangle ABC with $AB = 6$.

An equilateral triangle is constructed on segment AB of length 6 cm. Find the other two sides and the perimeter.

Exercise 3 - Choose the radius

To construct the perpendicular bisector of a segment 14 cm long, Jamal considers compass radii of 5 cm, 7 cm and 8 cm. Which radius works? Explain.

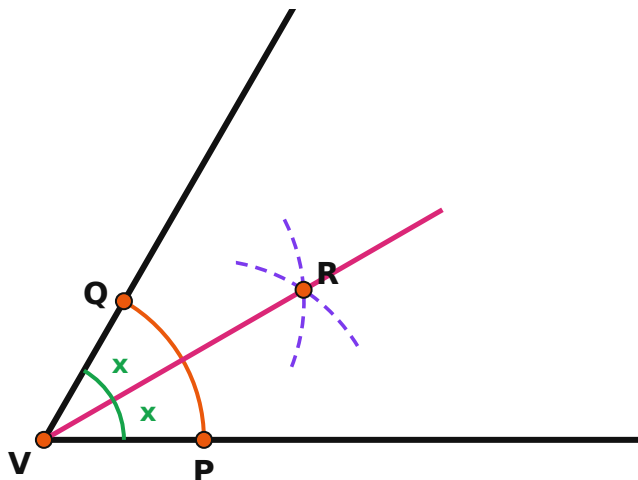
Exercise 4 - Point on the bisector



Point P is on the perpendicular bisector: arcs of the same radius (more than half of AB) from A and from B.

P lies on the perpendicular bisector of AB. $PA = 2x + 1$ and $PB = 3x - 4$. Find x and PA.

Exercise 5 - Bisect an angle



Angle bisector: arc across both rays, then two equal arcs meet at R.

The angle at V measures 84° . After bisecting it, find the measure of each angle.

Exercise 6 - Bisector with x

An angle measures $(8x + 4)^\circ$. After constructing its bisector, each half measures $(3x + 12)^\circ$. Find x and the original angle.

Exercise 7 - Angles from 60 degrees

Keisha constructs a 60° angle using an equilateral triangle. She then bisects it twice. Find the angle after each bisection.

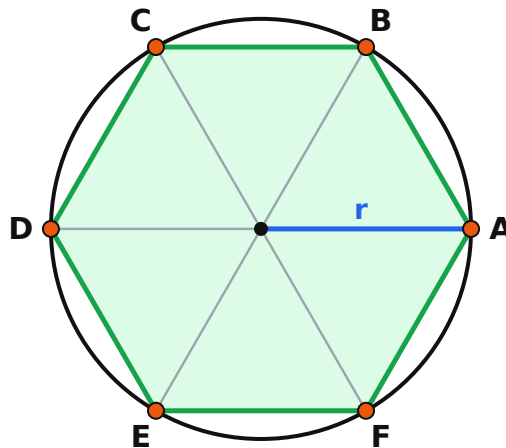
Exercise 8 - Add constructed angles

Explain how to build a 75° angle from a 60° angle using only constructions. Give the angles used.

Exercise 9 - Inscribed equilateral triangle

A circle has radius 6 cm. Joining every other vertex of an inscribed regular hexagon gives an inscribed equilateral triangle. A chord between vertices two steps apart has length $r\sqrt{3}$. Find the side of the triangle in simplest radical form and as a decimal to the nearest hundredth.

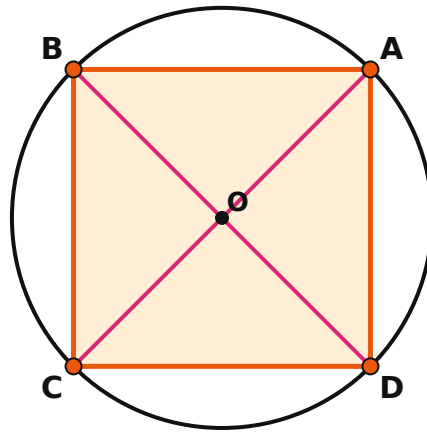
Exercise 10 - Hexagon in a circle



A regular hexagon: the side equals the radius, so step the radius around the circle.

A regular hexagon is inscribed in a circle of radius 8 cm. Find the side length and the perimeter.

Exercise 11 - Square in a circle



A square: draw two perpendicular diameters and join their endpoints.

A square is inscribed in a circle of radius 5 inches. Find its side length and area.

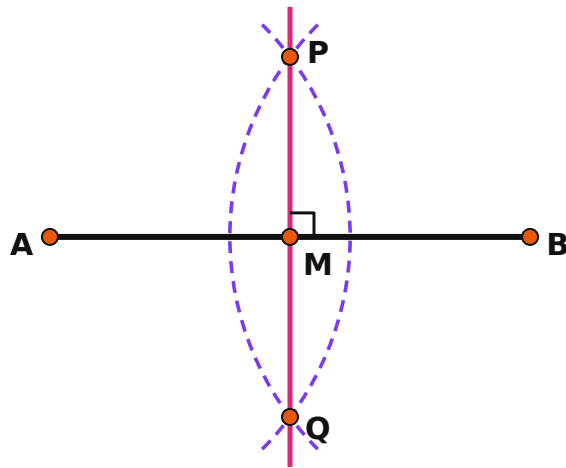
Exercise 12 - Order the steps

Put these steps in order to construct a perpendicular bisector of AB: (a) draw line PQ, (b) draw arcs from B with the same radius, (c) draw arcs above and below AB from A with a radius greater than half of AB.

Exercise 13 - Copy an angle for parallels

A transversal crosses line l , forming a 58° angle. Keisha copies this angle at another point on the transversal so that the two angles are corresponding. Why are the two lines parallel, and what is the corresponding same-side interior angle?

Exercise 14 - Why the bisector works



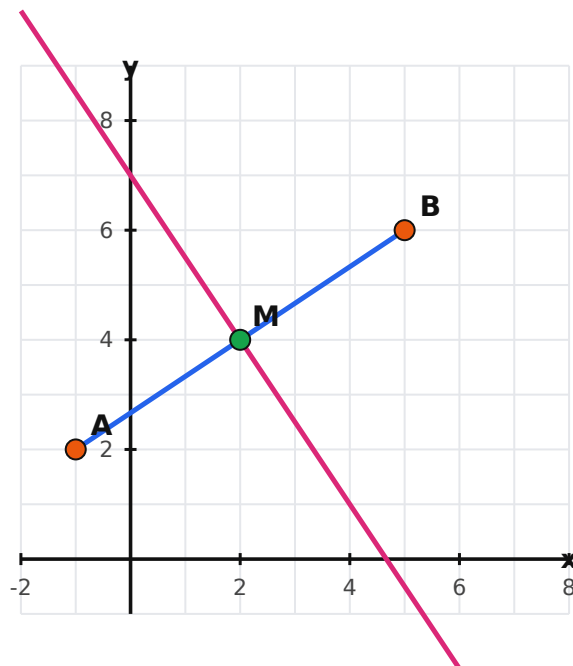
Arcs of radius 9 on $AB = 14$.

A perpendicular bisector is built with arcs of radius 9 on a segment AB of length 14. Find PM , the distance from the crossing point P to the midpoint M .

Exercise 15 - Bisector proof by SSS

In an angle bisector construction, $VP = VQ = 4$ and $PR = QR = 6$. Name the congruence test that proves that triangle VPR is congruent to triangle VQR and state which angles are congruent.

Exercise 16 - Perpendicular bisector equation



The bisector passes through $M(2, 4)$.

Find an equation of the perpendicular bisector of the segment with endpoints A(-1, 2) and B(5, 6).

Exercise 17 - Paver pattern

A garden path uses regular hexagonal pavers. Each paver is inscribed in a circle of radius 8 inches. Find the distance across the paver from one vertex to the opposite vertex, and the perimeter.

Exercise 18 - Equal distance from two gates

Two park gates A and B are 100 yards apart. A bench is on the perpendicular bisector of AB and is 130 yards from gate A. How far is the bench from gate B, and how far from the midpoint M of the gates?

Exercise 19 - Rug design

A designer inscribes a square in a circular rug with diameter 12 feet. Find the side and the area of the square, and the fraction of the rug's area that the square covers (use $\pi = 3.14$).

Exercise 20 - Copy a segment

Mei sets her compass to the length of segment AB, which is 7.5 cm, and marks three equal lengths in a row along a ray starting at A. How far is the third mark from A?