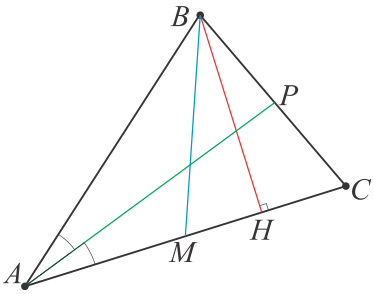
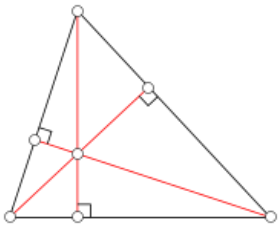
Classwork 24.

Special segments of a triangle.

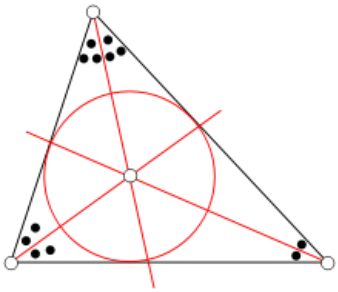


From each vertices of a tringle to the opposite side 3 special segment can be constructed.

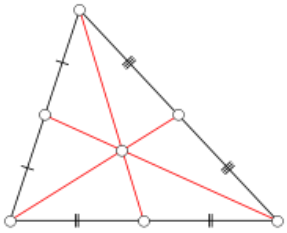


An **altitude** of a triangle is a straight line through a vertex and perpendicular to (i.e. forming a right angle with) the opposite side. This opposite side is called the *base* of the altitude, and the point where the altitude intersects the base (or its extension) is called the *foot* of the altitude.

An **angle bisector** of a triangle is a straight line through a vertex which cuts the corresponding angle in half.



A **median** of a triangle is a straight line through a vertex and the midpoint of the opposite side, and divides the triangle into two equal areas.



Area.

Area of a shape is a measure of surface of a plane, covered with a shape.

1. Can we measure the area of a triangle with sides equal to 1 unit? How many such triangles in an equilateral triangle with side 7 units?

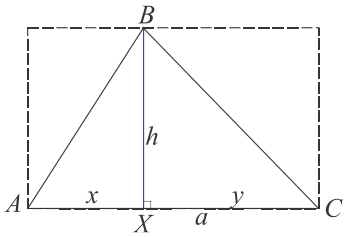
2. How the area of a square will change if we increase the length of the side 2 times? 3 times? $2\frac{1}{2}$ times? How will change the area of a triangle if each of its side will be increase 2 times? 3 times?

Area of a rectangle

$$S = a \cdot b$$

Area of a triangle.

The area of a triangle is equal to half of the product of its altitude and the base, corresponding to this altitude.

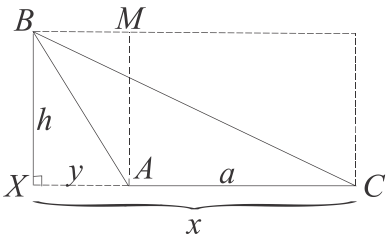


For the acute triangle it is easy to see.

$$S_{rec} = h \times a = x \times h + y \times h$$

$$S_{\Delta ABX} = \frac{1}{2}h \times x, \qquad S_{\Delta XBC} = \frac{1}{2}h \times y, \qquad S_{\Delta ABC} = S_{\Delta ABX} + S_{\Delta XBC}$$

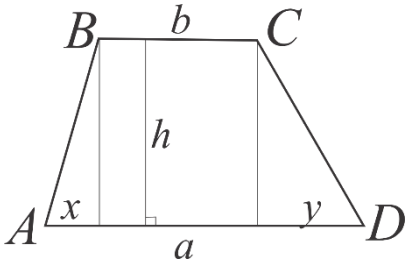
$$S_{\Delta ABC} = \frac{1}{2}h \times x + \frac{1}{2}h \times y = \frac{1}{2}h(x + y) = \frac{1}{2}h \times a$$



For an obtuse triangle it is not so obvious for the altitude drawn from the acute angle vertex.

Trapezoid and the area of trapezoid.

Trapezoid is a convex quadrilateral which has a pair of parallel sides. Isosceles trapezoid has nonparallel sides are equal. Can you find the area of trapezoid?

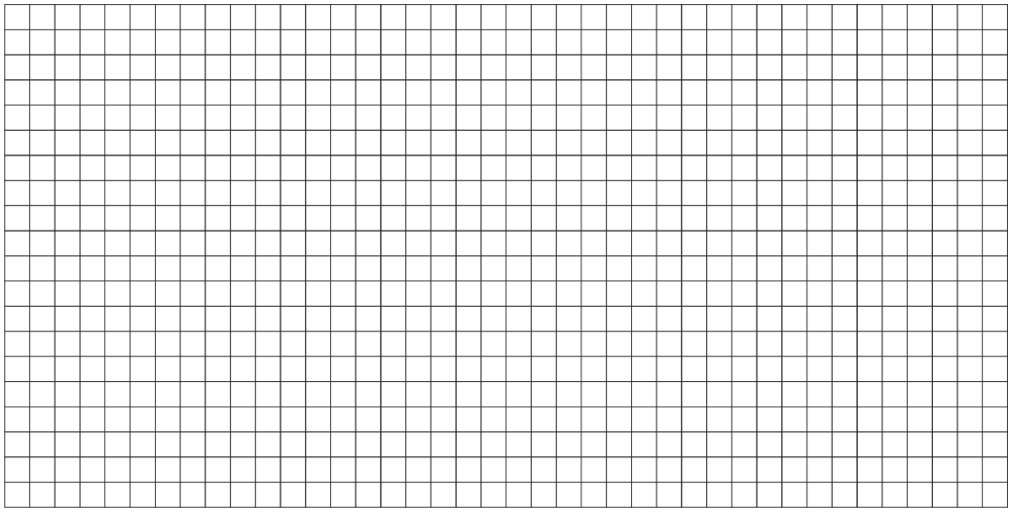


$$S = S_x + S_y + S_{rec} = \frac{1}{2}xh + \frac{1}{2}yh + (a - x - y)h$$

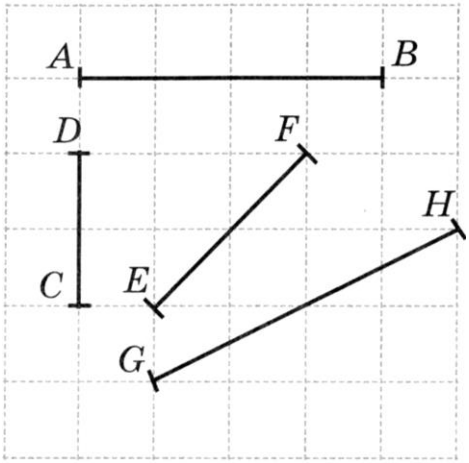
$$= h\left(\frac{1}{2}x + \frac{1}{2}y + a - x - y\right) = h\left(a - \frac{1}{2}x - \frac{1}{2}y\right)$$

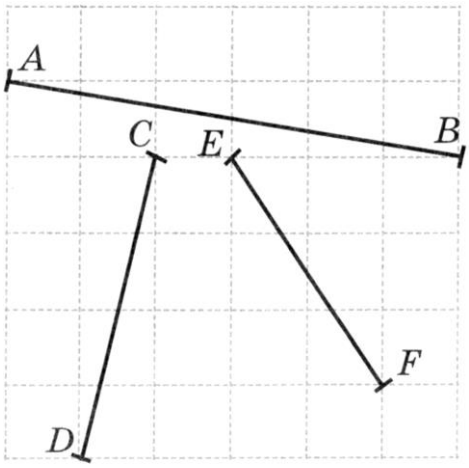
$$= \frac{1}{2}h(2a - x - y) = \frac{1}{2}h(a + a - x - y) = \frac{a + b}{2}h$$

1. On a graph paper draw a square with the area equal to 2 cells, 4 cells, 5, 8, 9, 10, 16, 20, 35 cells.

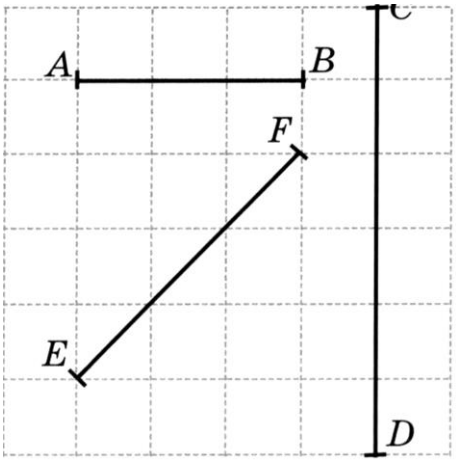


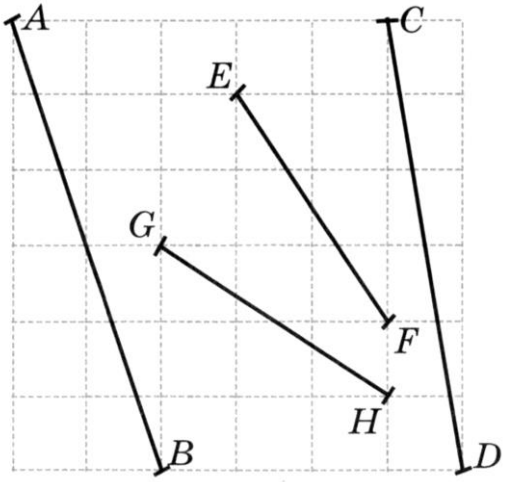
2. Find the midpoints of the segments.



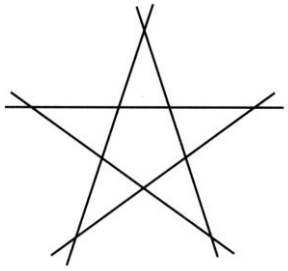


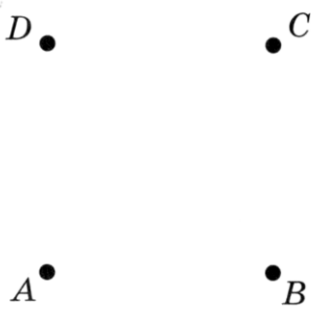
3. Find the points divided the segments into three equal parts.

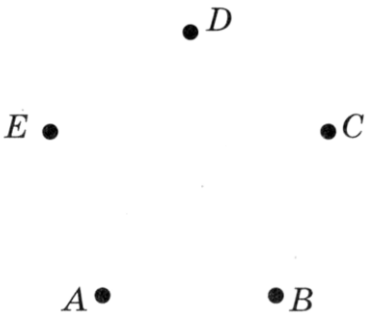




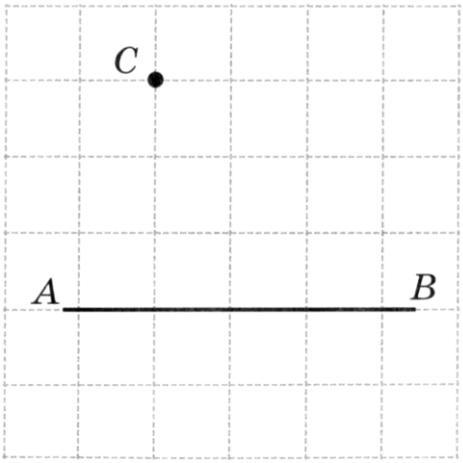
4. How many lines are on the picture? How many lines can be drawn through 4 points? 5 points?

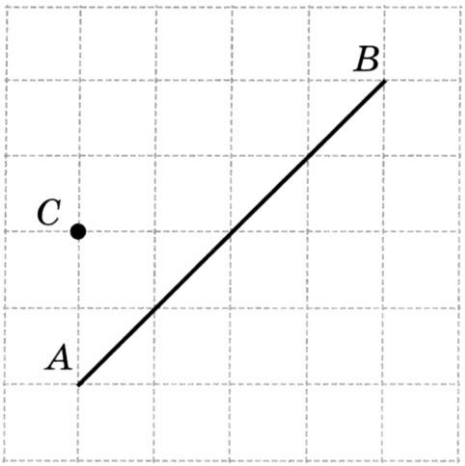


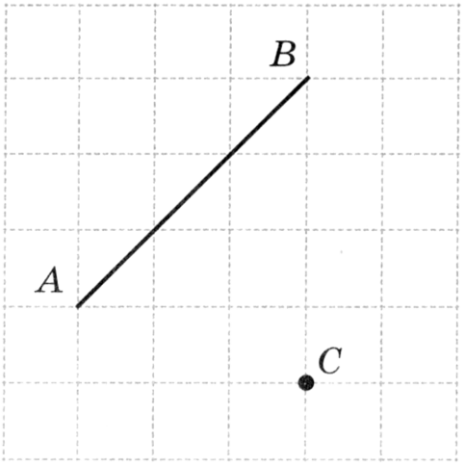




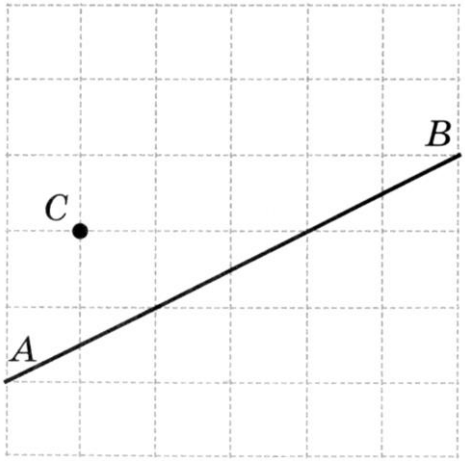
5. How many points of intersection can 3 straight line have?
6. Draw 4 line so they have 4 pairwise intersections, 5 or 6.
7. Through the point C draw the line perpendicular to line AB.

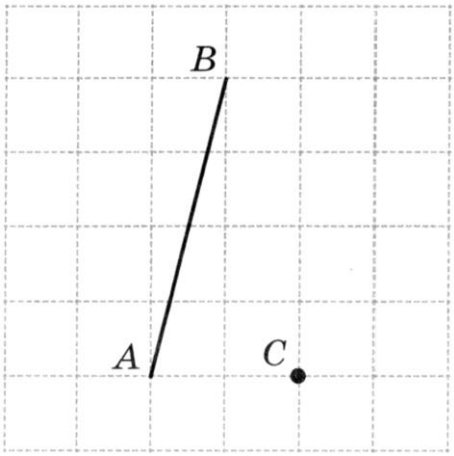






8. Through the point C draw a line parallel to the line AB





9. What is the angle?