Name: _____ Date: _____

POINTS, DISTANCES, AND SEGMENTS
COMMON CORE GEOMETRY

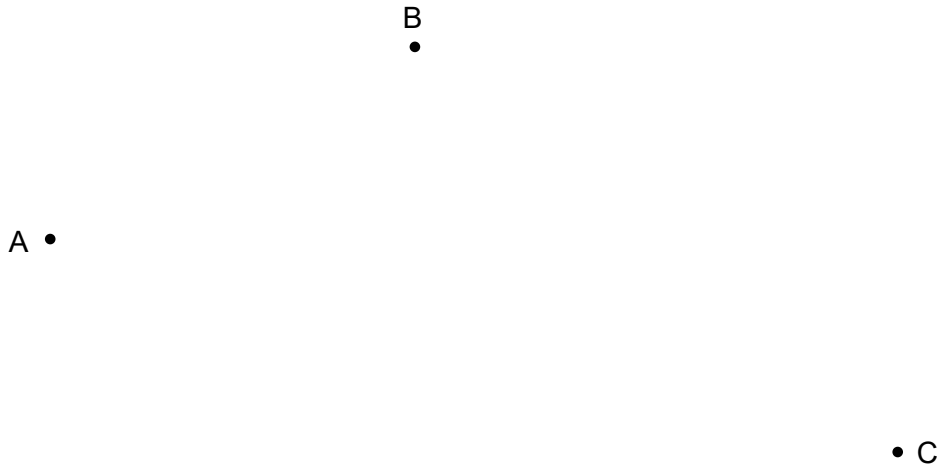
Geometry is a unique branch of mathematics, separate and distinct from Algebra. Its emphasis is on the **study** of the **properties of space:** primarily **distance**, **size, shape, and angle**. We begin our study, hence, with two basic notions, **points** and **distance**.

POINTS AND DISTANCE

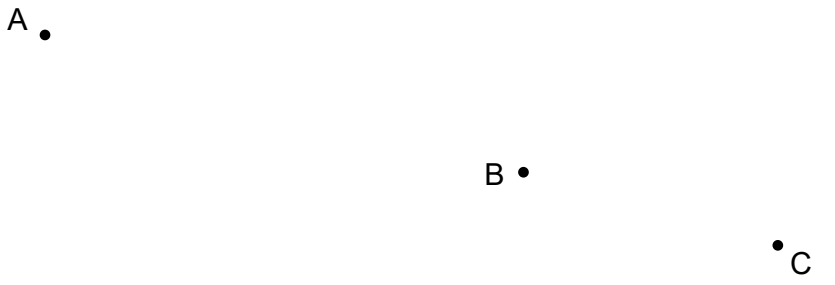
POINT: A physical location in space that has no dimensions (length, width or height). Points are often labeled with capital letters.

DISTANCE: The length of a straight line segment that connects two points.

***Exercise* #1:** Measure the distance between points *A* and *B*, symbolized by AB, the distance between points *B* and *C*, symbolized by BC, and the distance between points *A* and *C*, likewise symbolized by AC. Round each of your answers to the nearest *eighth* of an inch. Reduce when possible.

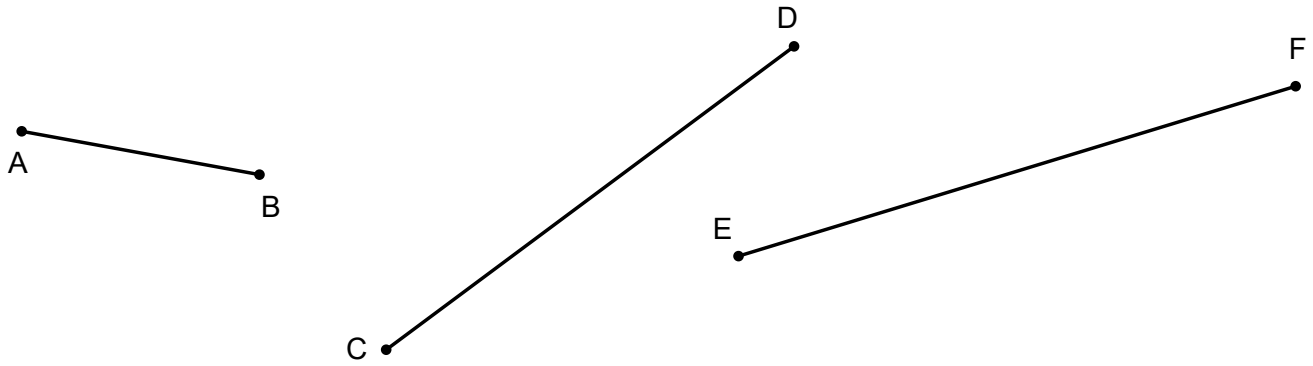


***Exercise* #2:** The points *A*, *B*, and *C* are shown below. Find the values of AB, BC, and AC. Round to the nearest *tenth* of a centimeter (i.e. millimeter). What is true about the value of $AB + BC$? What does this tell you about these three points?



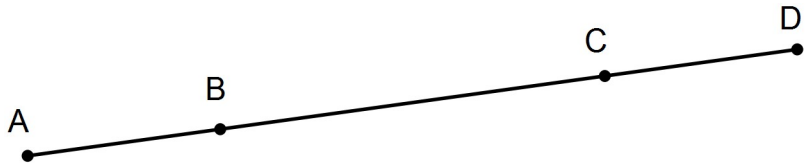
We will talk more about lines in the next lesson, but we take two facts about lines to be self-evident: (1) through any two points, only one straight line can be drawn and (2) the **shortest distance between two points** consists of the length of the **straight line segment** that connects them. We take the truths of both of these facts without any proof. In math these are known as **axioms**. More on axioms later.

***Exercise* #3:** Find the lengths of segments $\overline{AB}$, $\overline{CD}$, and $\overline{EF}$ shown below. Round your answers to the nearest *eighth* of an inch. Reduce if possible.



Three or more points are said to be **collinear** if they **fall on the same straight line**. In *Exercise* #2, we saw three collinear points.

***Exercise* #4:** In the diagram below, points A, B, C, and D are collinear. Find the lengths of segments $\overline{AC}$ and $\overline{BD}$ to the nearest millimeter. What statement can you make about these two line segments?



***Exercise* #5:** Do segments $\overline{AB}$ and $\overline{CD}$ have the same **measure** (length)? Why does this answer make sense given your answer to *Exercise* #4?

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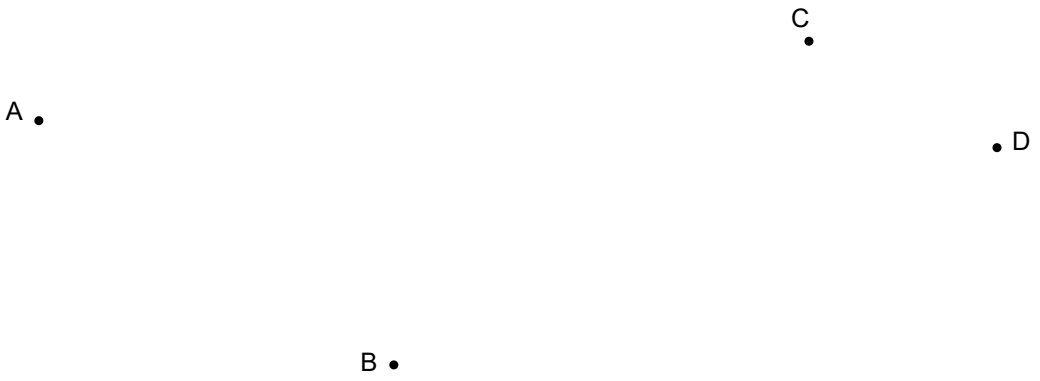
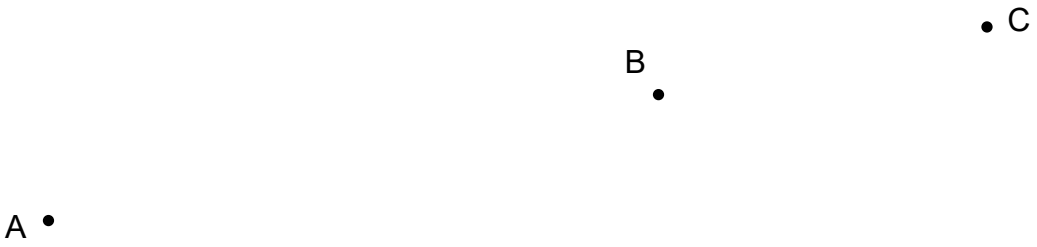
POINTS, DISTANCE, AND LINE SEGMENTS
COMMON CORE GEOMETRY HOMEWORK

MEASUREMENT

1. Find the values of AB, BC, CD, and AD. Round each measurement to the nearest *eighth of an inch*. Reduce when possible.



2. Are the points shown below collinear? Base your answer on the values of AB, BC, and AC.

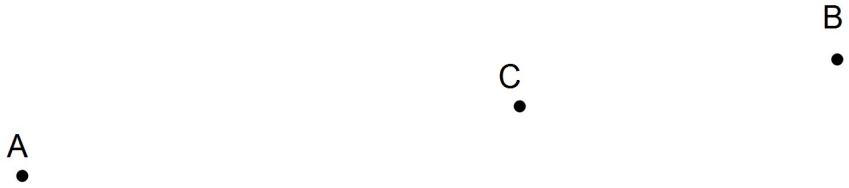


3. The points P, Q, R, and S shown below are collinear. Find the lengths of segments $\overline{PQ}$ and $\overline{RS}$ to the nearest millimeter.

4. What do your measurements in #3 tell you about the lengths of $\overline{PR}$ and $\overline{QS}$? Explain your thinking and then measure to verify your **conjecture**. Be sure to state your measurements.

PROBLEM SOLVING

5. In the diagram below, points A, B, and C are collinear. Answer each of the following questions. The figure shown below **is not drawn to scale**, meaning you cannot determine your answers by using your ruler.



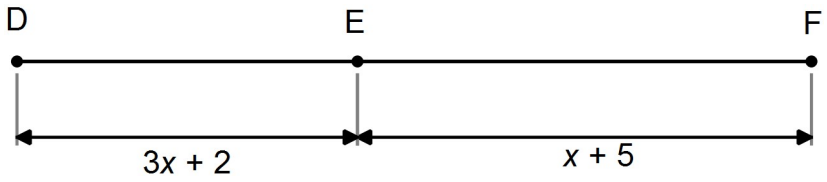
(a) Given: $AC = 5$ in and $CB = 3$ in
Find: The length of $\overline{AB}$ or AB

(b) Given: $AC = 6\frac{1}{4}$ in and $CB = 3\frac{1}{2}$ in
Find: The length of $\overline{AB}$ or AB

(c) Given: $AB = 10.2$ cm and $BC = 3.7$ cm
Find: The length of $\overline{AC}$ or AC

(d) Given: $AB = 4\frac{3}{4}$ in and $AC = 3\frac{1}{4}$ in
Find: The length of $\overline{BC}$ or BC

6. In the diagram below segment $\overline{DEF}$ is shown (since all three letters are shown, they are collinear). If $DE = 3x + 2$, $EF = x + 5$, and $DF = 23$, algebraically find the value of x.



REASONING

7. Three points, A, B, and C exists in space such that B is "between" A and C. It is known that $AB = 7$, $BC = 4$ and $AC = 9$. Are points A, B, and C collinear? Give a written explanation, supported by mathematical evidence, for your answer.