Basic Notions and Angles (Section 11.1)

1. For the figure below, answer the following:

![Diagram of a three-dimensional cube with labeled vertices A, B, C, D, E, F, G, H, and lines AD, BE, CF, DH, and HG.]

*aNote: This figure represents a three-dimensional cube.*

   a. Name two lines that are parallel.

   b. Name two lines that are perpendicular.

   c. Name two lines that are skew.

   d. Name a plane that is not defined by one of the faces.

2. If A, B, C, and D are collinear points, how many different ways can we name the line?

Try to generalize your result. That is, if we have $n$ collinear points, how many different ways can we name the line?
3. How many lines can be drawn through 10 points, no 3 of which are collinear?
HINT: Start by answering the same question for 2 points, 3 points, 4 points, and 5 points and then look for the pattern.

Try to generalize your result. That is, how many lines can be drawn through \( n \) points, no 3 of which are collinear?

**Properties of Lines and Planes**
What do we need to determine a line?

What do we need to determine a plane?
Angles

Angles as Movement
The static definition of an angle is not easy for children to grasp. Children more easily understand angles as movement.

Examples:

Exercises
1. In the following figure, \(\angle DCE = 55^\circ\), \(\angle ACF = 150^\circ\), and \(\angle DCB = 120^\circ\). Find the measure of the following angles.

\[
\angle ACD = \quad \text{and} \quad \angle ECF = \quad
\]

2. In the following figure, the measure of \(\angle ACD\) is 9 degrees less than half the measure of \(\angle DCB\). Determine the measure of both angles.

\[
\angle ACD = \quad \text{and} \quad \angle DCB = \quad
\]
Degrees, Minutes, and Seconds

Why minutes and seconds?
The arc-minute, or one minute of an angle, is commonly found in the firearms industry concerning the accuracy of rifles. One arc-minute subtends approximately one inch at 100 yards. A shooter can readjust their rifle scope by measuring the distance in inches the bullet hole is from the desired impact point and adjusting that many arc-minutes in the same direction.

Examples
a. Convert 8.42° to degrees, minutes, and seconds.

b. Convert 29°47’15” to degrees.

c. Perform each of the following operations. Leave your answer in simplest form.

\[
\begin{align*}
34^\circ & \quad 27^\prime & \quad 45^\prime & + & 52^\circ & \quad 23^\prime & \quad 15^\prime \\
+ & 57^\circ & \quad 55^\prime & \quad 25^\prime & - & 35^\circ & \quad 27^\prime & \quad 18^\prime \\
\end{align*}
\]

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