## Lesson 11: Use a Protractor to Draw Angles

* Let’s draw some angles.

### Warm-up: Estimation Exploration: Long Hand and Short Hand

How many degrees is the angle formed by the long hand and the short hand of the clock?



Make an estimate that is:

|  |  |  |
| --- | --- | --- |
| too low | about right | too high |
| $$ | $$ | $$ |

### 11.1: Draw These Angles

1. Draw a line that is neither vertical nor horizontal. Put a point somewhere on that line. Use your protractor to draw a perpendicular line through that point. Be as precise as possible. (No folding this time!)
2. Here is a ray that starts at point $M$.
* 
* Use a protractor to draw:
	1. A ray starting at point $M$ to create a $40^{∘}$ angle.
	2. Another ray starting at point $M$ to create a $20^{∘}$ angle.
	3. One more ray starting at point $M$ to create a $95^{∘}$ angle. Label each angle with its measurement.
1. In your drawing, there should be one angle that is not labeled with a measurement and is larger than $180^{∘}$ . Label the angle with an arc. How many degrees is this angle? Be prepared to explain how you know.

### 11.2: Angles Made to Order

Your teacher will give you some blank cards. Label them a–d.

1. On each card, draw an angle that meets one requirement. Use a ruler and a protractor.
	1. an angle that is less than $35^{∘}$
	2. an angle that is between $35^{∘}$ and $80^{∘}$
	3. an angle that is greater than $80^{∘}$ but less than $120^{∘}$
	4. an angle that is greater than $120^{∘}$ but less than $180^{∘}$
2. Trade cards with your partner.
	1. Measure and record each angle your partner drew. Check to make sure each angle meets the requirement.
	2. If a requirement is not met, return it to your partner so it can be corrected. Save the cards for the next lesson.

If you have time:

1. Create a drawing that shows several angles. Then, write some descriptions of your drawing. Be as specific as possible.
2. Ask a partner to recreate the drawing based on your descriptions. Does their drawing turn out as you had drawn? If not, adjust your descriptions and ask them to try again.

### Section Summary

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In this section, we learned about ways to describe and measure the size of angles.

We used clocks to describe angles as a turn of one away from the other. We learned that a degree is a measure of the turn around a circle and that 1 degree is ​​$\frac{1}{360}$​​ of a full turn of a ray through a circle.

Finally, we learned that a **protractor** is a tool used to measure angles and can also be used to create angles of a certain measure.



A protractor has two sets of numbers and that either set of numbers could be used, but it is helpful to use the set that counts up from 0 rather than count down from 180. We used a protractor to measure and draw different angles.



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