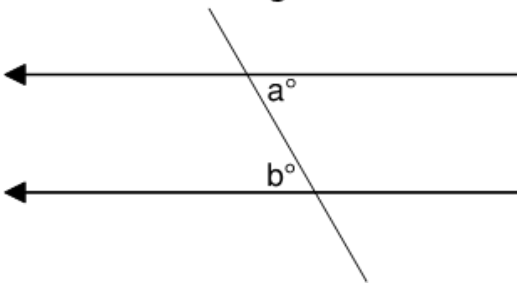
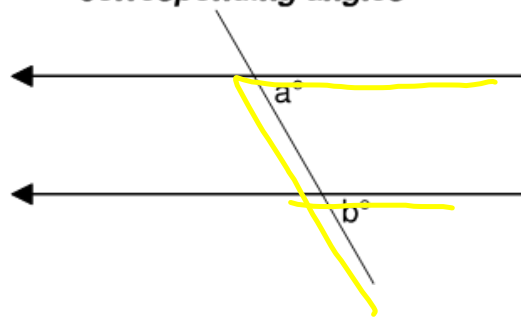


Chapter 7 - Angles and Parallel Lines

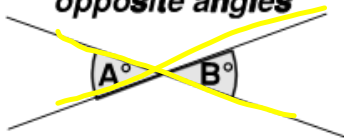
alternate angles



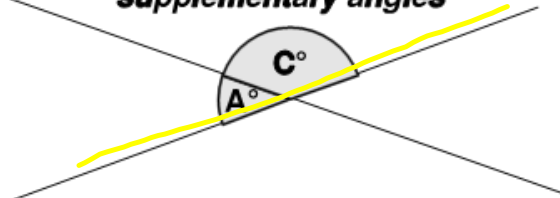
corresponding angles



opposite angles



supplementary angles



Let's talk angles...

Take a moment to look at the structures in your classroom that contain **angles**. Consider who would have been involved in creating the structures that have those angles, for example, architects, designers, surveyors, and carpenters. Angles are also useful to people who do not make structures. Aircraft pilots and boat pilots use angles for navigation. Astronomers use angles to locate objects in the sky.

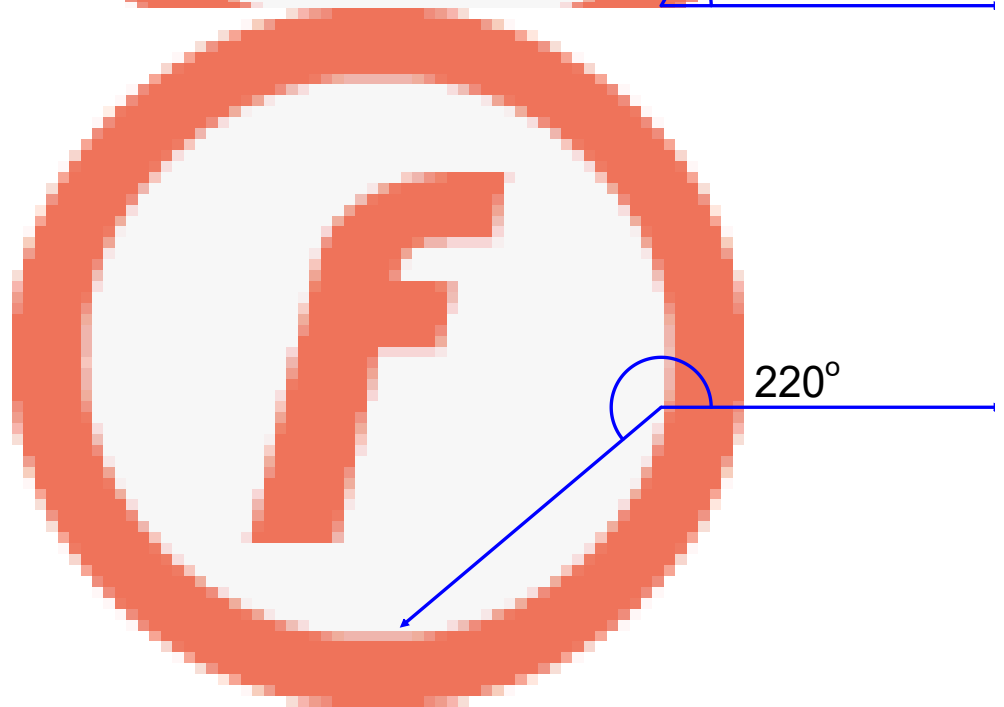
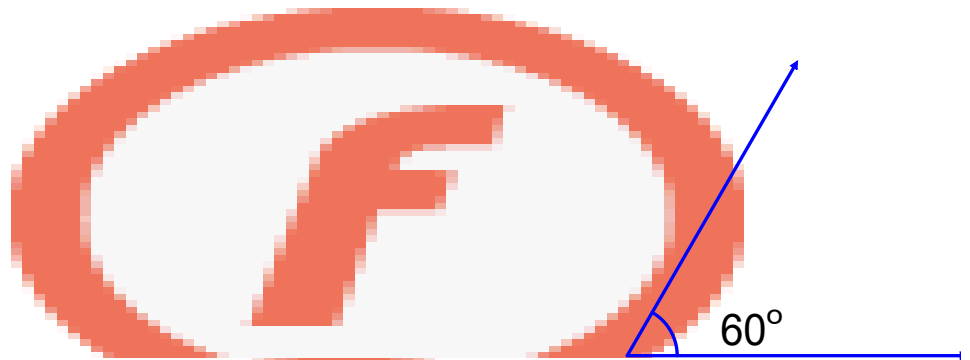
So, what exactly is an angle? An angle is formed when two rays meet at a common endpoint called a vertex. Angles are measured with tools, such as a protractor, that are marked in degrees.

Visualize an angle that is used to express direction in navigation and mapping, such as east. In this case, the angle is measured relative to true north, which is 0° and may be expressed as a bearing. A **true bearing** describes the number of degrees, measured clockwise, between an imaginary line pointing towards true north (geographic north) and another imaginary line pointing towards an intended direction or along a pathway. East is represented in land navigation and mapping at a 90° angle from true north.

Angle measures can be estimated by using **referents**, which are common measurements like 90° , 45° , 30° , and 22.5° .

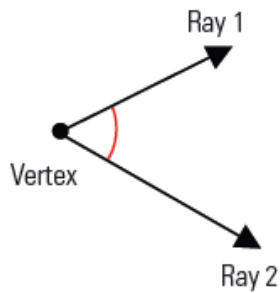
How can we draw angles? The tools used to measure angles can also be used to draw or replicate angles having specific measures. Tools have been designed to measure and create angles having only one or two specific measures, such as a set square used in technical drawings to draw right angles.

You have used a protractor and ruler to draw angles. You can also draw certain angles with a ruler and compass, and you can replicate any angle with these tools.

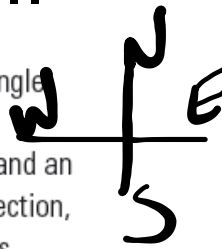


Key Terms...

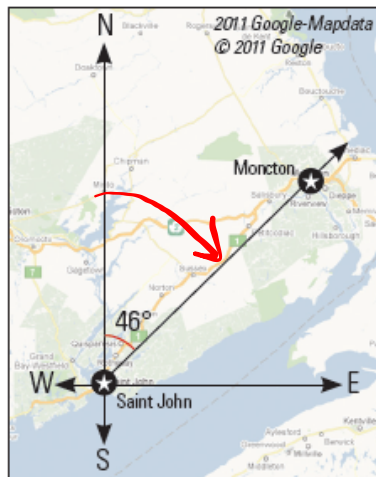
angle: two rays that meet at a point called the vertex



true bearing: the angle measured clockwise between true north and an intended path or direction, expressed in degrees



angle measure: a number representing the spread of the two rays of an angle, expressed in degrees



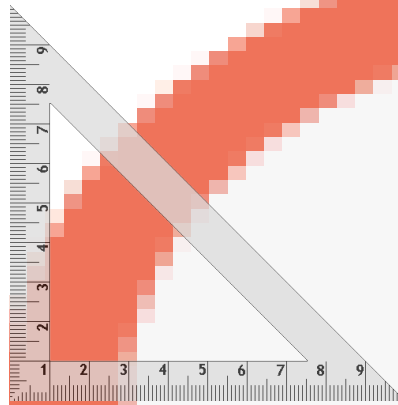
angle referent: a common standard of angle measure, for example, 0°, 45°, 90°, 180°, and 360°; they are used to estimate angles

Geometry Set... Bring tomorrow!

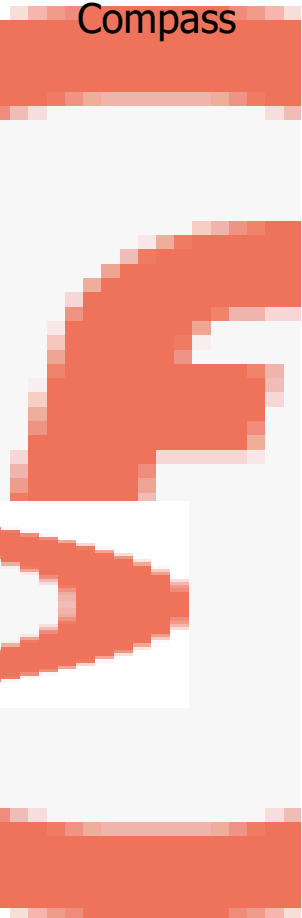
Protractor



Right Triangle



Compass



Ruler



Some More Key Terms...

Acute angle - measure is between 0° and 90°

Right angle - measure is 90° ; the two rays are perpendicular to each other

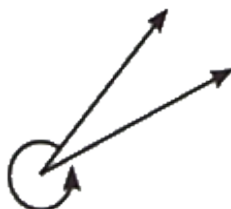
Obtuse angle - measure is between 90° and 180°

Straight angle - measure is 180°

Reflex angle - measure is between 180° and 360°

FIVE TYPES OF ANGLES	
<i>Definition of angle</i>	<i>Kind of angle</i>
greater than 0° but less than 90°	acute
90°	right
greater than 90° but less than 180°	obtuse
180° (two rays share a vertex and point in opposite directions)	straight
greater than 180° but less than 360°	reflex

EXERCISE: Identify each of the following angles using the correct terminology...



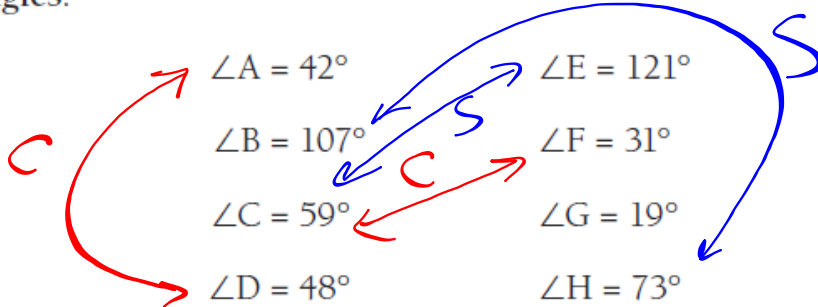
Reflex

More Key Terms...

complementary angles:
two angles that have
measures that add up to
 90°

supplementary angles:
two angles that have
measures that add up to
 180°

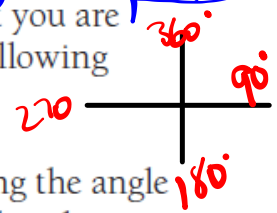
Sort the following angles into pairs of complementary and supplementary angles.



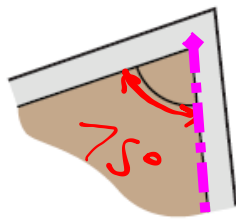
Estimating Angles using Referent Angles

90°, 180°, 270°, 360°, 45°

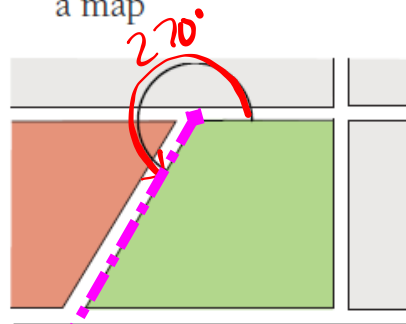
Estimations are made in many trades that use angles. Imagine that you are working as a tradesperson in the situations below and make the following estimations (aim to be within 5°).



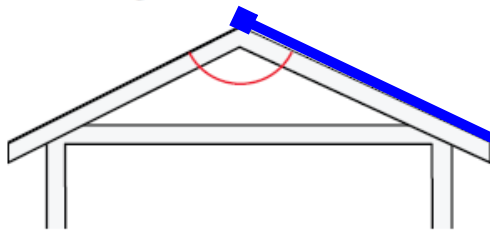
- a) a landscaper estimating the angle of the corner of a garden bed



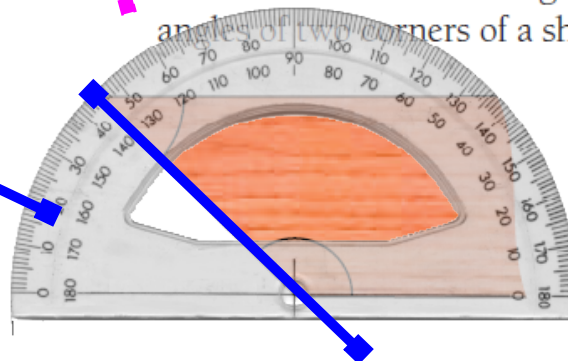
- b) a surveyor estimating the angle of a property boundary line on a map



- c) a roofer estimating the angle of the peak of a roof



- d) a cabinet-maker estimating the angles of two corners of a shelf



SOLUTION

- a) Students will be able to recognize a 90° angle without measuring, so they should be able to look at this angle and estimate it to be slightly less than 90°. They might also compare it to a real-life example of 90°, such as a corner. They will probably rotate the page on which the diagram appears, to position the angle so that one of the rays is horizontal, which will show clearly that the angle is an acute angle, less than 90°. A close estimate would be within 76° to 80°.
- b) Students will be able to see instantly that this angle is more than 180°, but not quite big enough to add another 45°. So they may describe it as “a straight angle (180°) plus about a bit less than one-half of a right angle (45°)”, and come up with a close estimate of 219° to 223°.
- c) Students will see that this is greater than 90° but not quite wide enough to add another 45°. They will be able to suggest a close estimate of around 130°.
- d) The acute angle in the top left corner can be seen to be a 45° angle by using a referent. The obtuse angle in the lower left corner can be seen to be a right angle plus a little more than a 45° angle so a close estimate will be about 145°.