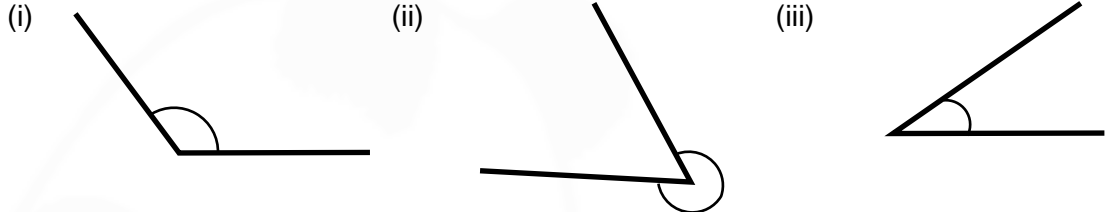


Classifying, Measuring and Drawing Angles

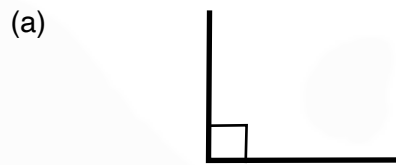
Starter

1. **(Review of last lesson)**
How many degrees does the minute hand of a clock turn between 9:30am and 9:55am?
2. (a) Draw two intersecting lines which are right angles to one another.

(b) Decide whether the marked angles are **more** or **less** than a right angle.



Working:



- (b) (i) More than a right angle.
(ii) More than a right angle.
(iii) Less than a right angle.

Notes

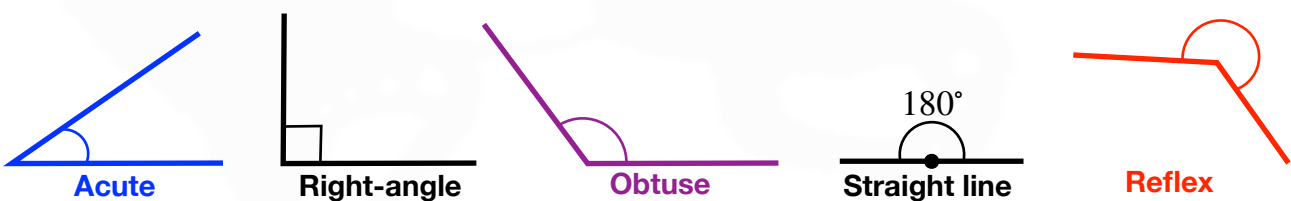
Classifying angles

There are three types of angles:

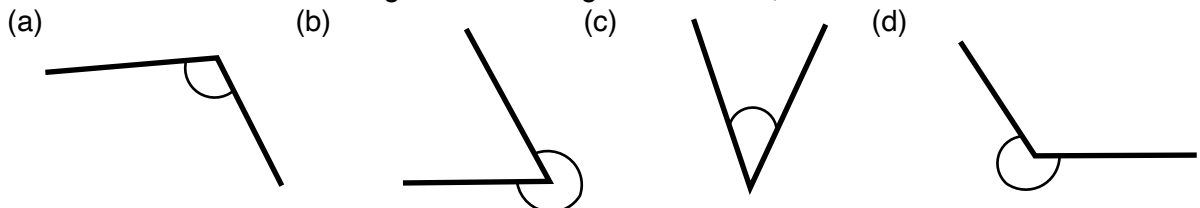
Acute — angles between 0° and 90° (i.e. less than a right angle)

Obtuse — angles between 90° and 180° (i.e. more than a right angle but less than a straight line)

Reflex — angles between 180° and 360° (i.e. more than a straight line)



E.g. 1 State whether the marked angle in these diagrams is acute, obtuse or reflex.



Working: (a) Obtuse

E.g. 2 Decide whether these statements are *always true*, *sometimes true* or *never true*.

- (a) An obtuse angle is more twice an acute angle
- (b) A triangle can have at most one reflex angle.
- (c) A quadrilateral (i.e. a four-sided shape) has two obtuse angles.
- (d) Twice an acute angle is less than a reflex angle.

Working: (a) Sometimes true. An acute angle could be 30° and double that is 60° which is still acute so smaller than an obtuse angle. However, an acute angle could be 80° and double that is 160° which is still bigger than some obtuse angles.

Exercise

Classifying angles: CIMT Y7A p75 Ex 5.3

Measuring angles

A **protractor** is used to measure angles.

How to use a protractor

Before measuring an angle using a protractor it is important to know whether the angle is **acute**, **obtuse** or **reflex**.

Acute and obtuse angles

If the angle is **acute** you know the number should be **between 0° and 90°** .

If the angle is **obtuse** you know the number should be **between 90° and 180°** .

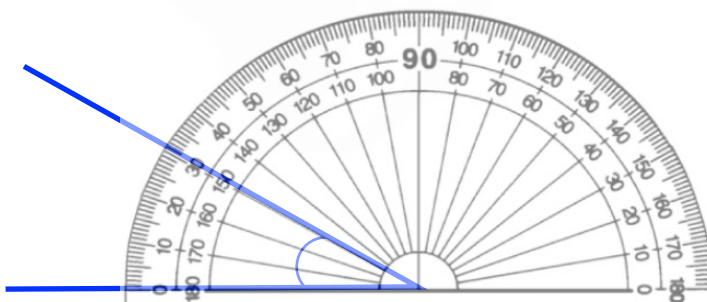
Success criteria – measuring acute and obtuse angles using a protractor

1. Decide whether the angle is acute or obtuse.
2. Place the cross hairs or dot of the protractor on the point where the two lines intersect.
3. Rotate the protractor so that its horizontal line at the bottom covers one of the lines.
4. Read the scale remembering that:

Acute – between 0° and 90° .

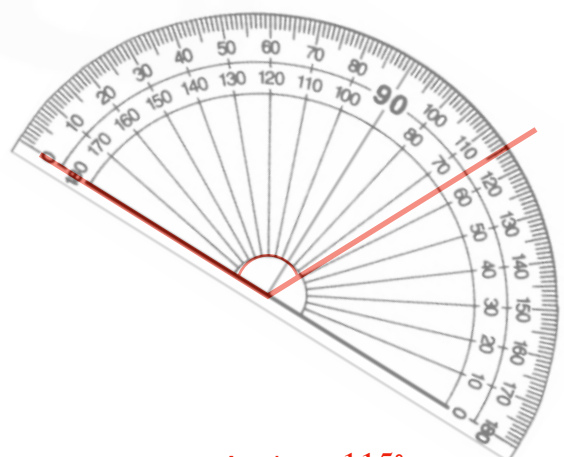
Obtuse – between 90° and 180° .

E.g. (a) Acute angle



Working: Angle = 31°

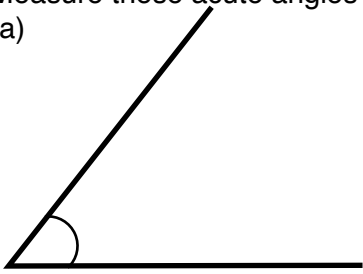
(b) Obtuse angle



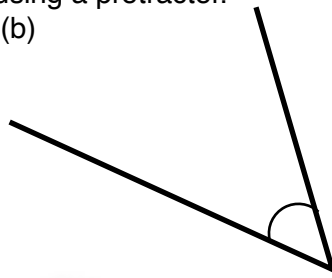
Angle = 115°

E.g. 3 Measure these acute angles using a protractor.

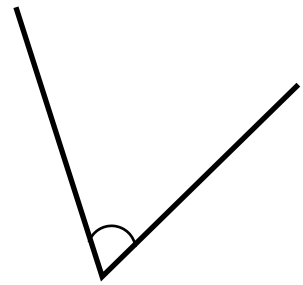
(a)



(b)



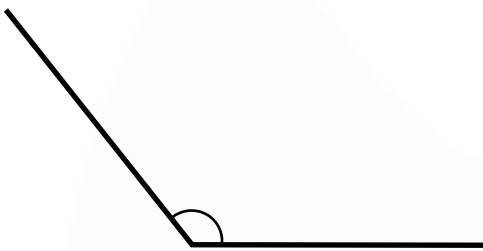
(c)



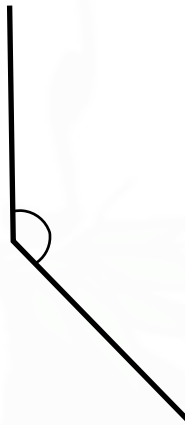
Working: (a) $52^\circ (\pm 1^\circ)$

E.g. 4 Measure these obtuse angles using a protractor.

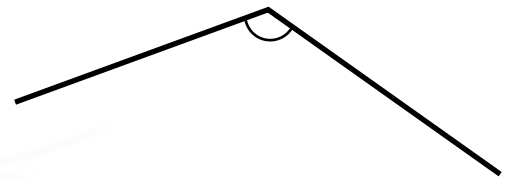
(a)



(b)



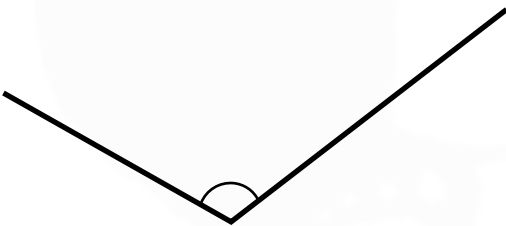
(c)



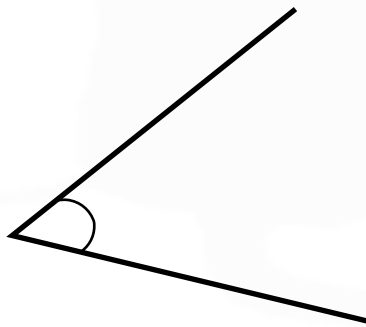
Working: (a) $129^\circ (\pm 1^\circ)$

E.g. 5 Measure these angles using a protractor.

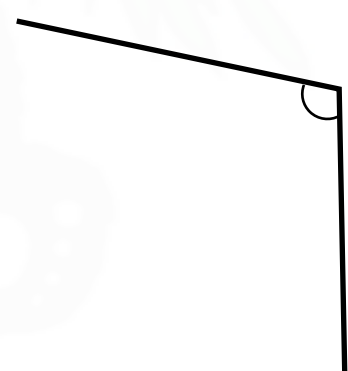
(a)



(b)



(c)

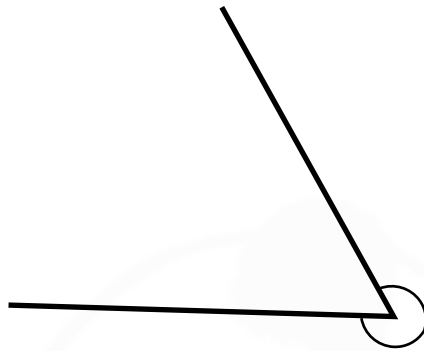


Working: (a) $114^\circ (\pm 1^\circ)$

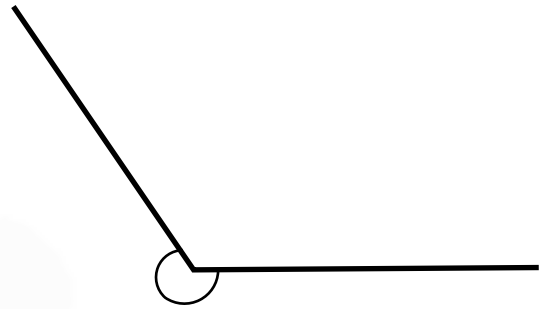
Reflex angles

E.g. 6 (a) Use your protractor to find the value of these reflex angles.

(i)



(ii)



(b) Write an explanation of how to find the value of a reflex angle using a protractor.

Many protractors only go up to 180° so it is not possible to measure the angle directly. Instead, the acute or obtuse must be measured and taken away from 360°

Success criteria – finding the value of reflex angles using a protractor

1. Decide whether the angle on the other side of the reflex angle is acute or obtuse – this is the angle to measure.
2. Place the cross hairs or dot of the protractor on the point where the two lines intersect.
3. Rotate the protractor so that its horizontal line at the bottom covers one of the lines.
4. Read the scale remembering that:

Acute – between 0° and 90° .

Obtuse – between 90° and 180° .

5. Subtract the angle measured from 360° .

Drawing angles

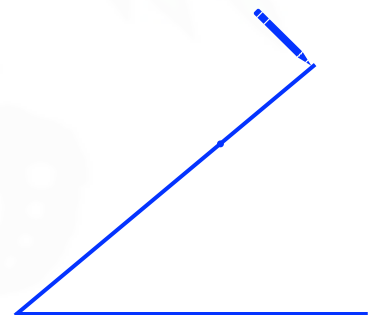
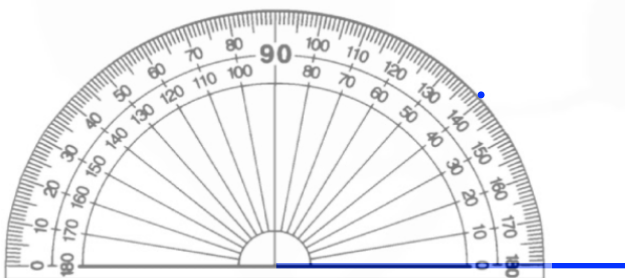
E.g. 7 (a) With the aid of a protractor:

(i) draw an angle of 41°

(ii) draw an angle of 158° .

(b) Explain how to draw an angle with the aid of a protractor.

Working: (a)



Success criteria – drawing angles

1. Make a note whether the angle is going to be acute (between 0° and 90°) or obtuse (between 90° and 180°).
2. Draw a horizontal line about 8 cm long.
3. Place the cross hairs or dot of the protractor on one of the ends of the line.
4. Measure the angle round from the other end of the line until the required number is reached. Make a mark.
5. Draw a line from the end of the line where the cross hairs or dot of the protractor was to the mark.
6. Check your angle is the correct type.

Drawing angle game

Working in pairs, Player 1 states an angle which Player 2 must draw *without a protractor*. After drawing the angle, Player 1 measures it to see how close it is and points are awarded as below:

- Exact angle: 10 points
- Within 2° : 5 points
- Within 5° : 3 points
- Within 10° : 1 point

Then players swap over and Player 2 states an angle which Player 1 must draw *without a protractor*, and the game continues.

Video: [Types of angles](#)
Video: [Measuring angles](#)
Video: [Drawing angles](#)

[Solutions to Starter and E.g.s](#)

Exercise

Classifying angles: CIMT Y7A p75 Ex 5.3

Measuring angles: CIMT Y7A p71 Ex 5.2

Summary

Classifying angles

Acute — angles between 0° and 90° (i.e. less than a right angle)

Obtuse — angles between 90° and 180° (i.e. more than a right angle but less than a straight line)

Reflex — angles between 180° and 360° (i.e. more than a straight line)

Success criteria — measuring acute and obtuse angles using a protractor

1. Decide whether the angle is acute or obtuse.
2. Place the cross hairs or dot of the protractor on the point where the two lines intersect.
3. Rotate the protractor so that its horizontal line at the bottom covers one of the lines.
4. Read the scale remembering that:

Acute — between 0° and 90° .

Obtuse — between 90° and 180° .

Success criteria — finding the value of reflex angles using a protractor

1. Decide whether the angle on the other side of the reflex angle is acute or obtuse — this is the angle to measure.
2. Place the cross hairs or dot of the protractor on the point where the two lines intersect.
3. Rotate the protractor so that its horizontal line at the bottom covers one of the lines.
4. Read the scale remembering that:

Acute — between 0° and 90° .

Obtuse — between 90° and 180° .

5. Subtract the angle measured from 360° .

Success criteria — drawing angles

1. Make a note whether the angle is going to be acute (between 0° and 90°) or obtuse (between 90° and 180°).
2. Draw a horizontal line about 8 cm long.
3. Place the cross hairs or dot of the protractor on one of the ends of the line.
4. Measure the angle round from the other end of the line until the required number is reached. Make a mark.
5. Draw a line from the end of the line where the cross hairs or dot of the protractor was to the mark.
6. Check your angle is the correct type.