Unit 10

Trigonometry

Topic A: Angles and triangles

- Angles
- Triangles
- Find the missing measurement

Topic B: Trigonometric functions

- Sides and angles
- Trigonometric functions
- Sine, cosine, and tangent

Topic C: Solving right triangles

- Trigonometry using a calculator
- Solving triangles
- Angles of depression and elevation
- Applications of trigonometry

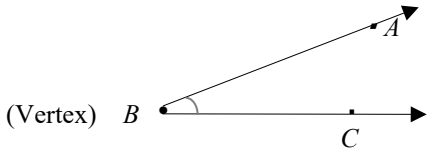
Unit 10 Summary

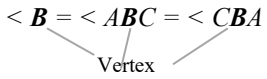
Unit 10 Self-test

Topic A: Angles and Triangles

Angles

Angle: two rays (sides) that have a common point (the vertex).

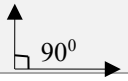
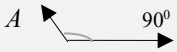
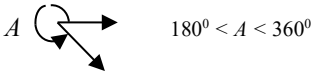
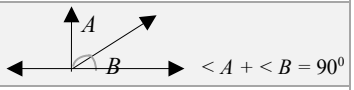
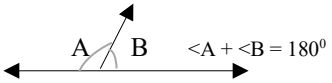
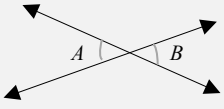




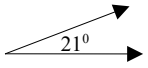
The angle *B* in the figure above could be called $< B$ or $< ABC$ or $< CBA$.

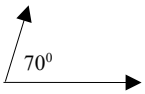
An angle can vary from 0 to 360 degrees (360^0).

Classifying angles:

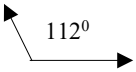
Angle	Definition	Figure
Straight angle	An angle of exactly 180 degrees.	
Right angle	An angle of exactly 90 degrees.	
Acute angle	An angle between 0 and 90 degrees. (Less than 90^0)	
Obtuse angle	An angle between 90 and 180 degrees.	
Reflex angle	An angle between 180 and 360 degrees.	
Complementary angles	Two angles whose sum is exactly 90 degrees.	
Supplementary angles	Two angles whose sum is exactly 180 degrees.	
Vertical angles	Two angles formed by the intersection of two straight lines. $<A$ and $< B$ are vertical angels.	

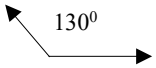
Example: Label each of the following angles.

1) 



Acute angles.

2) 

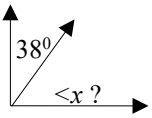


Obtuse angles.

3) 


Obtuse angles. Reflex angle.

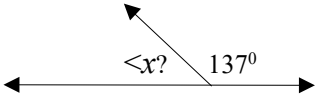
Example: What is the complementary angle to 38 degrees?



$< x + 38^0 = 90^0$

$< x = 90^0 - 38^0 = \boxed{52^0}$

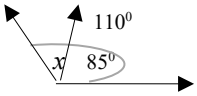
Example: What is the supplementary angle to 137^0?



$< x + 137^0 = 180^0$

$< x = 180^0 - 137^0 = \boxed{43^0}$

Example: What is the size of the angle x?



$< x = 110^0 - 85^0 = \boxed{25^0}$

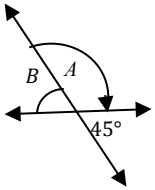
Example 1) Two angles A and 45^0 that add together to measure 180^0 are said to be____?

supplementary

2) What is the size of angle A and B?

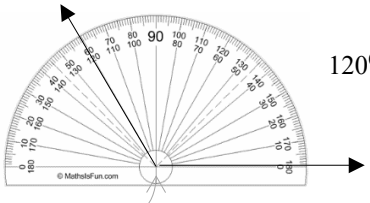
$< A + 45^0 = 180^0$, $< A = 180^0 - 45^0$, $\boxed{< A = 135^0}$

$< A + < B = 180^0$, $< B = 180^0 - <A$, $\boxed{< B = 45^0}$



How to use a protractor:

- Place the protractor so that the center hole is over the angle's vertex.
- Line up the base line of the protractor with one of the sides of the angle.
- Read the angle over the the second side of the angle.

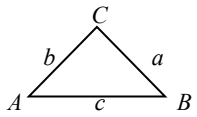
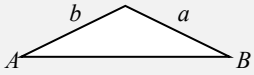
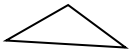


120^0

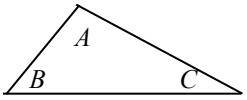
Vertex

Triangles

Classify triangles:

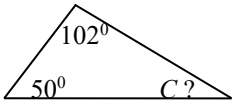
Name of triangle	Definition	Figure
Equilateral triangle	A triangle that has three equal sides and three equal angles. $a = b = c$, $< A = < B = < C = 60^0$	
Isosceles triangle	A triangle that has two equal sides and two equal angles. $a = b$, $< A = < B$	
Acute triangle	A triangle that has three acute angles ($< 90^0$).	
Right triangle	A triangle that has a right angle ($= 90^0$). (A right angle is usually marked on the figure as a small square.)	
Obtuse triangle	A triangle that has an obtuse angle ($> 90^0$).	
Scalene triangle	A triangle that has three unequal sides.	

Angles in a triangle: the sum of the three angles in a triangle is always 180^0.



$$< A + < B + < C = 180^0$$

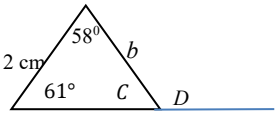
Example: What is the size of angle *C* in the following figure?



$$102^0 + 50^0 + < C = 180^0$$

$$< C = 180^0 - (102^0 + 50^0) = 28^0$$

Example: What is the size of angle *C, D* and the side *b* in the following figure?



$$61^0 + 58^0 + < C = 180^0$$

$$< C = 180^0 - (61^0 + 58^0) = 61^0$$

$$< D = 180^0 - < C = 180^0 - 61^0 = 119^0$$

$b = 2$ cm (An isosceles triangle)

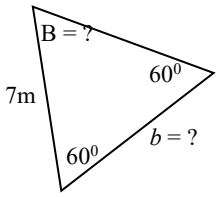
Example: Match the following triangles to the letter with the best definition.

_____Scalene triangle	a. has three equal sides	c.
_____Equilateral triangle	b. has two equal sides	a.
_____Isosceles triangle	c. has three unequal sides	b.

Find the Missing Measurement

Example: Find the missing measurement and then name the kind of triangle.

1)



$< B = 180^0 - (60^0 + 60^0)$ $< A + < B + < C = 180^0$

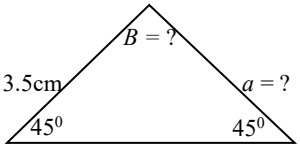
$= \boxed{60^0}$

It is an equilateral triangle. It has three equal angles.

(An acute triangle: $60^0 < 90^0$.)

$b = \boxed{7 \text{ m}}$ It is an equilateral triangle.

2)



$< B = 180^0 - (45^0 + 45^0)$ $< A + < B + < C = 180^0$

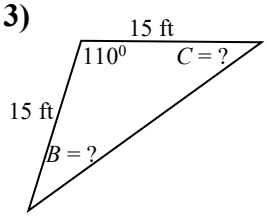
$= \boxed{90^0}$

It is an isosceles triangle. It has two equal angles.

(An right triangle: it has a 90^0 angle.)

$a = \boxed{3.5 \text{ cm}}$ It is an isosceles triangle.

3)



It is an isosceles triangle. It has two equal sides.

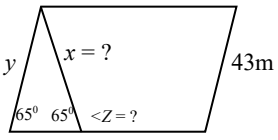
$< B + < C = 180^0 - 110^0$ $< A + < B + < C = 180^0$

$= \boxed{70^0}$

$< B = < C = 70^0 \div 2 = \boxed{35^0}$ It is an isosceles triangle.

(An obtuse triangle: it has an angle $> 90^0$.)

4)



It is an isosceles triangle. It has two equal angles.

$y = 43$ m A parallelogram.

$x = y = \boxed{43 \text{ m}}$ It is an isosceles triangle.

$< Z = 180^0 - 65^0 = \boxed{115^0}$ Supplementary angles

(An acute triangle: $65^0 < 90^0$)