**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).

***∙*** *A*

*<* ***B*** *= < A****B****C = < C****B****A*

(Vertex) *B* • **∙**  Vertex

*C*

**The angle *B* in the figure above could be called** *<* ***B*** or *< A****B****C* or *< C****B****A.*

**An angle can vary from 0 to 360 degrees (3600).**

3600

**Classifying angles:**

|  |  |  |
| --- | --- | --- |
| **Angle** | **Definition** | **Figure** |
| **Straight angle** | An angle of exactly 180 degrees. | 1800 |
| **Right angle** | An angle of exactly 90 degrees. | 900 |
| **Acute angle** | An angle between 0 and 90 degrees.  (Less than 900) | *A A <* 900 |
| **Obtuse angle** | An angle between 90 and 180 degrees. | *A* 900 *< A <* 1800 |
| **Reflex angle** | An angle between 180 and 360 degrees. | *A* 1800 *< A <* 3600 |
| **Complementary angles** | Two angles whose sum is exactly 90 degrees. | *A*  *B < A + < B =* 900 |
| **Supplementary angles** | Two angles whose sum is exactly 180 degrees. | A B <A + <B = 1800 |
| **Vertical angles** | Two angles formed by the [intersection](http://www.mathopenref.com/intersection.html) of two straight lines.  ＜*A* and < *B* are vertical angels. | *A　　　 B* |

**Example:**  Label each of the following angles.

1. 210 700 Acute angles.

1. 1120 1300

Obtuse angles.



Obtuse angles.Reflex angle.

**Example:**   What is the complementary angle to 38 degrees?

380 < *x +* 380 = 900

*<x* ? < *x* = 900 – 380 = 520

**Example:**   What is the supplementary angle to 1370?

< *x* + 1370 = 1800

<*x*? 1370 < *x* = 1800 –1370 = 430

**Example:**   What is the size of the angle *x*?

1100 *< x =* 1100– 850 = 250

*x* 850

**Example** **1)** Two angles *A* and 450 that add together to measure 1800 are said to be\_\_\_\_? supplementary

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

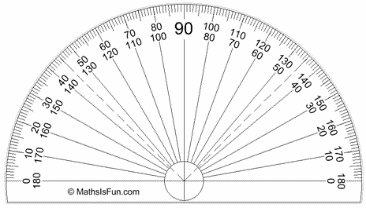
*A*

< *A* + 450 = 1800, < *A* = 1800 – 450, < *A* = 1350

< *A* + < *B* = 1800, < *B* = 1800 – <A, < *B* = 450

**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.



1200

Vertex

**Triangles**

**Classify triangles:**

|  |  |  |
| --- | --- | --- |
| **Name of triangle** | **Definition** | **Figure** |
| **Equilateral triangle** | A [triangle](http://www.mathopenref.com/triangle.html) that has three equal sides and  three equal angles.  *a* = *b* = *c*, < *A* = < *B* = < *C =* 600 | *C*  *b a*  *A c B* |
| **Isosceles triangle** | A triangle that has two equal sides and two equal angles.  *a* = *b*, < *A* = < *B* | *b a*  *A B* |
| **Acute triangle** | A triangle that has three acute angles (< 900). |  |
| **Right triangle** | A triangle that has a right angle (= 900).  (A right angle is usually marked on the figure as a small square.) |  |
| **Obtuse triangle** | A triangle that has an obtuse angle ( > 900). |  |
| **Scalene triangle** | A triangle that has three unequal sides. |  |

**Angles in a triangle: the sum of the three angles in a triangle is always 1800.**

*A < A + < B + < C* = 1800

*B C*

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

10201020 + 500 *+ < C* = 1800

500 *C* ? *< C =* 1800 – (1020 +500) = 280

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

610 + 580 *+ < C* = 1800

*b*

580

2 cm   *< C =* 1800 – (610 + 580) = 610

*D*

*< D =* 1800 – <*C* = 1800 – 610 = 1190

*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.

B = ?

< *B* = 1800 – (600 + 600) *< A + < B + < C* = 1800

600

7m

= 600

600

*b* = ? 7m

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

(An acute triangle: 600 < 900.)

*b* = 7 m It is an equilateral triangle.

*B =* ?

3.5cm *a* = ? < *B* = 1800 – (450 + 450) *< A + < B + < C* = 1800

450

450

= 900

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

(An right triangle: it has a 900 angle.)

*a* = 3.5 cm It is an isosceles triangle.

1100

*C* = ?

15 ft

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

15 ft

< *B + < C* = 1800 – 1100 *< A + < B + < C* = 1800

*B* = ?

= 700

< *B = < C* = 7002 = 350 It is an isosceles triangle.

(An obtuse triangle: it has an angle > 900.)

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

*x* = ?

*y*  43m *y* = 43 m A parallelogram.

*<Z* = ?

650

650

*x* = *y* = 43 m It is an isosceles triangle.

< Z = 1800 – 650 = 1150 Supplementary angles

(An acute triangle: 650 < 900)