

**Prerequisite Practice 2-1: Ratios and Proportions****RATIOS:**

A **ratio** is a comparison of **like** quantities with the **same** units.  
**Equivalent** ratios have the **same simplest form** or the **same comparison**.

How many boys do we have in our class today? \_\_\_\_\_ Boys (1 quantity)

How many girls do we have in our class today? \_\_\_\_\_ Girls (1 quantity)

What is the ratio of number of boys to number of girls in the class?

Boys to Girls

What is the ratio of number of girls to number of boys in the class?

Girls to Boys

**\*\*Note the difference between the two ratios. The order of the quantities is important.**

**Ratios can also be expressed in fraction form.**

**Practice:**

**For each of the following expressions:**

**(a) Write the expression as a ratio.**

**(b) Write the ratio in fraction form.**

1. 4 dogs to 7 cats

(a) Ratio:

2. 5 pens to 11 books

(a) Ratio:

(b) Fraction:

(b) Fraction:

**EQUIVALENT RATIOS:**

Ratios are fractions, so we have to reduce ratios to lowest terms as well.

**Write the following ratios in lowest terms.**

3. (a) 4 : 12

(b) 15 : 35

(c) 3 : 9 : 27

How many minutes are there in 1 hour?

How many cm are there in 1 m?

**Units are not written in ratios.**

Write each ratio using the given information.

4. (a) 10 cm to 1 m

(b) 4 min to 1 h

(c) 15 s to 1 min

**PROPORTIONS:**

A **proportion** is a statement of **equality** between **equivalent** ratios.  
\*Please note the equal sign between the ratios.

**Find a ratio that is equivalent to the following ratios.**

How?? \*Either by dividing or multiplying both sides by the same number

(a) 2:5

(b) 8:6

(c) 1.5:3

(d)  $9:\frac{1}{3}$

**Write the above equivalent ratios as proportions.**

(a)

(b)

(c)

(d)

**SOLVING PROPORTIONS FOR UNKNOWN QUANTITY:**

**Two Terms:**

**Solve for the Unknown Value.**

(a)  $x:3 = 1:5$

(b)  $4:7 = 8:y$

Step 1: Write both ratios as fractions.

Step 2: Cross Multiply.

Step 3: Isolate  $x$ .

**Three Terms:**

(c)  $5:3:1 = 15:x:y$

Step 1: Write a two-term proportion with one unknown.

Step 2: Write both ratios as fractions.

Step 3: Cross Multiply.

Step 4: Isolate the Variable.

Step 5: Write a two-term proportions with the other unknown.

Step 6: Write both ratios as fractions.

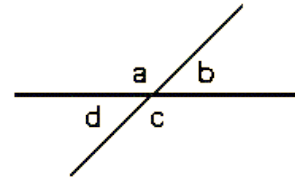
Step 7: Cross Multiply.

Step 8: Isolate the Variable.

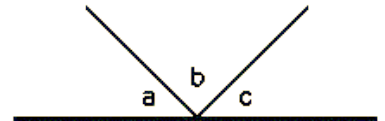
**Prerequisite Practice 2-2: Angle Properties**

**Lines and Angles**

If **two straight lines cross each other**, four angles are formed. The **sum of these angles** (a, b, c, d) will always be **360°**. The **angles vertically opposite each other** when straight lines cross will always be **equal**. In the given diagram, **'a' equals 'c'** and **'b' equals 'd'**.

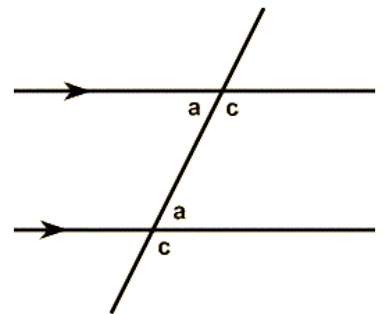


If any number of straight lines meets at the same point of another straight line, the **sum of the angles formed on a straight line** will always be **180°**. Here **the angles a, b, and c, add up to 180°**.



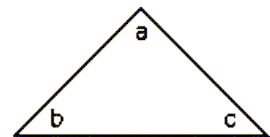
**Parallel Lines and Angles**

In the given diagram, the two horizontal lines are parallel to each other, and are crossed by a sloping straight line (a transversal), causing angles to be formed. The angles marked 'c' are equal to each other, and they are called **corresponding angles**. Each 'c' angle has an **adjacent** angle marked 'a'. As you have already learnt, the sum of each pair of 'a' and 'c' angles will always be 180° (as angles on a straight line). Also the two 'a' angles are equal to each other, as **alternate angles** between the two parallel lines.

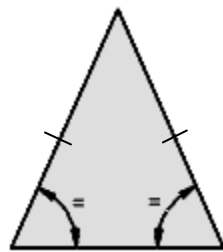


**Interior angles of a Triangle**

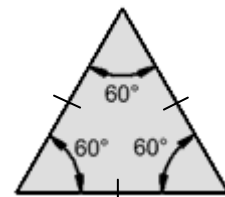
With every triangle, the sum of its three angles will always be 180°. In every triangle, sum of its angles **a + b + c = 180°**.



Scalene Triangle

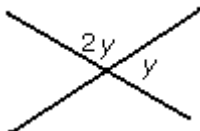


Isosceles Triangle



Equilateral Triangle

**Example 1: Find the unknown angle measures without using a protractor.**



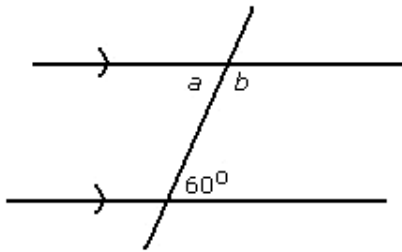
$2y + y = 180^\circ$  (sum of angles on a straight line)

$3y = 180^\circ$

$y = 180^\circ \div 3$

$y = 60^\circ$

Example 2: Find the unknown angle measures without using a protractor.



$a = 60^\circ$  (alternate angles)

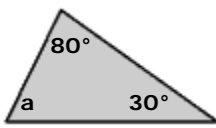
$a + b = 180^\circ$  (sum of angles on a straight line)

$60^\circ + b = 180^\circ$

$b = 180^\circ - 60^\circ$

$b = 120^\circ$

Example 3: For the given triangle, find the measure of the unknown angle.



$a + 80^\circ + 30^\circ = 180^\circ$  (sum of angles in a triangle)

$a = 180^\circ - 80^\circ - 30^\circ$

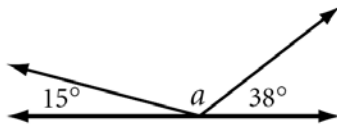
$a = 180^\circ - 110^\circ$

$a = 70^\circ$

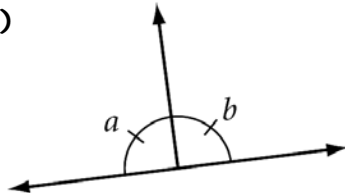
Practice

1. For each given diagram, find the unknown angle measures without using a protractor.

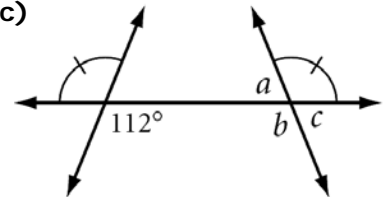
(a)



(b)

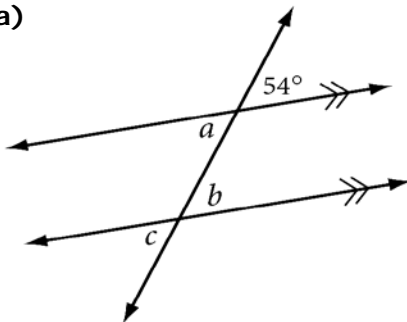


(c)

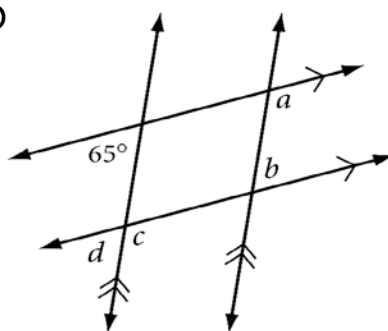


2. For each given diagram, find the unknown angle measures without using a protractor.

(a)

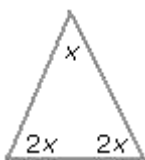


(b)

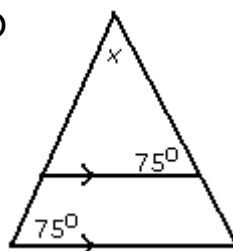


3. Find the angle measure of "a" in each triangle.

(a)



(b)



Answers:

1. (a)  $a = 127^\circ$  (b)  $a = b = 90^\circ$   
 (c)  $a = 68^\circ$ ,  $b = 112^\circ$ ,  $c = 68^\circ$

2. (a)  $a = 54^\circ$ ,  $b = 54^\circ$ ,  $c = 54^\circ$   
 (b)  $a = 115^\circ$ ,  $b = 65^\circ$ ,  $c = 115^\circ$ ,  $d = 65^\circ$

3. (a)  $x = 36^\circ$  (b)  $x = 30^\circ$