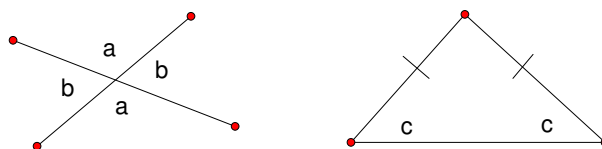


Principles to Remember:

- The three angles in a triangle add up to 180° .
- All angles along a straight line add up to 180°
- When two straight lines intersect, it creates two pairs of equal angles that are opposite each other. In the diagram below, the two angles marked a are the same and the two angles marked b are the same.
- In an isosceles triangle, the two angles at the bottoms of the equal legs are the same. In the diagram below, the two angles marked c are the same.



1. In the first diagram, since y is on a straight line with 46 , we know that $y + 46 = 180^\circ$, so $y = 134^\circ$. Now, we have two of the three angles in the triangle, and we know that $x + 26 + 134 = x + 160 = 180$, so $x = 20^\circ$. $x = 20, y = 134$

In the second diagram, we see that $120 = x + 44$ because they are opposite angles, so $x = 76$. Now we have two angles in a triangle, so we can find that $z + 76 + 84 = z + 160 = 180$, so $z = 20$. Then if you consider the big triangle with angles $z, x + 44$, and y , we can see that $20 + 76 + 44 + y = y + 140 = 180$, so $y = 40$. $x = 76, y = 40, z = 20$

2. In the first diagram, we see that y and 134 are on a straight line, so they must add up to 180 . This gives us $y = 46$. Now we can find the missing angle in the triangle, which is 49 , and since x and 49 are on a straight line, they must add up to 180 . So $x = 131$. $x = 131, y = 46$.

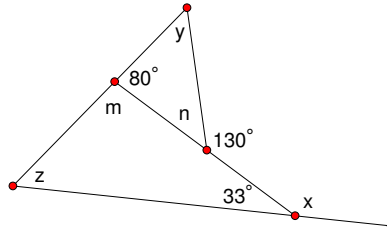
In the second diagram, we see that there is an isosceles triangle, so the other angle in the triangle must also be 34 . So now we have that $34 + 34 + x = 180$, so $x = 112$. To find y , we must find the missing angle in its triangle. I will call this angle a . We know that a and 34 are on a straight line, so they must add up to 180 , so $a = 146$. So we know that $y + 21 + 146 = 180$, so $y = 13$. $x = 112, y = 13$

3. Notice that the angle y isn't $\angle PSQ$. It is next to a little circular line, which means that y is $\angle PSR$. In both triangles, we have two isosceles triangles. We know that the bottom leg angles are the same in each triangle. So write x in $\angle QSR$. We know that $78 + x + x = 180$, so $x + x = 102$, so $x = 51$. In the other triangle, call $\angle QPS = \angle QSP = n$. We know that $n + n + 18 = 180$, so $n + n = 162$, so $n = 81$. Now we can find y , because $y = x + n$. So $y = 51 + 81 = 132$. $x = 51, y = 132$.

4. $33 + x = 180$, so $x = 147$.

$n + 130 = 180$, so $n = 50$. (the angle n is marked in the diagram below). $y + 80 + 50 = 180$, so $y = 50$.

$m + 80 = 180$, so $m = 100$. $z + 100 + 33 = 180$, so $z = 47$.



$$x = 147, y = 50, z = 47$$

5. $x + 33 + 25 = 180$, so $x = 122$.

Call the only unlabeled angle n . Then $122 + n = 180$, so $n = 58$. Then $y + 58 + 80 = 180$, and $y = 42$.

$$x = 122, y = 42, z = 100$$

6. Since the figure has an isosceles triangle, we can write x in the blank angle next to z , and we know that $100 + x + x = 180$, so $x + x = 80$, so $x = 40$.

$$40 + z = 180, \text{ so } z = 140.$$

Now we can write 80 in the angle next to the 100° angle. In the quadrilateral, we know the sum of the 4 angles is 360° . So $80 + 110 + 140 + y = 360$, so $y = 30$.

$$x = 40, y = 30, z = 140$$