EXERCISE 6.2

For what value of x + y in Fig. 6.4 will ABC be a line? Justify your answer.

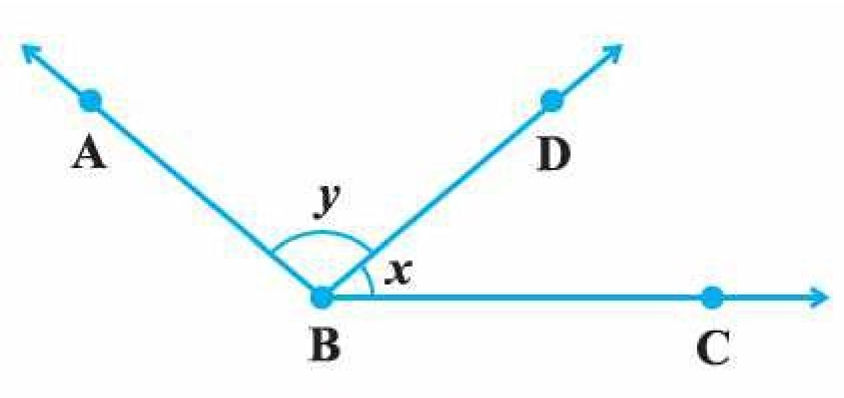

Fig. 6.4

Solution:

The value of x + y should be 180° for ABC to be a line.

Justification:

From the figure, we can say that,

BD is a ray that intersects AB and BC at the point B, which results in

∠ABD = y

and, ∠DBC = x

We know,

If a ray stands on a line, then the sum of two adjacent angles so formed is 180°.

⇒ If the sum of two adjacent angles is 180°, then a ray stands on a line.

Thus, for ABC to be a line,

The sum of ∠ABD and ∠DBC should be equal to 180°.

⇒ ∠ABD + ∠DBC = 180°

⇒ x + y = 180°

Therefore, the value of x + y should be equal to 180° for ABC to be a line.

1. Can a triangle have all angles less than 60°? Give reasons for your answer.

Solution:

No. A triangle cannot have all angles less than 60°

Justification:

According to the angle sum property,

We know that the sum of all the interior angles of a triangle should be = 180°.

Suppose, all the angles are 60°,

Then we get, 60° + 60° + 60° = 180°.

Now, considering angles less than 60°,

Let us take 59°, which is the highest natural number less than 60°.

Then we have,

$59^\circ + 59^\circ + 59^\circ = 177^\circ \neq 180^\circ$

Hence, we can say that if all the angles are less than 60°, the measure of the angles won't satisfy the angle sum property.

Therefore, a triangle cannot have all angles less than 60°.

2. Can a triangle have two obtuse angles? Give reasons for your answer.

Solution:

No. A triangle cannot have two obtuse angles

Justification:

According to the angle sum property,

We know that the sum of all the interior angles of a triangle should be = 180°.

An obtuse angle is one whose value is greater than 90° but less than 180°.

Considering two angles to be equal to the lowest natural number greater than 90°, i.e., 91°.

According to the question,

If the triangle has two obtuse angles, then there are two angles which are at least 91° each.

On adding these two angles,

Sum of the two angles = 91° + 91°

⇒ Sum of the two angles = 182°

The sum of these two angles already exceeds the sum of three angles of the triangle, even without considering the third angle.

Therefore, a triangle cannot have two obtuse angles.

3. How many triangles can be drawn having its angles as 45°, 64° and 72°? Give reasons for your answer.

Solution:

No triangle can be drawn having its angles 45°, 64° and 72°.

Justification:

According to the angle sum property,

We know that the sum of all the interior angles of a triangle should be = 180°.

But, according to the question,

We have the angles 45°, 64° and 72°.

Sum of these angles = 45° + 64° + 72°

= 181°, which is greater than 180°.

Hence, the angles do not satisfy the angle sum property of a triangle.

Therefore, no triangle can be drawn having its angles 45°, 64° and 72°.

4. How many triangles can be drawn having its angles as 53°, 64° and 63°? Give reasons for your answer.

Solution:

Infinitely many triangles can be drawn having its angles as 53°, 64° and 63°.

Justification:

According to the angle sum property,

We know that the sum of all the interior angles of a triangle should be = 180°.

According to the question,

We have the angles 53°, 64°, and 63°.

Sum of these angles = 53° + 64° + 63°

= 180°

Hence, the angles satisfy the angle sum property of a triangle.

Therefore, infinitely many triangles can be drawn having its angles as 53°, 64° and 63°.