RD SHARMA

Solutions

Class 7 Maths

Chapter 15

Ex 15.2

Q1. Two angles of a triangle are of measures 150° and 30°. Find the measure of the third angle.

Let the third angle be x

Sum of all the angles of a triangle=180°

$105^\circ + 30^\circ$+x= 180°

135°+x=180°

x=$180^\circ - 135^\circ$

x=45°

Therefore the third angle is 45°

Q2. One of the angles of a triangle is 130°, and the other two angles are equal What is the measure of each of these equal angles?

Let the second and third angle be x

Sum of all the angles of a triangle=180°

130°+ x+x= 180°

130°+2x=180°

2x=$180^\circ - 130^\circ$

2x=50°

x=$\frac{50}{2}$

x=25°

Therefore the two other angles are 25° each

Q3. The three angles of a triangle are equal to one another. What is the measure of each of the angles?

Let the each angle be x

Sum of all the angles of a triangle=180°

x+x+x= 180°

3x=180°

x=$\frac{180}{3}$

x=60°

Therefore angle is 60° each

Q4. If the angles of a triangle are in the ratio 1 : 2 : 3, determine three angles.

If angles of the triangle are in the ratio 1:2:3 then take first angle as ‘x’, second angle as ‘2x’ and third angle as ‘3x’

Sum of all the angles of a triangle=180°

x+2x+3x= 180°

6x=180°

x=$\frac{180}{6}$

x=30°

2x=$30^\circ \times 2$=60°

3x=$30^\circ \times 3$=90°

Therefore the first angle is 30°, second angle is 60° and third angle is 90°

Q5. The angles of a triangle are $(x-40)^\circ$, $(x-20)^\circ$ and $(\frac{1}{2}-10)^\circ$. Find the value of x.

Sum of all the angles of a triangle=180°

$$(x-40)^\circ + (x-20)^\circ + (\frac{x}{2}-10)^\circ = 180^\circ$$
$$x + x + \frac{x}{2} - 40^\circ - 20^\circ - 10^\circ = 180^\circ$$
$$x + x + \frac{x}{2} - 70^\circ = 180^\circ$$
$$x + x + \frac{x}{2} = 180^\circ + 70^\circ$$
$$\frac{5x}{2} = 250^\circ$$
$$x = \frac{2}{5} \times 250^\circ$$
$$x = 100^\circ$$

Hence we can conclude that x is equal to 100°

Q6. The angles of a triangle are arranged in ascending order of magnitude. If the difference between two consecutive angles is 10°. Find the three angles.

Let the first angle be x

Second angle be x+10°

Third angle be x+10°+ 10°

Sum of all the angles of a triangle=180°

x+ x+10°+ x+10°+ 10°= 180°

3x+30=180

3x=180-30

3x=150

x=$\frac{150}{3}$

x=50°

First angle is 50

Second angle x+10°=50+10= 60°

Third angle x+10°+ 10°=50+10+10= 70°

Q7. Two angles of a triangle are equal and the third angle is greater than each of those angles by 30°. Determine all the angles of the triangle

Let the first and second angle be x

The third angle is greater than the first and second by 30°=x+30°

The first and the second angles are equal

Sum of all the angles of a triangle=180°

x+x+x+30°= 180°

3x+30=180

3x=180-30

3x=150

x=$\frac{150}{3}$

x=50°

Third angle=x+30°= 50°+ 30°= 80°

The first and the second angle is 50° and the third angle is 80°

Q8. If one angle of a triangle is equal to the sum of the other two, show that the triangle is a right triangle.

One angle of a triangle is equal to the sum of the other two

x=y+z

Let the measure of angles be x,y,z

x+y+z=180°

x+x=180°

2x=180°

x= $\frac{180°}{2}$

x= $90°$

If one angle is $90°$ then the given triangle is a right angled triangle

Q9. If each angle of a triangle is less than the sum of the other two, show that the triangle is acute angled.

Each angle of a triangle is less than the sum of the other two

Measure of angles be x,y and z

$x>y+z$

$y<x+z$

$z<x+y$

Therefore triangle is an acute triangle

Q10. In each of the following, the measures of three angles are given. State in which cases the angles can possibly be those of a triangle:

(i) $63°$, $37°$, $80°$

(ii) $45°$, $61°$, $73°$

(iii) $59°$, $72°$, $61°$

(iv) $45°$, $45°$, $90°$

(v) $30°$, $20°$, $125°$

(i) $63°, 37°, 80°$ = $180°$

Angles form a triangle

(ii) $45°, 61°, 73°$ is not equal to $180°$

Therefore not a triangle

(iii) $59°, 72°, 61°$ is not equal to $180°$

Therefore not a triangle

(iv) $45°, 45°, 90°$ = 180

Angles form a triangle

(v) $30°, 20°, 125°$ is not equal to $180°$

Therefore not a triangle

Q11. The angles of a triangle are in the ratio 3: 4 : 5. Find the smallest angle

Given that

Angles of a triangle are in the ratio: 3: 4: 5

Measure of the angles be 3x, 4x, 5x

Sum of the angles of a triangle=180°

3x+4x+5x=180°

12x=180°

x=$\frac{180^\circ}{12}$

x=15°

Smallest angle=3x

=3 x 15°

=45°

Q12. Two acute angles of a right triangle are equal. Find the two angles.

Given acute angles of a right angled triangle are equal

Right triangle: whose one of the angle is a right angle

Measured angle be x,x,90°

x+x+180° =180°

2x=90°

x=$\frac{90^\circ}{2}$

x=45°

The two angles are 45° and 45°

Q13. One angle of a triangle is greater than the sum of the other two. What can you say about the measure of this angle? What type of a triangle is this?

Angle of a triangle is greater than the sum of the other two

Measure of the angles be x,y,z

x>y+z or

y>x+z or

z>x+y

x or y or z>90° which is obtuse

Therefore triangle is an obtuse angle

Q14. AC, AD and AE are joined. Find $\angle FAB + \angle ABC + \angle BCD + \angle CDE + \angle DEF + \angle EFA$

$\angle FAB + \angle ABC + \angle BCD + \angle CDE + \angle DEF + \angle EFA$

We know that sum of the angles of a triangle is 180°

Therefore in $\triangle ABC$,we have

$\angle CAB + \angle ABC + \angle BCA = 180^\circ$ –(i)

In $\triangle ACD$,we have

$\angle DAC + \angle ACD + \angle CDA = 180^\circ$ –(ii)

In $\triangle ADE$,we have

$\angle EAD + \angle ADE + \angle DEA = 180^\circ$ –(iii)

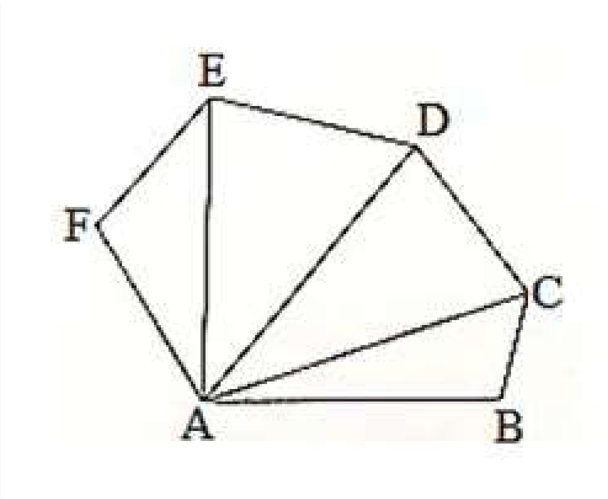
In $\triangle AEF$,we have

$\angle FAE + \angle AEF + \angle EFA = 180^\circ$ –(iv)

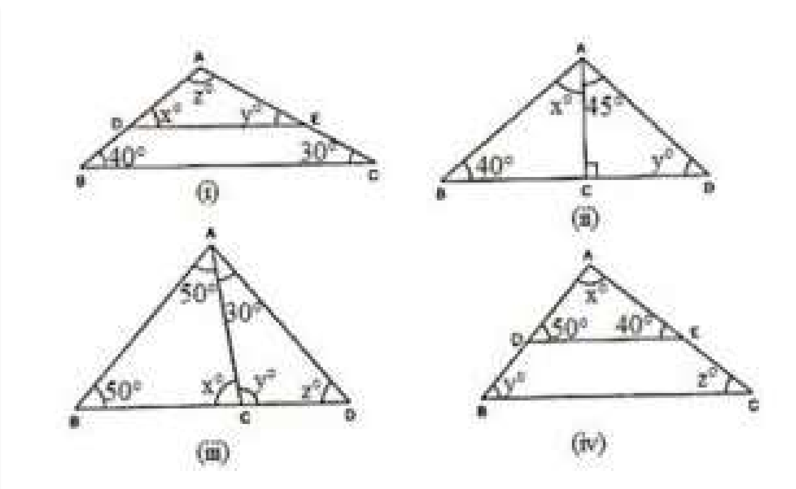
Adding (i),(ii),(iii),(iv) we get

$\angle CAB + \angle ABC + \angle BCA + \angle DAC + \angle ACD + \angle CDA + \angle EAD + \angle ADE + \angle DEA$
$+ \angle FAE + \angle AEF + \angle EFA$
= 720°

Therefore $\angle FAB + \angle ABC + \angle BCD + \angle CDE + \angle DEF + \angle EFA$= 720°



Q15.Find x,y,z(whichever is required) from the figures given below



(i)

In $\triangle \mathrm{ABC}$ and $\triangle \mathrm{ADE}$ we have :

$\angle \mathrm{ADE} = \angle \mathrm{ABC}$ (corresponding angles)

x=40°

$\angle \mathrm{AED} = \angle \mathrm{ACB}$ (corresponding angles)

y=30°

We know that the sum of all the three angles of a triangle is equal to 180°

x +y +z = 180° (Angles of A ADE)

Which means : 40° +30° + z = 180°

z= $180^{\circ} - 70^{\circ}$

z=110°

Therefore, we can conclude that the three angles of the given triangle are 40°, 30° and 110°.

(ii) We can see that in $\triangle ADC$, $\angle ADC$ is equal to 90°.

($\triangle ADC$ is a right triangle)

We also know that the sum of all the angles of a triangle is equal to 180°.

Which means : $45^\circ + 90^\circ + y = 180^\circ$ (Sum of the angles of $\triangle ADC$)

$135^\circ + y = 180^\circ$

$y = 180^\circ - 135^\circ$.

$y = 45^\circ$.

We can also say that in $\triangle ABC$, $\angle ABC + \angle ACB + \angle BAC$ is equal to 180°.

(Sum of the angles of A ABC)

$40^\circ + y + (x + 45^\circ) = 180^\circ$

$40^\circ + 45^\circ + x + 45^\circ = 180^\circ$ $(y = 45^\circ)$

$x = 180^\circ - 130^\circ$

$x = 50^\circ$

Therefore, we can say that the required angles are 45° and 50°.

(iii) We know that the sum of all the angles of a triangle is equal to 180°.

Therefore, for $\triangle ABD$:

$\angle ABD + \angle ADB + \angle BAD = 180^\circ$ (Sum of the angles of $\triangle ABD$)

$50^\circ + x + 50^\circ = 180^\circ$

$100^\circ + x = 180^\circ$

$x = 180^\circ - 100^\circ$

$x = 80^\circ$

For $\triangle ABC$:

$\angle ABC + \angle ACB + \angle BAC = 180^\circ$ (Sum of the angles of $\triangle ABC$)

$50^\circ + z + (50^\circ + 30^\circ) = 180^\circ$

$50^\circ + z + 50^\circ + 30^\circ = 180^\circ$

$z = 180^\circ - 130^\circ$

$z = 50^\circ$

Using the same argument for $\triangle ADC$:

$\angle ADC + \angle ACD + \angle DAC = 180^\circ$ (Sum of the angles of $\triangle ADC$)

$y + z + 30^\circ = 180^\circ$

$y + 50^\circ + 30^\circ = 180^\circ$ $(z = 50^\circ)$

y = $180^\circ - 80^\circ$

y = 100°

Therefore, we can conclude that the required angles are 80°, 50° and 100°.

(iv) In $\triangle ABC$ and $\triangle ADE$ we have :

$\angle ADE = \angle ABC$ (Corresponding angles)

y = 50°

Also, $\angle AED = \angle ACB$ (Corresponding angles)

z = 40°

We know that the sum of all the three angles of a triangle is equal to 180°.

Which means : x+50° +40° =180° (Angles of $\triangle ADE$)

x = $180^\circ - 90^\circ$

x = 90°

Therefore, we can conclude that the required angles are 50°, 40° and 90°.

Q16. If one angle of a triangle is 60° and the other two angles are in the ratio 1 :2, find the angles

We know that one of the angles of the given triangle is 60°. (Given)

We also know that the other two angles of the triangle are in the ratio 1 : 2.

Let one of the other two angles be x.

Therefore, the second one will be 2x.

We know that the sum of all the three angles of a triangle is equal to 180°.

60° +x + 2x = 180°

3x =$180^\circ - 60^\circ$

3x = 120°

x = $\frac{120^\circ}{3}$

x = 40°

2x = 2 x 40

2x = 80°

Hence, we can conclude that the required angles are 40° and 80°.

Q17. It one angle of a triangle is 100° and the other two angles are in the ratio 2 : 3. find the angles.

We know that one of the angles of the given triangle is 100°.

We also know that the other two angles are in the ratio 2 : 3.

Let one of the other two angles be 2x.

Therefore, the second angle will be 3x.

We know that the sum of all three angles of a triangle is 180°.

100° + 2x + 3x = 180°

5x = $180^\circ - 100^\circ$

5x = 80°

x = $\frac{80^\circ}{5}$

2x = 2 x 16

2x = 32°

3x = 3 x 16

3x = 48°

Thus, the required angles are 32° and 48°.

Q18. In $\triangle ABC$, if $3\angle A = 4\angle B = 6\angle C$, calculate the angles.

We know that for the given triangle, $3\angle A = 6\angle C$

$\angle A = 2\angle C$ −(i)

We also know that for the same triangle, $4\angle B = 6\angle C$

$\angle B = \frac{6}{4}\angle C$ −(ii)

We know that the sum of all three angles of a triangle is 180°.

Therefore, we can say that:

$\angle A + \angle B + \angle C = 180^\circ$ (Angles of $\triangle ABC$)−(iii)

On putting the values of $\angle A$ and $\angle B$ in equation (iii), we get :

$2\angle C + \frac{6}{4}\angle C + \angle C = 180^\circ \ \frac{18}{4}$ angleC $= 180^\circ$ angleC $= 40^\circ$

From equation (i), we have:

angleA $= 2\angle C = 2 \times 40$ angleA $= 80^\circ$

From equation (ii), we have:

angleB $= \frac{6}{4}\angle C = \frac{6}{4} \times 40^\circ$ angleB $= 60^\circ$

angleA $= 80^\circ$, angleB $= 60^\circ$, angleC $= 40^\circ$

Therefore, the three angles of the given triangle are 80°, 60°, and 40°.

Q19. Is it possible to have a triangle, in which

(i) Two of the angles are right?

(ii) Two of the angles are obtuse?

(iii) Two of the angles are acute?

(iv) Each angle is less than 60°***?***

(v) Each angle is greater than 60°***?***

(vi) Each angle is equal to 60°

Give reasons in support of your answer in each case.

(i) No, because if there are two right angles in a triangle, then the third angle of the triangle must be zero, which is not possible.

(ii) No, because as we know that the sum of all three angles of a triangle is always 180°. If there are two obtuse angles, then their sum will be more than 180°, which is not possible in case of a triangle.

(iii) Yes, in right triangles and acute triangles, it is possible to have two acute angles.

(iv) No, because if each angle is less than 60°, then the sum of all three angles will be less than 180°, which is not possible in case of a triangle.

Proof:

Let the three angles of the triangle be $\angle A$, $\angle B$ and $\angle C$.

As per the given information,

$\angle A < 60^\circ$ ... (i)

$\angle B < 60^\circ$ ...(ii)

$\angle C < 60^\circ$ ... (iii)

On adding (i), (ii) and (iii), we get :

$\angle A + \angle B + \angle C < 60^\circ + 60^\circ + 60^\circ$

$\angle A + \angle B + \angle C < 180^\circ$

We can see that the sum of all three angles is less than 180°, which is not possible for a triangle.

Hence, we can say that it is not possible for each angle of a triangle to be less than 60°.

(v) No, because if each angle is greater than 60°, then the sum of all three angles will be greater than 180°, which is not possible.

Proof:

Let the three angles of the triangle be $\angle A$, $\angle B$ and $\angle C$. As per the given information,

$\angle A > 60^\circ$ ... (i)

$\angle B > 60^\circ$ ...(ii)

$\angle C > 60^\circ$ ... (iii)

On adding (i), (ii) and (iii), we get:

$\angle A + \angle B + \angle C > 60^\circ + 60^\circ + 60^\circ$

$\angle A + \angle B + \angle C > 180^\circ$

We can see that the sum of all three angles of the given triangle are greater than 180°, which is not possible for a triangle.

Hence, we can say that it is not possible for each angle of a triangle to be greater than 60°.

(vi) Yes, if each angle of the triangle is equal to 60° , then the sum of all three angles will be 180° , which is possible in case of a triangle.

Proof:

Let the three angles of the triangle be $\angle A$, $\angle B$ and $\angle C$. As per the given information,

$\angle A = 60^\circ$ ... (i)

$\angle B = 60^\circ$ ...(ii)

$\angle C = 60^\circ$ ... (iii)

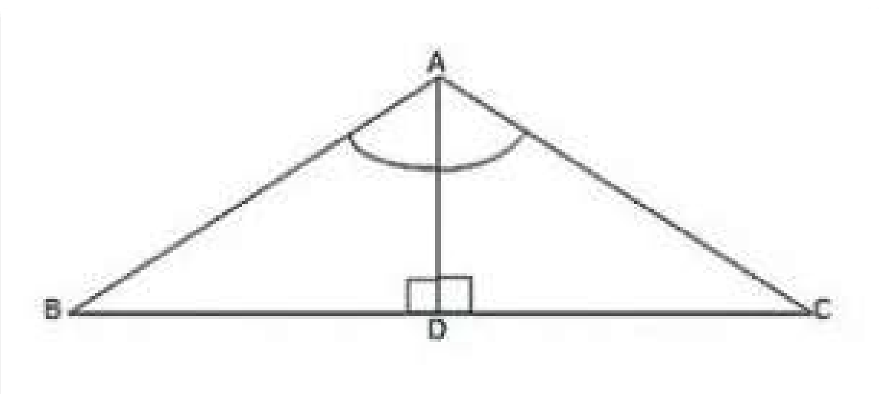
On adding (i), (ii) and (iii), we get:

$\angle A + \angle B + \angle C = 60^\circ + 60^\circ + 60^\circ$

$\angle A + \angle B + \angle C = 180^\circ$

We can see that the sum of all three angles of the given triangle is equal to 180° , which is possible in case of a triangle. Hence, we can say that it is possible for each angle of a triangle to be equal to 60° .

Q20. In $\triangle ABC$, $\angle A = 100^\circ$, AD bisects $\angle A$ and AD perpendicular BC. Find $\angle B$



Consider $\triangle ABD$

$\angle BAD = \frac{100}{2}$ (AD bisects $\angle A$)

$\angle BAD = 50^\circ$

$\angle ADB = 90^\circ$ (AD perpendicular to BC)

We know that the sum of all three angles of a triangle is 180°.

Thus,

$\angle ABD + \angle BAD + \angle ADB = 180^\circ$ (Sum of angles of $\triangle ABD$)

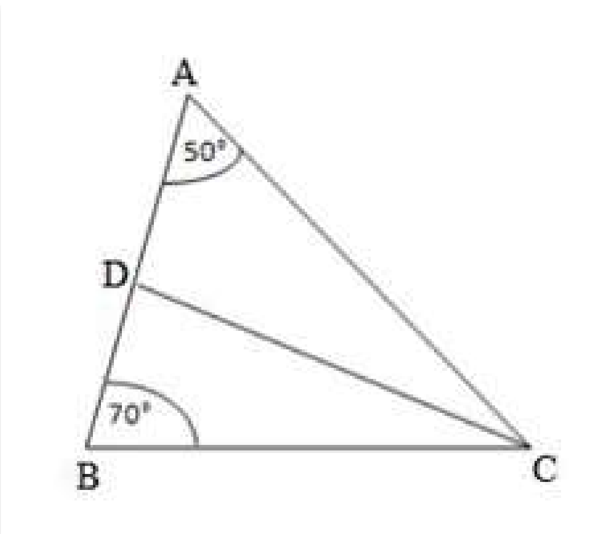
Or,

$\angle ABD + 50^\circ + 90^\circ = 180^\circ$

$\angle ABD = 180^\circ - 140^\circ$

$\angle ABD = 40^\circ$

Q21. In $\triangle ABC$, $\angle A = 50^\circ$, $\angle B = 100^\circ$ and bisector of $\angle C$ meets AB in D. Find the angles of the triangles ADC and BDC



We know that the sum of all three angles of a triangle is equal to 180°.

Therefore, for the given $\triangle ABC$, we can say that :

$\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of $\triangle ABC$)

$50^\circ + 70^\circ + \angle C = 180^\circ$

$\angle C = 180^\circ - 120^\circ$

$\angle C = 60^\circ$

$\angle ACD = \angle BCD = \frac{\angle C}{2}$ (CD bisects $\angle C$ and meets AB in D.)

$\angle ACD = \angle BCD = \frac{60^\circ}{2} = 30^\circ$

Using the same logic for the given $\triangle ACD$, we can say that :

$\angle DAC + \angle ACD + \angle ADC = 180^\circ$

$50^\circ + 30^\circ + \angle ADC = 180^\circ$

$\angle ADC = 180^\circ - 80^\circ$

$\angle ADC = 100^\circ$

If we use the same logic for the given $\triangle BCD$, we can say that

$\angle DBC + \angle BCD + \angle BDC = 180^\circ$

$70^\circ + 30^\circ + \angle BDC = 180^\circ$

$\angle BDC = 180^\circ - 100^\circ$

$\angle BDC = 80^\circ$

Thus,

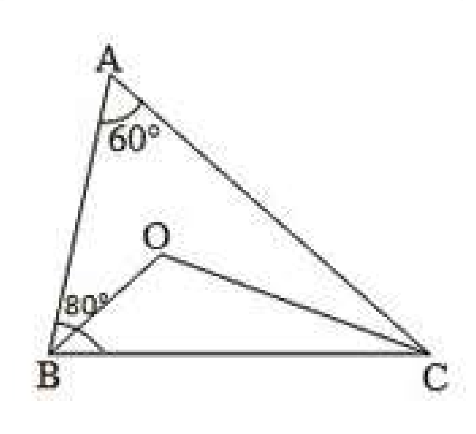
For $\triangle ADC: \angle A = 50^\circ, \angle D = 100^\circ \quad \angle C = 30^\circ$

$\triangle BDC: \angle B = 70^\circ, \angle D = 80^\circ \quad \angle C = 30^\circ$

Q22. In $\triangle ABC$, $\angle A = 60^\circ$, $\angle B = 80^\circ$, and the bisectors of $\angle B$ and $\angle C$, meet at O. Find

(i) $\angle C$

(ii) $\angle BOC$



We know that the sum of all three angles of a triangle is 180°.

Hence, for $\triangle ABC$, we can say that :

$\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of $\triangle ABC$)

$60^\circ + 80^\circ + \angle C = 180^\circ$.

$\angle C = 180^\circ - 140^\circ$

$\angle C = 140^\circ$.

For $\triangle OBC$,

$\angle OBC = \frac{\angle B}{2} = \frac{80^\circ}{2}$ (OB bisects $\angle B$)

$\angle OBC = 40^\circ$

$\angle OCB = \frac{\angle C}{2} = \frac{40^\circ}{2}$ (OC bisects $\angle C$)

$\angle OCB = 20^\circ$

If we apply the above logic to this triangle, we can say that :

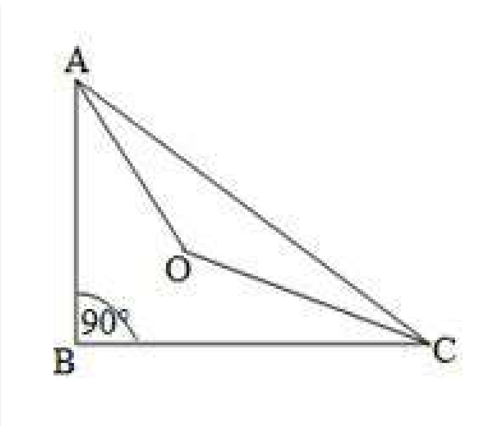
$\angle OCB + \angle OBC + \angle BOC = 180^\circ$ (Sum of angles of $\triangle OBC$)

$20^\circ + 40^\circ + \angle BOC = 180^\circ$

$\angle BOC = 180^\circ - 60^\circ$

$\angle BOC = 120^\circ$

Q23. The bisectors of the acute angles of a right triangle meet at O. Find the angle at O between the two bisectors.



We know that the sum of all three angles of a triangle is 180°.

Hence, for $\triangle ABC$, we can say that :

$\angle A + \angle B + \angle C = 180^\circ$

$\angle A + 90^\circ + \angle C = 180^\circ$

$\angle A + \angle C = 180^\circ - 90^\circ$

$\angle A + \angle C = 90^\circ$

For $\triangle OAC$:

$\angle OAC = \frac{\angle A}{2}$ (OA bisects LA)

$\angle OCA = \frac{\angle C}{2}$ (OC bisects LC)

On applying the above logic to $\triangle OAC$, we get :

$\angle AOC + \angle OAC + \angle OCA = 180^\circ$ (Sum of angles of $\triangle AOC$)

$\angle AOC + \frac{\angle A}{2} + \frac{\angle C}{2} = 180^\circ$

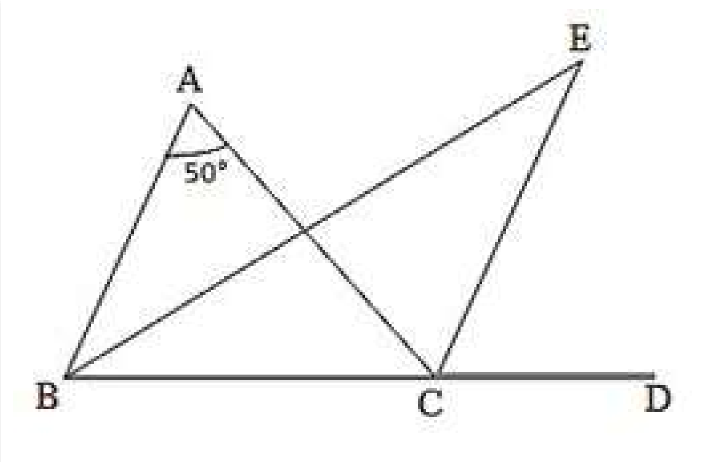
$\angle AOC + \frac{\angle A + \angle C}{2} = 180^\circ$

$\angle AOC + \frac{90^\circ}{2} = 180^\circ$

$\angle AOC = 180^\circ - 45^\circ$

$\angle AOC = 135^\circ$

Q24. In $\triangle ABC$, $\angle A = 50^\circ$ and BC is produced to a point D. The bisectors of $\angle ABC$ and $\angle ACD$ meet at E. Find $\angle E$.



In the given triangle,

$\angle ACD = \angle A + \angle B$. (Exterior angle is equal to the sum of two opposite interior angles.)

We know that the sum of all three angles of a triangle is 180°.

Therefore, for the given triangle, we can say that :

$\angle ABC + \angle BCA + \angle CAB = 180^\circ$ (Sum of all angles of $\triangle ABC$)

$\angle A + \angle B + \angle BCA = 180^\circ$

$\angle BCA = 180^\circ - (\angle A + \angle B)$

$\angle ECA = \frac{\angle ACD}{2}$ (EC bisects $\angle ACD$)

$\angle ECA = \frac{\angle A + \angle B}{2}$ $(\angle ACD = \angle A + \angle B)$

$\angle EBC = \frac{\angle ABC}{2} = \frac{\angle B}{2} (EB bisects \angle ABC)$

$\angle ECB = \angle ECA + \angle BCA$

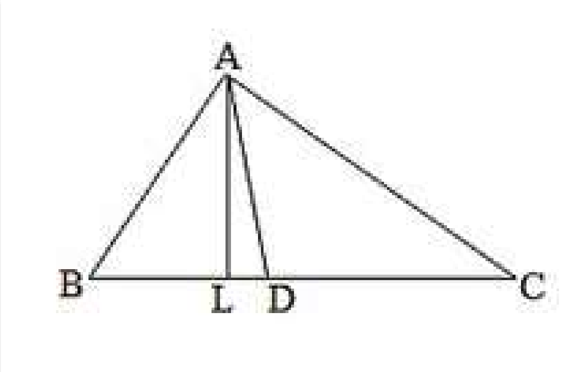
$\angle ECB = \frac{\angle A + \angle B}{2} + 180^\circ - (\angle A + \angle B)$

If we use the same logic for $\triangle EBC$, we can say that :

$\angle EBC + \angle ECB + \angle BEC = 180^\circ$ (Sum of all angles of $\triangle EBC$)

$\frac{\angle B}{2} + \frac{\angle A + \angle B}{2} + 180^\circ - (\angle A + \angle B) + \angle BEC = 180^\circ$ $\angle BEC = \angle A + \angle B - (\frac{\angle A + \angle B}{2} - \frac{\angle B}{2}$ $\angle BEC = \frac{\angle A}{2}$ $\angle BEC = \frac{50^\circ}{2} = 25^\circ$

Q25. In $\triangle ABC$, $\angle B = 60^\circ$, $\angle C = 40^\circ$, AL perpendicular BC and AD bisects $\angle A$ such that L and D lie on side BC. Find $\angle LAD$



We know that the sum of all angles of a triangle is 180°

Therefore, for $\triangle ABC$, we can say that :

$\angle A + \angle B + \angle C = 180^\circ$

Or,

$\angle A + 60^\circ + 40^\circ = 180^\circ$

$\angle A = 80^\circ$

$\angle DAC = \frac{\angle A}{2}$ (AD bisects $\angle A$)

$\angle DAC = \frac{80^\circ}{2}$

If we use the above logic on $\triangle ADC$, we can say that :

$\angle ADC + \angle DCA + \angle DAC = 180^\circ$ (Sum of all the angles of $\triangle ADC$)

$\angle ADC + 40^\circ + 40^\circ = 180^\circ$

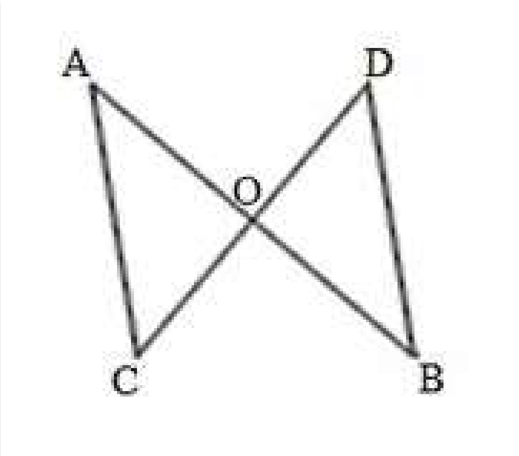
$\angle ADC = 180^\circ + 80^\circ$

$\angle ADC = \angle ALD + \angle LAD$(Exterior angle is equal to the sum of two Interior opposite angles.)

$100^\circ = 90^\circ + \angle LAD$ (AL perpendicular toBC)

$\angle LAD = 90^\circ$

Q26. Line segments AB and CD intersect at O such that AC perpendicular DB. It $\angle CAB = 35^\circ$ ***and*** $\angle CDB = 55^\circ$ ***. Find*** $\angle BOD$**.**



We know that AC parallel to BD and AB cuts AC and BD at A and B, respectively.

$\angle CAB = \angle DBA$ (Alternate interior angles)

$\angle DBA = 35^\circ$

We also know that the sum of all three angles of a triangle is 180°.

Hence, for $\triangle OBD$, we can say that :

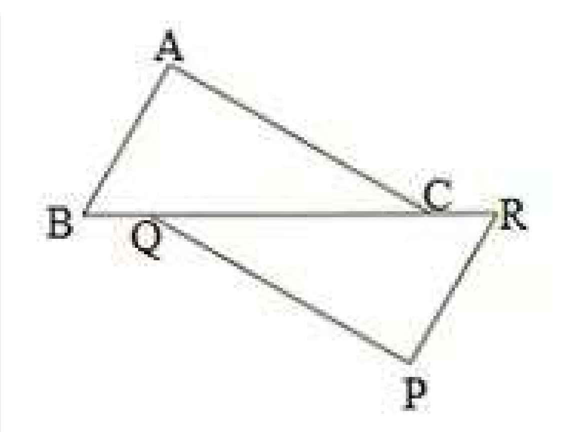
$\angle DBO + \angle ODB + \angle BOD = 180^\circ$

$35^\circ + 55^\circ + \angle BOD = 180^\circ$ ($\angle DBO = \angle DBA$ and $\angle ODB = \angle CDB$)

$\angle BOD = 180^\circ - 90^\circ$

$\angle BOD = 90^\circ$

Q27. In Fig. 22, $\triangle ABC$ is right angled at A, Q and R are points on line BC and P is a point such that QP perpendicular to AC and RP perpendicular to AB. Find $\angle P$



In the given triangle, AC parallel to QP and BR cuts AC and QP at C and Q, respectively.

$\angle QCA = \angle CQP$ (Alternate interior angles)

Because RP parallel to AB and BR cuts AB and RP at B and R, respectively,

$\angle ABC = \angle PRQ$ (alternate interior angles).

We know that the sum of all three angles of a triangle is 180°.

Hence, for $\triangle ABC$, we can say that :

$\angle ABC + \angle ACB + \angle BAC = 180^\circ$

$\angle ABC + \angle ACB + 90^\circ = 180^\circ$ (Right angled at A)

$\angle ABC + \angle ACB = 90^\circ$

Using the same logic for $\triangle PQR$, we can say that :

$\angle PQR + \angle PRQ + \angle QPR = 180^\circ$

$\angle ABC + \angle ACB + \angle QPR = 180^\circ$ ($\angle ABC = \angle PRQ$ and $\angle QCA = \angle CQP$)

Or,

$90^\circ + \angle QPR = 180^\circ$ ($\angle ABC + \angle ACB = 90^\circ$)

$\angle QPR = 90^\circ$