EXERCISE 12B

ANSWER1

(i) Given O is the centre

$AO = OC$, $\angle BAO = 40°$, $\angle OCB = 30°$

Join OB

Here, $OA = OB$

Then, $\angle BAO = \angle OBA = 40°$

Also, $OC = OB$

$\angle OCB = \angle BCO = 30°$

$\therefore \angle ABC = \angle ABO + \angle OBC$

$= (40° + 30°) = 70°$

Now, $\angle AOC = 2\angle ABC = 2x70 = 140°$

(ii) Given,

$\angle AOB = 90°$, $\angle AOC = 110°$

Here, $OB = OC = OA$ (radius)

As we know sum of all angles of circle be 360°

Then, by adding angles.

$\angle AOB + \angle AOC + \angle BOC = 360$

$90° + 110° + \angle BOC = 360°$

$\angle BOC = 360 - 110 - 90$

$\angle BOC = 160°$

Hence, $\angle BAC = \frac{1}{2}\angle BOC = \frac{1}{2}x160 = 80°$

ANSWER2

Given,

$\angle AOB = 70°$

As we know that exterior angle is equal some of 2 angles then.

$\angle AOB = \angle OCA + \angle OAC$

$\Rightarrow OA = OC$ (radius)

$\therefore \angle OCA = \angle OAC$

We can calculate, the angle subtended by arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.

$$\angle OCA = \frac{1}{2}\angle AOB = \frac{1}{2}x70 = 35°$$

Hence, $\angle OCA = \angle OAC = 35°$

ANSWER3

Given, O is the centre

$\angle APB = 110°$, $\angle PBC = 25°$

In liner APC ,

$180 = \angle APB + \angle BPC$

$\angle BPC = 180 - 110 = 70°$

So, $\angle ACB = \angle PCB$
Then, In $\triangle CPB$
$\angle PCB = 180 - \angle PCB - \angle PBC$
$\angle PCB = 180 - 25 - 70 = 85°$
Hence, $\angle PCB = \angle ACB$
Angle with same segment .
$\angle ACB = \angle ADB = 85°$

ANSWER4
Given, o is centre of the circle.
$\angle ABD = 35°$, $\angle BAC = 70°$
By fig, $AD \perp AB$, $\angle A = 90°$
Then, In $\triangle ADB$
$\angle DAB + \angle ADB + \angle DBA = 180°$
$90° + \angle ADB + 35° = 180°$
$\angle ADB = 180 - 90 - 35 = 55°$
Angle with same segment
$\angle ADB = \angle ACB = 55°$

ANSWER5
Given, O is the centre of the circle.
$\angle ACB = 50°$
So, $\angle AOB = 2 \times \angle ACB = 2\text{x}50 = 100°$
Then, let the radius be r ,
On the same segment $\angle OAB = \angle OBA = r°$
In $\triangle AOB$
$\angle OAB + \angle OBA + \angle AOB = 180°$
$r + r + 100 = 180$
$2r = 180 - 100 = 80$
$r = \frac{80}{2} = 40°$

ANSWER6
Given, $\angle ABD = 45°$, $\angle BCD = 43°$

(i) As we know that angle on same segment are equals
So, on chord AD
$\angle ABD = \angle ACD = 54°$

(ii) On chord BD
$\angle DCB = \angle BAD = 43°$

(iii) In $\triangle ABD$
$\angle BAD = \angle 43°$, $\angle ABD = 54°$
Sum of all the angles be 180°
$\angle BAD + \angle ABD + \angle ADB = 180$
$54 + 43 + \angle ADB = 180$
$\angle ADB = 180 - 54 - 43$
$\angle ADB = 83°$

ANSWER7

Given , AC∥DE , ∠CBD = 60°

On same line segment chord CD

∠DBC = ∠DAC = 60°

And ∠ADC = 90° angle is in semi circle.

In △ADC

As we know that sum of all the angles in the triangle 180

∠ADC +∠DAC +∠ACD = 180°

∠ADC +60+ 90 = 180

∠ADC= 180-60-90

Hence, ∠ADC = 30°

ANSWER8

Given, AB∥CD, ∠ABC = 25°

Draw joining line OC and OD

Here, ∠ABC = ∠BCD = 25°……..[alternative int. angles]

Then, arc BD makes ∠BOD at the centre and ∠BCD at a point on the circle.

∠BOD =2∠BCD = 50°

Similary,

∠AOC = 2∠ABC = 50°

In liner segment AOB

Sum of all the angles on the line segment is 180°

Then,

∠AOC +∠COD +∠BOD = 180°

∠COD + 50 +50 = 180

∠COD = 180 – 50-50 = 80°

Hence, similarly ∠CED = $\frac{1}{2}$?$COD = 40°$

ANSWER9

Given, ∠AOC = 80° , ∠CDE = 40°

(i) In △CDE

Here, ∠CDE= 90°……… [with in semicircle make angle at 90°]

So, ∠CDE +∠EDC +∠DCE = 180

∠DCE = 180 – 90- 40 = 50°

Hence, ∠DCE =50°

(ii) In line segment AOB

∠BOC = 180 - ∠AOC

∠BOC = 180 – 80 = 100°

So, in △BOC

∠BOC +∠CBO+∠OCB = 180°

∠CBO = 180 - ∠BOC - ∠OCB

∠CBO = 180 – 50 – 100 = 40°

Hence, ∠ABC = ∠CBO = 30°

ANSWER10
Given,
∠AOB = 40° , ∠BDC = 100°
Here, ∠ACB = $\frac{1}{2}\angle AOB = \frac{1}{2}$x40 = 20°
So, in △DBC
∠DCB +∠DBC +∠CDB = 180°
∠DCB = 180 - ∠DBC +∠CDB
∠DCB = 180 – 100 – 20 = 60°
Hence, ∠DCB = 60°

ANSWER11
Given ∠OAB = 25°
Join OB we get radius of circle is same
OB = OA and ∠OAB = ∠OBA = 25°
Then, In △AOB
∠AOB +∠OAB +∠ABO = 180°
∠AOB + 25 +25 = 180°
∠AOB = 180 – 25 – 25
∠AOB = 130°
As we know the angle subtended by arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.

Then, ∠ACB = $\frac{1}{2}\angle AOB = \frac{1}{2}$x130 = 65°
In △EBC
So, ∠CEB = 90°……..[by fig]
∠CEB +∠ECB +∠CEB = 180
∠EBC + 90 + 65 = 180°
∠EBC = 180 – 90 -65
∠EBC = 25°

ANSWER12
Given , ∠OAB = 20°, ∠OCB = 55°

(i) As we know that equal chords of a circles subtend equal angles at the centre
Here, OC = OB (radius) and ∠OCB = ∠OBC = 55°
In △OCB
∠OCB +∠OBC +∠BOC = 180°
55° + 55° + ∠BOC = 180°
∠BOC = 180° - 55 – 55 = 70°

(ii) In △AOB
OA = OB and ∠OAB = ∠OBA
Sum of all the angles is 180°
∠AOB +∠OAB +∠OBA = 180°
∠AOB + 20 + 20 = 180
∠AOB = 180 – 20-20 = 140°
And ∠AOB = ∠BOC + ∠AOC
∠AOC = ∠AOB - ∠BOC = 140 – 70
Hence, ∠AOC = 70°

ANSWER13
Given ∠BCO = 30°
And by fig, ∠AOD = ∠OEC = 90°…[corresponding angles]
OD∥BC , OC is trANSWERversal
∠DOC = ∠OCE = 30°…..[alternative int angles]
As we know the angle subtended by arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.
Then, $\angle CBD = \frac{1}{2}\angle COD = \frac{1}{2}$ x $30 = 15°$
Hence, y = 15° centre
∠AOD = 90° (given)
And $\angle ABC = \frac{1}{2}\angle AOD = \frac{1}{2}x90 = 45°$
In △ABE
∠A+∠B+∠E = 180°
∠A = 180 -∠B - ∠E
∠A = 180 -90-(45+y°) = 180 – 90 – (45 +15)
∠A= 180 – 90 – 60 = 30°
Hence, ∠A = x= 30°

ANSWER14
Given, BD = OD , CD⊥AB
Join CA
By fig, BD = OD and OD = OB (radius of circle)
BD = OD = OB ….. [equilateral triangle]
Sum of angles will be 180° in equilateral so, each angles is divided into 60°
In △DBO
∠DBO = ∠BDO = ∠BOD = 60°
Since altitudes of an angle of an equilateral △ bisects the vertical angle
So, ∠BDE =∠ODE = 30°
Angles on the segment will be equal , on segment of CB
∠CAB = ∠CDB = 30°

ANSWER15
Given PQ is diameter . ∠PQR =65° , ∠SPR =40° , ∠PQM = 50°
In △QPR , ∠QRP = 90° …………..[angle in the semicircle is right angle]
∠QRP+∠QPR+∠PQR = 180°
∠QPR = 180 -∠QRP - ∠PQR
∠QPR = 180 – 65 – 90
Hence, ∠QPR = 25°
⇒∠QPR = ∠PRS = 25°…..[alternative int angles]
Similarly, △QPM
∠QPM +∠PMQ +∠PQM = 180°
∠QPM + 50 + 90 = 180
∠QPM = 180-50-90 = 40°
Hence, ∠QPM = 40°

ANSWER16
Given, ∠APB = 150° , join BC which is common chord of the angles
As we know the angle subtended by arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.
$\therefore \angle ACB = \frac{1}{2}\angle APB = \frac{1}{2}x150 = 75°$
In linear segment ACD
∠ACB +∠CBD = 180°
∠CBD = 180 - ∠ACB
∠CBD = 180 – 75 = 105°
Similarly, in second circle
∠BCD = $\frac{1}{2}$reflex ∠BQD ....[angle made by the major arc BFD at the centre 2∠BCD]

105° = $\frac{1}{2}$(360-x)
⇒ 210° = 360- x°
⇒ x° = 360-210 = 150°

ANSWER17
Given , ∠BAC= 30°
As we know the angle subtended by arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.

$$\angle BOC = 2\angle ABC = 2\text{x}30 = 60°$$

Here, OB = OC is radius of the circle
Then, from above in △OBC
Since, OB = OC (radius)
∠OBC = ∠OCB
Sum of all the angles is 180°
∠OBC +∠OCB +∠BOC = 180°
∠OBC + ∠OBC = 180 - ∠BOC
2∠OBC = 180 – 60 = 120
∠OBC = 120/2 = 60°
Hence, △OBC is equilateral △ then, all the sides are equal too
BC is equal to radius of the circumcircle.

ANSWER18
Join AC, BC , BD
Given AB is the chord ,
And angle subtended by an arc CXA = ∠AOC , Angle subtended by arc DYB = ∠DOB
As we know the angle made by an arc at the centre is twice the angle made by this arc at a point on the remaining part of the circle.
∠AOC = 2∠ABC ....(1)
Similarly , ∠DOB = 2∠DCB ....(2)
Adding both equation
∴ ∠AOC +∠DOB = 2∠ABC + 2∠DCB = 2∠AEC
Hence, ∠AEC = $\frac{1}{2}(\angle AOC + \angle DOB)$