EXERCISE12C

ANSWER1

Given, ∠DBC = 60° , ∠BAC= 40°

(i) On same chord CB
∠BAC = ∠BDC = 40°
In △DBC
∠DCB +∠CBD +∠CDB = 180°
∠DCB + 40° + 60° = 180°

(ii) On same chord CD
∠CBD = ∠CAD = 60°

ANSWER2

Given , ∠PSR = 150°
As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
∠PSR +∠PQR = 180°
∠PQR = 180 – 150 = 30°
Here, angle in semicircle make 90°
∠PRQ = 90°
△In PQR
∠PQR +∠RPQ +∠QRP = 180°
∠RPQ + 90+30 = 180°
∠RPQ = 180 – 90 -30 = 60°

ANSWER3

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.

$$\angle PBC = \frac{1}{2}\angle AOC = \frac{1}{2}\text{x}130 = 65°$$

ANSWER4

Given ∠FAE = 20° , ∠ABC= 92°
As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
Then, ∠ABC + ∠ADC =180
∠ABC = 180 – 92 = 88°
So, by the fig CD∥AE ,
∠ADC = ∠ADF ………..(alt int ∠)
∠ADF = ∠ADE + ∠FAE
∠ADF = 88 + 20 = 108°
As we know that exterior angle is equal to the int opposite angles
∠BCD = ∠ADF = 108°
Hence , ∠BCD = 108°

ANSWER5

Given, BD = DC , ∠CBD =30°
∠CBD = ∠DCB = 30°
In △CBD

$\angle CBD + \angle CDB + \angle BCD = 180°$
$\angle CDB + 30 + 30 = 180$
$\angle CDB = 180 - 30 - 30 = 120°$
As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
$\angle BAC + \angle BDC = 180°$
$\angle BAC + 120° = 180°$
Hence , $\angle BAC = 180 - 120 = 60°$

ANSWER6
Given , $\angle AOC = 100°$
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.

$$\angle ADC = \frac{1}{2}\angle AOC = \frac{1}{2}\text{x}100 = 50°$$

So, As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
Then, $\angle ADC + \angle ABC = 180°$
$\angle ABC = 180 - \angle ADC = 180 - 50$
Hence, $\angle ADC = 130°$

ANSWER7

(i) Given $\triangle ABC$ is equilateral $\triangle$

$\therefore$ AB= BC= AC
And $\angle ABC = \angle BAC = \angle ACB = 60°$
On same segment of chord BC

(ii) So, As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°

$\angle BDC + \angle BEC = 180°$
$\angle BEC = 180 - \angle BDC$
hence $\angle BEC = 180 - 60 = 120°$

ANSWER8
Given, $\angle BCD = 100°$, $\angle ABD = 50°$
As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
$\angle BAD + \angle BCD = 180°$
$\angle BAD + 100 = 180°$
$\angle BAD = 180 - 100 = 80°$
So, in $\triangle ADB$
$\angle ADB + \angle DBA + \angle BAD = 180°$
$\angle ADB + 50 + 80 = 180°$
$\angle ADB = 180 - 50 - 80$
Hence, $\angle ADB = 50°$

ANSWER9
Given, $\angle BOD = 150°$
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

$$\angle DCB = \frac{1}{2}\angle DOB = \frac{1}{2}\text{x}150 = 75°$$

Hence, y° = 75

Then, As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°

∠DCB +∠BAD = 180°

∠BAD + 75 = 180°

Hence, ∠BAD = 105°

ANSWER10

Then, As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°

∠DCB +∠BAD = 180°

y + 50° = 180°

y = 180 – 50 = 130°

In equilateral △OAB

OA = OB , ∠OBA = ∠OAB = 50°

As we know that exterior angle is equal to the int opposite angles

∠BOD = 180 – (∠OAB + ∠OBA)

∠BOD = 180 – (50 + 50) = 80°

ANSWER11

As we know that exterior angle is equal to the int opposite angles

Then, ∠CBF = 130° (given)

Now, ∠CDE = 180 - ∠CBF

= 180 – 130= 50°

Hence , x = ∠CDE = 50°

ANSWER12

Given, DO ∥CB and ∠BCD = 120°

(i) As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°

∠BAD = 180- ∠BCD

∠BAD = 180 – 120 = 60°

(ii) So, ∠BDA = 90°

In △ADB

∠ADB +∠BAD +∠ABD = 180°

∠ABD + 60 + 90 = 180°

∠ABD = 180 – 60-90 = 30

Hence, ∠ABD = 30°

(iii) △AOD

OA = OD ,

And ∠ODA = ∠BAD =∠OAD = 60°

In semicircle △ADB

∴ ∠ODB = 90 - ∠ODA

= 90 – 60

∠ODB = 30°

OD∥CB , DB is trANSWERversal

∠ODB = ∠CBD = 30°……………[alt int angles]

(iv) In $\triangle CBD$

$\angle CBD + \angle BDC + \angle DCB = 180°$

$\angle BDC + 120 + 30 = 180°$

$\angle BDC = 180 - 120 - 30 = 30°$

Then, by fig

$\angle ADC = \angle BDC + \angle BDA$ (Above values)

Hence, $\angle ADC = 90 + 30 = 120°$

$\triangle AOD$

OA = OD (radius)

$\angle AOD = \angle ADO = \angle OAD = 60°$

Hence, it is proved equilateral $\triangle$

ANSWER13

As we know that AB and CD are the chords intersect at point then

AP x BP = CP x CD

(AB+BP) x BP = (CD+DP) x CD

(6+2) x 2 = (CD +2.5) x 2.5

$\Rightarrow 8 \times 2 = 2.5CD + 6.25$

$\Rightarrow 2.5\ CD = 16 - 6.25 = 9.75$

$\Rightarrow CD = \frac{9.75}{2.5} = 3.9cm$

ANSWER14

Given, $\angle AOD = 140°$, $\angle CAB = 50°$

(i) we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°

So, $\angle BAC + \angle BDC = 180°$

$\angle BDC + 50 = 180°$

$\angle BDC = 180 - 50 = 130°$

Then, in line segment CDE

$\angle BDC + \angle EDB = 180°$

$\angle EDB = 180 - 130 = 50°$

Hence, $\angle EDB = 50°$

(ii) here, $\angle BOD = 180 - \angle AOD$ (given)

$\angle BOD = 180 - 140 = 40°$

Also, OD = OB so, the angles $\angle OBD = \angle ODB$

We can calculate by $\triangle ODB$

$\angle ODB + \angle OBD + \angle BOD = 180$

$2\angle ODB + 40 = 180$

$2\angle ODB = 180 - 40 = 140°$

$\angle ODB = \frac{140}{2} = 70°$

$\angle ODB = \angle OBD = 70°$

In line segment OBE

$180 = \angle OBD + \angle EBD$

$\angle EBD = 180 - \angle OBD$
Hence, $\angle EBD = 180 - 70 = 110°$

ANSWER15
Given, In $\triangle ABC$
$AB = AC$
D is intersecting at AB and E is intersecting AC
$\therefore \angle CBA = \angle BCA$
As we know that exterior angle is equal to the int opposite angles
And ext.$\angle ADE = \angle CBA = \angle BCA$
Hence, $\angle ADE = \angle ABC$, $DE \parallel BC$

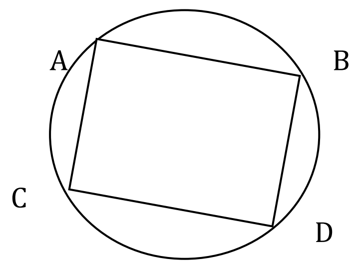
ANSWER16
As we know that exterior angle is equal to the int opposite angles
Ext $\angle EDC = \angle A$, Ext $\angle DCE = \angle B$
$AB \parallel CD$ (given)
So, $\angle A = \angle B$
Hence, $\triangle AEB$ is isosceles
$\angle A = \angle B$, $AE = BE$

ANSWER17
Given $\angle BAD = 75°$
we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
then in first Quadrilateral ABCD
$\angle BAD + \angle BCD = 180°$
$\angle BCD = 180 - \angle BAD$
$\angle BCD = 180 - 75 = 105°$
As we know that exterior angle is equal to the int opposite angles
Then, $\angle BCD = \angle DEF = 105°$
$y = 105°$
In line segment BCF
$\angle BCD + \angle DCF = 180°$
$\Rightarrow \angle DCF = 180 - \angle BCD = 180 - 105 = 75°$
Hence, $\angle DCF = 75°$
$x = 75°$

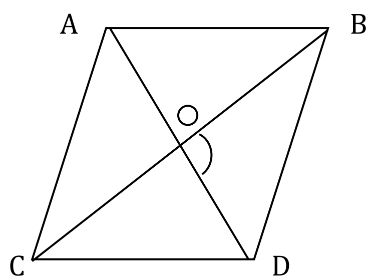
ANSWER18
Given , ABCD is quadrilateral $AD = BC$ and $\angle ADC = \angle BCD$
Draw $\perp$ lines on AB such that $DE \perp AB$ and $CF \perp AB$
So, $\angle DEA = \angle CFB = 90°$
In $\triangle ADE$ and $\triangle BCF$, we have
$\angle ADE = \angle ADC - 90°$
$\Rightarrow \angle BCD - 90° = \angle BCF$ [$\angle ADC = \angle BCD$]
$AD = BC$
And $\angle ADE = \angle BFC = 90°$
$\therefore \Delta ADE \cong \Delta BCF$
$\angle A = \angle B$
$\therefore \angle A + \angle B + \angle C + \angle D = 360°$

2∠B +2∠D =360 ……..[∠ADC = ∠BCD (Given)]
Then, ∠B +∠D = 180°
Similarly, ∠A + ∠C = 180°
Because we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
Hence proved ABCD is lie on circle

ANSWER19
Suppose, ABCD be a cyclic quadrilaterals and O be the centre of the circle.
Then, AB ,BC, CD DA are the chords of the circle , and its bisector must pass through the centre of the circle, O .
Hence, we can say that right bisector of AB, BC , CD and DA pass through O so, it is concurrent.

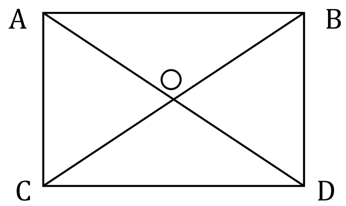


ANSWER20



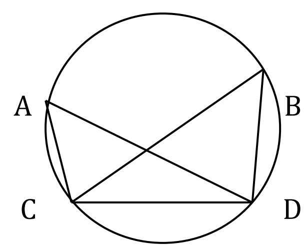
Let AD and BC is the diagonal of a rhombus ABCD intersect at O.
As we know that the diagonals of a rhombus bisects at 90° right angle ∆
So, ∠BOD = 90°
Also, ∠BOD is lies in the semicircle.
Thus, the circle drawn with BD as diameter will pass through O
Similarly, AB , CD, AC are the diameter as pass through O.

ANSWER21



Let O be the intersection point of the diagonals AC and BD of rect, ABCD .
Since the diagonals of a rectangles are equal and bisects each other , we have ,
OA = OB = OC = OD.
Hence, O is centre of the circle through A, B,C,D.

ANSWER22

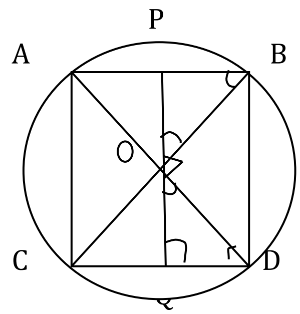


Let ACD are the given points . with the B as an center radius equal to AD draw an arc. With D as centre and CB as radius draw another arc, intersecting the previous arc at B. then B is the desired point
PROOF join AD and BC
$\Delta ADC \cong BCD \ldots\ldots [AC = BD, CB = AD, CD = CD]$
$\Rightarrow \angle DAC = \angle CBD$
Thus, CD subtends equal angles ∠ACD and ∠CBD on the same side of it.
∴ A , B, C, D are cyclic .

ANSWER23
Given, ABCD is cyclic equilateral , (∠B -∠D) = 60°
As we know that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°
∠B +∠D = 180°
∴ by solving above equation
⇒ ∠B -∠D = 60°
∠B + ∠D = 180
2∠B = 240°
∠B = $\frac{240}{2} = 120°$

And ∠D = 180 - ∠B
⇒∠D = 180 – 120 = 60°

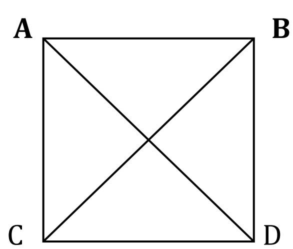
ANSWER24



Let ABCD is the cyclic quadrilaterals whose diagonals AC and BD intersect at O at the right angles.
Let OQ⊥CD such that OQ produced to P meet at AB chord

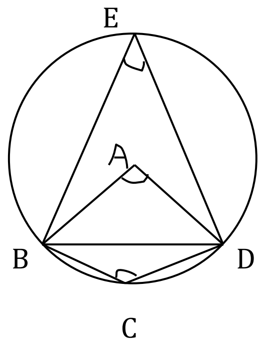
Then by fig,
We have to prove that CM = MD
Clearly, ∠CBA = ∠ADC .....[same line segment]
∠QDO + ∠DOQ = 90° [∵ ∠OQD = 90°]
∠QOD + ∠POB = 90° [∵ POQ is linear segment and ∠BOD = 90°]
∴ ∠QDO + ∠DOQ = ∠QOD + ∠POB ⇒ ∠QDO = ∠POB
Thus, , ∠CBA = ∠ADC and ∠QDO = ∠POB ⇒ ∠CBA = ∠POB
∴ OP= PB and OP = PA
Hence, PB = PA

ANSWER25



By fig, ∠ACB = 90° ∠ADB = 90°
As we know that the opposite angles of quadrilateral ABCD are supplementary or 180°
Then , ABCD is cyclic quadrilateral
This meANSWER circles pass through the points A, B, C, D
∴ ∠BAC = ∠BDC .... [angles in the same segment

ANSWER26



Given, ABCD is a quadrilateral such that A is the centre of the circle passing through B,C and D.
Take Point E on the circle outside arc BCD. Join BE, DE and BD
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
Clearly , $\angle BAD = 2\angle BED$
Now, EBCD ia cyclic quadrilateral .
$\therefore \angle BED + \angle BCD = 180°$
$\Rightarrow \angle BCD = 180° - \angle BED$
$\Rightarrow \angle BCD = 180° - \frac{1}{2}\angle BAD$ ……..[$\angle BAD = 2\angle BED$]

In $\triangle BCD$, we have
$\angle BCD + \angle CBD + \angle BDC = 180°$
$\angle CBD + \angle CDB = 180° - \angle BCD$
$= 180° - (180 - \frac{1}{2}\angle BAD) = \frac{1}{2}\angle BAD$
Hence $\angle CBD + \angle CDB = \frac{1}{2}\angle BAD$.