Ch 15 : Circle

Exercise 15.1

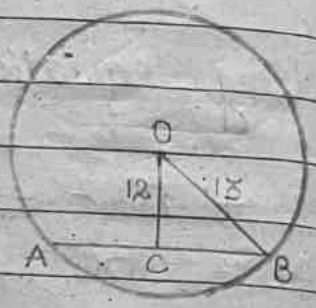
(1) $CB^2 = OB^2 - OC^2$

$CB^2 = 13^2 - 12^2$

$CB^2 = 169 - 144$

$CB = \sqrt{25}$

$CB = 5$ cm

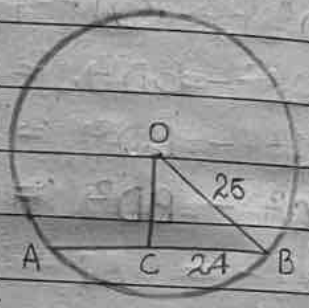


$\therefore AB = 2 \times 5$

$= \boxed{10 \text{ cm}}$ ans

(2) $AB = 48$ cm

$CB = 24$ cm



$OC^2 = OB^2 - CB^2$

$OC^2 = 25^2 - 24^2$

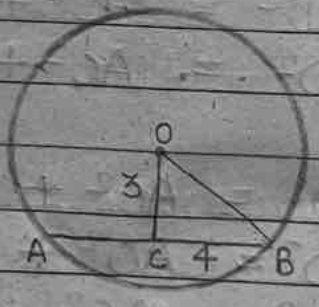
$OC^2 = 625 - 576$

$OC = \sqrt{49}$

$\therefore OC = \boxed{7 \text{ cm}}$ ans

(3) $AB = 8$ cm

$CB = 4$ cm



$OB^2 = 3^2 + 4^2$

$OB^2 = 9 + 16$

$OB = \sqrt{25}$

$\therefore OB = \boxed{5 \text{ cm}}$ ans.

(4) $BD = 20$ cm
$OB = 10$ cm

$CB^2 = OB^2 - OC^2$
$CB^2 = 10^2 - 6^2$
$CB^2 = 100 - 36$
$CB = \sqrt{64}$
$CB = 8$ cm

$\therefore AB = 2 \times 8$
$= \boxed{16 \text{ cm}}$ ans

(5) $AB = 16$ cm
$AC = 8$ cm

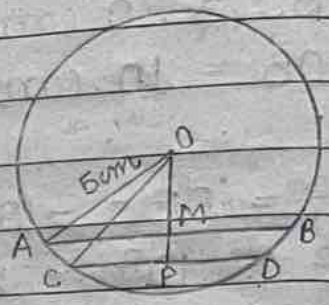
$OA^2 = OC^2 + AC^2$
$OA^2 = 6^2 + 8^2$
$OA^2 = 36 + 64$
$OA = \sqrt{100}$
$OA = 10$ cm

$PR^2 = PO^2 - OR^2$
$PR^2 = 10^2 - 8^2$
$PR^2 = 100 - 64$
$PR = \sqrt{36}$
$PR = 6$ cm

$\therefore QP = 2 \times 6$ cm
$= \boxed{12 \text{ cm}}$ ans.

(6i) $AB = 8\,cm$

$AM = 4\,cm$



In ΔOAM,

$OM^2 = OA^2 - AM^2$

$OM^2 = 5^2 - 4^2$

$OM = \sqrt{25 - 16}$

$OM = \sqrt{9}$

$OM = 3\,cm$

$CD = 6\,cm$

$CP = 3\,cm$

In ΔOCP,

$OP^2 = OC^2 - CP^2$

$OP^2 = 5^2 - 3^2$

$OP^2 = 25 - 9$

$OP = \sqrt{16}$

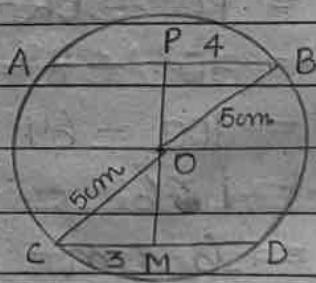
$OP = 4\,cm$

∴ Distance between the chords $\Rightarrow OP - OM$

$\Rightarrow 4 - 3 = \boxed{1\,cm}$ ans

(ii) $CD = 6cm$

$CM = 3cm$



In ΔOCM,

$OM^2 = OC^2 - CM^2$

$OM^2 = 5^2 - 3^2$

$OM^2 = 25 - 9$

$OM = \sqrt{16}$

$OM = 4\,cm$

$AB = 8cm$
$BP = 4cm$

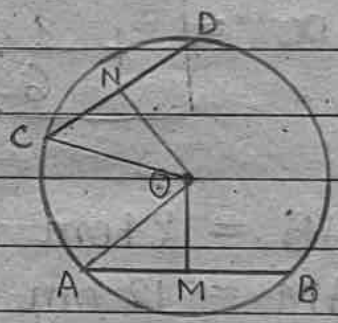
In $\triangle OPB$,

$OP^2 = OB^2 - BP^2$
$OP^2 = 5^2 - 4^2$
$OP^2 = 25 - 16$
$OP = \sqrt{9}$
$OP = 3\,cm$

$\therefore$ Distance between the chords $\Rightarrow OP + OM$
$\Rightarrow 4 + 3 = \boxed{7\,cm}$

(7i) a) $AB = 24\,cm$, $OM = 5cm$, $ON = 12\,cm$

$AM = 12\,cm$



In $\triangle OAM$,

$OA^2 = OM^2 + AM^2$
$OA^2 = 5^2 + 12^2$
$OA^2 = 25 + 144$
$OA = \sqrt{169}$
$OA = 13$

$\therefore \boxed{\text{radius} = 13\,cm}$ ans

b) $OC = 13\,cm$

In $\triangle OCN$,

$NC^2 = OC^2 - ON^2$
$NC^2 = 13^2 - 12^2$

$NC^2 = 169 - 144$

$NC = \sqrt{25}$

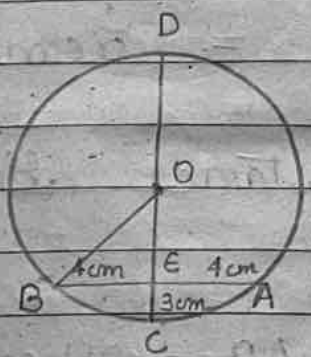
$NC = 5\ cm$

$\therefore CD = 2 \times 5cm$

$= \boxed{10\ cm}$ ans

(7ii) $OE = OC - 3$ (let radius be x)

$OB = OC = x$



$OB^2 = BE^2 + OE^2$

$OB^2 = 4^2 + (OC - 3)^2$

$OB^2 = 16 + (x - 3)^2$

$x^2 = 16 + x^2 + 9 - 6x$

$6x = 16 + 9$

$x = \frac{25}{6}$

$\therefore x = \boxed{4\ \frac{1}{6}\ cm}$ ans

(8) $AB = 24cm$ $CD = 18\ cm$

$AM = 12\ cm$ $CN = 9cm$

$OC = OA = 15\ cm$

In ΔOCN,

$ON^2 = OC^2 - CN^2$

$ON^2 = 15^2 - 9^2$

$ON^2 = 225 - 81$

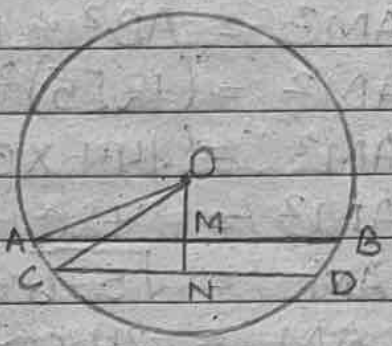
$ON = \sqrt{144}$

$ON = 12\ cm$

OM = 9cm

∴ Distance between two chords = OM + ON
= 9 + 12
= 21 cm ans

(9) AB = 10 cm
AM = 5 cm



let OM be x.

$OA^2 = OM^2 + AM^2$
$OA^2 = x^2 + 5^2$ [OA = OC, radius of circle]

$OC^2 = ON^2 + CN^2$
$OC^2 = (OM + 3)^2 + 2^2$
$OC^2 = (x + 3)^2 + 2^2$

$x^2 + 5^2 = (x + 3)^2 + 2^2$
$x^2 + 25 = x^2 + 9 + 6x + 4$
$25 - 9 - 4 = 6x$
$\frac{12}{6} = x$

$x = 2$

$OA^2 = AM^2 + OM^2$
$OA^2 = 5^2 + 2^2$
$OA^2 = 25 + 4$
$OA = \sqrt{29}$

radius = $\sqrt{29}$

∴ diameter = 2r

= $\boxed{2\sqrt{29}\text{ cm}}$ ans

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