MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

CIRCLE

Others

1. Prove Equal chords of a circle subtend equal angles at the centre.

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2. Prove Chords of congruent circles which are equidistant from the corresponding centres, are equal.

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3. Prove Equal chords of congruent circles subtend equal angles at the centre.

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4. If the angles subtended by two chords of a circle at the centre are equal, then Prove chords are equal.

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5. Of any two chords of a circle show that one which is larger is nearer to the centre.

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6. If the angles subtended by two chords of congruent circles at the corresponding centres are equal, then Prove chords are equal.

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7. If two equal chords of a circle in intersect within the circle, prove that : the segments of the chord are equal to the corresponding segments of the other chord. the line joining the point of intersection to the centre makes equal angles with the chords.

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8. Two equal chords AB and CD of a circle with centre O , when produced meet at a point E, as shown in Figure. Prove that $BE = DE$ and $AE = CE$.

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9. Two equal chords AB and CD of a circle with centre O, when produced meet at a point E, as shown in Figure. Prove that $BE = DE$ and $AE = CE$.

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10. Prove that , Of any two chords of a circle, show that the one which is nearer to the centre is larger.

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11. Chords of a circle which are equidistant from the centre are equal.

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12. Equal chords of congruent circles are equidistant from the corresponding centres.

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13. The lengths of two parallel chords of a circle are 6 cm and 8 cm. If the smaller chord is at a distance of 4 cm from the centre, what is the distance of the other chord from the centre?

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14. Equal chords of a circle are equidistant from the centre.

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15. Two circle with centres A and B intersect at C and D. Prove that $\angle ACB = \angle ADB$.

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16. Prove that the line joining the mid-points of two parallel chords of a circle passes through the centre.

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17. Prove that the right bisector of a chord of a circle, bisects the corresponding arc or the circle.

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18. Prove that the perpendicular bisector of a chord of a circle always passes through the centre.

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19. Prove that the line joining the mid-points of two parallel chords of a circle passes through the centre.

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20. Two circles of radil $5cm$ and $3cm$ intersect at two points and the distance between their centres is $4cm$. Find the length of the common chord.

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21. Two circles are drawn with sides AB, AC of a triangle ABC as diameters. The circles intersect at a point D. Prove that D lies on BC.

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22. In the figure, two circles intersect at A and B. AC and AD are respectively the diameters of the circles. Prove that C, B, D are collinear.

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23. Prove that any angle subtended by a minor arc in the alternate segment is acute and any angle subtended by a major arc in the alternate segment is obtuse.

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24. The arc of a circle subtending a right angle at any point of the circle in its alternate segment is a semi-circle.

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25. Using vectors, prove that angle in a semicircle is a right angle.

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26. Prove that angle in the same segment of a circle are equal.

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27. Prove that the circle drawn on any one of the equal sides of an isosceles triangle as diameter bisects the base.

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28. A chord of a circle is equal to the radius of the circle find the angle subtended by the chord at a point on the monor arc and also at a point on the major arc.

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29. In Figure, ABC is a triangle in which $\angle BAC = 30^\circ$. Show that BC is the radius of the circumcircle of $ABC,$ whose centre is O.

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30. Theorem:- If the line segment joining two points subtends equal angles at two other points lying on the same side of the line segment; the four points are concyclic. i.e lie on the same circle.

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31. In Figure, OA and OB ar respectively perpendiculars to chords CD and EF of a circle whose centre is O. If $OA = OB$, prove that $CE = DF$.

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32. Draw the graph of the fuction 4x+3y=12,at what pt it cut the coordinate axis

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33. If two equal chords of a circle in intersect within the circle, prove that: the segments of the chord are equal to the corresponding segments of the other chord.

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34. prove that the line joining the mid-point of two equal chords of a circle subtends equal angles with the chord.

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35. Show that if two chords of a circle bisect one another they must be diameters.

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36. In Figure, equal chords AB and CD of a circle with centre O, cut at right angles at E. If M and N are mid-point of AB and CD respectively, prove that OMEN is a square.

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37. Two equal circles intersect in P and Q . A straight line through P meets the circles in A and B . Prove that $QA = QB$.

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38. Prove that all the chords of a circle through a given point within it, the least is one which is bisected at that point.

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39. Prove that the diameter is the greatest chord in a circle.

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40. Bisector AD of $\angle BAC$ of $\triangle ABC$ passes through the centre O of the circumcircle of $\triangle ABC$ as shown in figure. Prove that $AB = AC$.

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41. If two sides of a cyclic quadrilateral are parallel, prove that the remaining two sides are equal and the diagonals are also equal. OR A cyclic trapezium is isosceles and its diagonals are equal.

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42. The quadrilateral formed by angle bisectors of a cyclic quadrilateral is also cyclic.

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43. If two non-parallel sides of a trapezium are equal, it is cyclic. OR An isosceles trapezium is always cyclic.

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44. If two opposite sides of a cyclic quadrilateral are equal, then the other two sides are parallel.

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45. The sum of either pair of opposite angles of a cyclic quadrilateral is 180^0 OR The opposite angles of a cyclic quadrilateral are supplementary.

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46. If the chord of a circle is equal to the radius of the circle, then the angle subtended by the chord at a point on the minor arc is .....

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47. If one side of a cyclic quadrilateral is produced, then the exterior angle is equal to the interior opposite angle.

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48. If the sum of any pair of opposite angles of a quadrilateral is 180°; then the quadrilateral is cyclic.

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49. The sum of the angles in the four segments exterior to a cyclic quadrilateral is equal to 6 right angles.

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50. If the bisectors of the opposite angles $\angle A and \angle B$ of a cyclic quadrilateral $ABCD$ intersect the corresponding cicle at $P and Q$ respectively, then PQ is a diameter of the circle.

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51. If O is the circumcentre of a ABC and $OD \perp BC$, prove that $\angle BOD = \angle A$.

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52. Two diameters of a circle intersect each other at right angles. Prove that the quadrilateral formed by joining their end-points is a square.

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53. ABC and ADC are two right triangles with common hypotenuse AC. Prove that $\angle CAD = \angle CBD$.

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54. In a circle with centre O, chords $ABandCD$ intersect inside the circumference at E. Prove that $\angle AOC + \angle BOD = 2\angle AEC$.

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55. ABC and ADC are two right triangles with common hypotenuse AC. Prove that $\angle CAD = \angle CBD$.

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56. Bisectors of angles A, B and C of a triangle ABC intersect its circumcircle at D, E and F respectively. Prove that the angles of the

triangle DEF are $90o - \frac{1}{2}A$,$90o - \frac{1}{2}B$ and $90o - \frac{1}{2}C$

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57. Prove that the circle drawn with any side of a rhombus as a diameter, passes through the point of intersection of its diagonals.

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58. $ACandBD$ are chords of a circle that bisect each other. Prove that: $ACandBD$ are diameters ABCD is a rectangle.

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59. Prove that the mid-point of the hypotenuse of a right triangle is equidistant from its vertices.

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60. In Figure, P, is any point on the chord BC of a circle such that $AB = AP$. Prove that $CP = CQ$.

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61. Two chords AB and CD of a circle are parallel and a line l is the perpendicular bisector of AB. Show that l bisects CD.

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62. A circular park of radius $20m$ is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in his hands to talk to each other. Find the length of the string of each phone.

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63. In an equilateral triangle, prove that the centroid and centre of the circum-circle (circum centre) coincide.

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64. In Figure, l is a line intersecting the two concentric circles, whose common centre is O, at the points A, B, C and D. Show that $AB = CD$.

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65. In the Figure, OD is perpendicular to the chord AB of a circle whose centre is O. If BC is a diameter, show that $CA = 2OD$.

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66. AB and CD are two chords of a circle such that $AB = 6cm, CD = 12cm$ and $AB \parallel CD$. If the distance between AB and CD is $3cm$, find the radius of the circle.

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67. AB and CD are two parallel chords of a circle such that $AB = 10cm$ and $CD = 24cm$. If the chords are on the opposite sides of the centre and the distance between them is $17cm$, find the radius of the circle.

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68. PQ and RS are two parallel chords of a circle whose centre is O and radius is $10cm$. If $PQ = 16cm$ and $RS = 12cm$, find the distance between PQ and RS, if they lie: on the same side of the centre O. on opposite side of the centre O.

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69. AB and CD are two parallel chords of a circle whose diameter is AC . Prove that $AB = CD$.

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70. If a diameter of a circle bisects each of the two chords of a circle, prove that the chords are parallel.

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71. Prove that the line segment joining the mid points of two side of a triangle is parallel to the third side and equal to half of it.

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72. Prove that the angle in a segment greater than a semi-circle is less than a right angle.

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73. Prove that the angle in a segment greater than a semi-circle is less than a right angle.

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74. $ABCD$ is a parallelogram. If AB is produced to E such that $BE = AB$. Prove that ED bisects BC.

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75. If two sides of a cyclic quadrilateral are parallel, prove that the remaining two sides are equal and the diagonals are also equal.

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76. Prove that the circle drawn with any side of a rhombus as a diameter, passes through the point of intersection of its diagonals.

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77. Let the vertex of an angle ABC be located outside a circle and let the sides of the angle intersect equal chords AD and CE with the circle. Prove that $\angle ABC$ is equal to half the difference of the angles subtended by the chords AC and DE at the centre.

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78. In any triangle ABC, if the angle bisector of $\angle A$and perpendicular bisector of BCintersect, prove that they intersect on the circumcircle of the triangle ABC

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79. P is a point on the side BC of a triangle ABC such that $AB = AP$. Through A and C, lines are drawn parallel to BC and PA, respectively, so as to intersect at D as shown in Figure. Show that $ABCD$ is a cyclic quadrilateral.

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80. $ABCD$ is a cyclic quadrilateral whose diagonals $ACandBD$ intersect at P . If $AB = DC$, Prove that : $PAB \cong PDC$ $PA = PDandPC = PB\ ADllBC$

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81. (Converse of Theorem 3) The line joining the centre of a circle to the mid-point of a chord is perpendicular to the chord.

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82. .The equation of the circle passing through three non-collinear points P(x_1, y_1) Q(x_2, y_2) and R(x_3, y_3) is

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83. Two chords AB and AC of a circle are equal. Prove that the centre of the circle lies on the angle bisector of $\angle BAC$.

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84. If two chords AB and AC of a circle with centre O are such that the centre O lies on the bisector of $\angle BAC$, prove that $AB = AC$, i.e. the chords are equal.

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85. If two arcs of a circle (or of congruent circles) are congruent, then corresponding chords are equal.

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86. If two chord of a circle (or of congruent circles) are equal, then their corresponding arcs. (minor, major or semi-circular) are congruent.

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87. The perpendicular from the centre of a circle to a chord bisects the chord.

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88. If two circles intersect in two points, prove that the line through the centres is the perpendicular bisector of the common chord.

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89. Find the length of the chord which is at 12 cm distance from center and radius of circle is 13cm.

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90. In an isosceles triangle ABC with $AB = AC,$ a circle passing through B and C intersects the sides $ABandAC$ at$DandE$ respectively. Prove that $DE \| BC.$

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91. PQ and RS are two parallel chords of a circle and lines RP and SQ intersect each other at O as shown in Figure. Prove that $OP = OQ.$

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92. ABC is an isosceles triangle in which $AB = AC$. If $DandE$ are the mid-points of $ABandAC$ respectively, prove that the points $B, C, DandE$ are concyclic.

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93. D and E are points on equal sides AB and AC of an isosceles triangle ABC such that $AD = AE$. Prove that B, C, D, E are concylic.

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94. $D\ and\ E$ are, respectively, the points on equal sides $AB\ and\ AC$ of an isosceles triangle ABC such that $B,\ C,\ E,\ and\ D$ are concyclic as shown in Figure. If O is the point of intersection of $CD\ and\ BE,$ prove that AO is the bisector of line segment DE

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95. $ABCD$ is a cyclic quadrilateral. $ABandDC$ are produced to meet in E. Prove that $EBC \sim EDA$.

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96. In Figure, $PQRS$ is a cyclic quadrilateral. Find the measure of each of its angles.

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97. Prove that any cyclic parallelogram is a rectangle.

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98. $ACandBD$ are chords of a circle which bisect each other. Prove that (i) $ACandBD$ are diameters (ii) $ABCD$ is a rectangle.

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99. $ABCD$ is a parallelogram. The circle through $A, BandC$ intersects CD produced at $E,$ prove that $AE = AD.$

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100. Fill in the blanks: All point lying inside/outside a circle are called ... points/ ... points. Circle having the same centre and different radii are called ... circles. A point whose distance from the centre of a circle is greater than its radius lies in .... of the circle. A continuous piece of a circle is .... of the circle. The longest chord of a circle is a .....of the circle. An arc is a ..... when its ends are the ends of a diameter. Segment of a circle is the region between an arc and ... of the circle. A circle divides the plane, on which it lies, in .... parts.

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101. Write the truth value (T/F) of the following with suitable reasons: A circle is a plane figure. Line segment joining the centre to any point on the circle is a radius of the circle. If a circle is divided into three equal arcs each is a major arc. A circle has only finite number of equal chords. A chord of a circle, which is twice as long is its radius is a diameter of the circle. Sector is the region between the chord and its corresponding arc. The degree measure of an arc is the complement of the central angle containing the arc. The degree measure of a semi-circle is 180^0

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102. The radius of a circle is 13 cm and the length of one of its chords is 10 cm. Find the distance of the chord from the centre.

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103. Find the length of a chord which is at a distance of 5 cm from the centre of a circle of radius 13 cm.

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104. In Figure, O is the centre of the circle of radius $5\,cm.\,OP\,\perp AB,\,OQ\,\perp CD,\,AB\,||\,CD,\,AB = 6\,cm\,and\,CD = 8\,cm$. Determine PQ.

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105. In Figure, O is the centre of the circle of radius $5\,cm\dot{O}P \perp AB,\,OQ \perp CD,\,ABCD,\,AB = 6\,cm\,and\,CD = 8\,cm\cdot$ Determine PQ

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106. $PQ\,and\,RS$ are two parallel chords of a circle whose centre is O and radius is $10\,cm\cdot$ If $PQ = 16\,cm\,and\,RS = 12\,cm,$ find the distance between $PQ\,and\,RS,$ if they lie: on the same side of centre O

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107. PQ and RS are two parallel chords of a circle whose centre is O and radius is $10cm$. If $PQ = 16cm$ and $RS = 12cm$, find the distance between PQ and RS, if they lie: on the same side of the centre O. on opposite side of the centre O.

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108. AB and CD are two parallel chords of a circle such that $AB = 10cm$ and $CD = 24cm$. If the chords are on the opposite sides of the centre and the distance between them is $17cm$, find the radius of the circle.

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109. $AB\ and\ CD$ are two chords of a circle such that $AB = 6\ cm,\ CD = 12\ cm\ and\ AB \parallel CD$. If the distance between

AB and CD is $3\ cm$, find the radius of the circle.

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110. In the figure, OD is perpendicular to the chord AB of a circle whose centre is O. If BC is a diameter, show that $CA = 2OD$.

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111. In Figure, l is a line intersecting the two concentric circles, whose common centre is O, at the points A, B, C and D. Show that $AB = CD$.

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112. In a circle of radius $5\ cm$, AB and AC are two chords such that $AB = AC = 6cm$. Find the length of the chord BC.

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113. In an equilateral triangle, prove that the centroid and centre of the circum-circle (circum centre) coincide).

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114. A circular park of radius $20m$ is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in his hands to talk to each other. Find the length of the string of each phone.

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115. Two chords $AB\ and\ CD$ of a circle are parallel and a line L is the perpendicular bisector of AB. Show that L bisects CD

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116. If a diameter of a circle bisects each of the two chords of a circle, prove that the chords are parallel.

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117. $AB \; and \; CD$ are two parallel chords of a circle whose diameter is AC. Prove that $AB = CD$

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118. Two concentric circle with centre O have $A,\ B,\ C,\ D$ as the points of intersection with the line l as shown in Figure. If $AD = 12cm \; and \; BC = 8cm,$ find the lengths of $AB,\ CD,\ AC \; and \; BD.$

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119. Two circles whose centres are O and O' intersect at P. Through P, a line l parallel to OO' intersecting the circles at $C \; and \; D$ is drawn. Prove that $CD = 2\,OO'$

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120. Prove that the line joining the mid-points of two parallel chords of a circle passes through the centre.

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121. Two circles of radii $10\,cm \; and \; 8\,cm$ intersect and the length of the common chord is $12cm$. Find the distance between their centres.

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122. Two circles of radii $5\ cm\ and\ 3cm$ intersect at two points and the distance between their centres is $4cm$. Find the length of the common chord.

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123. In Figure, two circles with centres $A\ and\ B$ and of radii $5\ cm\ and\ 3\ cm$ touch each other internally. If the perpendicular bisector of segment AB meets the bigger circle in $P\ and\ Q$, find the length of PQ

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124. In Figure, $\widehat{AB} \cong \widehat{AC}$ and O is the centre of the circle. Prove that OA is the perpendicular bisector of BC

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125. Prove that the right bisector of a chord of a circle, bisects the corresponding arc or the circle.

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126. Prove that the perpendicular bisector of a chord of a circle always passes through the centre.

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127. In Figure, $AB = CB \; and \; O$ is the centre of the circle. Prove that BO bisects $\angle ABC$.

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128. Two circle with centres A and B intersect at C and D. Prove that $\angle ACB = \angle ADB$.

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129. Prove that the line joining centres of two interesting circles subtends equal angles at the two points of intersection.

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130. The radius of a circle is 8cm and the length of one of its chords is 12cm. Find the distance of the chord from the centre.

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131. Find the length of a chord which is at a distance of 5 cm from the centre of a circle of radius 10 cm.

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132. Find the length of a chord which is at a distance of 4 cm from the centre of the circle of radius 6 cm.

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133. Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, find the radius of the circle.

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134. Suppose you are given a circle. Give a construction to find its centre.

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135. Prove that the line joining the mid-point of a chord to the centre of the circle passes through the mid-point of the corresponding minor arc.

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136. Prove that a diameter of a circle which bisects a chord of the circle also bisects the angle subtended by the chord at the centre of the circle.

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137. Prove that two different circles cannot intersect each other at more than two points.

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138. A line segment AB is of length 5 cm. Draw a circle of radius 4 cm passing through $A \; and \; B$? Give reason in support of your answer.

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139. An equilateral triangle of side 9 cm is inscribed in a circle. Find the radius of the circle.

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140. Given an arc of a circle, complete the circle.

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141. Draw different pairs of circles. How many points does each pair have in common? What is the maximum number of common points?

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142. Suppose you are given a circle. Give a construction to find its centre.

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143. Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, find the radius of the circle.

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144. The lengths of two parallel chords of a circle are 6 cm and 8 cm. If the smaller chord is at a distance of 4 cm from the centre, what is the distance of the other chord from the centre?

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145. If two chords of a circle are equally inclined to the diameter through their point of intersection, prove that the chords are equal.

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146. In Figure, O is the centre of a circle and PO BISECTS $\angle APD$. Prove that $AB = CD$

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147. Two equal chords AB and CD of a circle with centre O , when produced meet at a point E, as shown in Figure, Prove that $BE = DE$ and $AE = CE$.

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148. If two equal chords of a circle in intersect within the circle, prove that: the segments of the chord are equal to the corresponding segments of the other chord. the line joining the point of intersection to the centre makes equal angles with the chords.

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149. If two equal chords of a circle intersect within the circle, prove that: the segments of the chord are equal to the corresponding segments of the other chord.

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150. prove that the line joining the mid-point of two equal chords of a circle subtends equal angles with the chord.

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151. $L\ and\ M$ are mid-point of two equal chords $AB\ and\ CD$ of a circle with centre O. Prove that $\angle OLM = \angle OML$ (ii) $\angle ALM = \angle CML$

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152. PQ and RQ are chords of a circle equidistant from the centre. Prove that the diameter passing through Q bisects ∠PQR and ∠PSR

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153. In the figure, two equal chords AB and CD of a circle with centre O, intersect each other at E, Prove that AD=CB

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154. A, B, C, D are four consecutive points on a circle such that $AB = CD$. Prove that $AC = BD$

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155. Show that if two chords of a circle bisect one another they must be diameters.

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156. In Figure, equal chords AB and CD of a circle with centre O, cut at right angles at E. If M and N are mid-point of AB and CD respectively, prove that OMEN is a square.

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157. Two equal circles intersect in P and Q . A straight line through P meets the circles in A and B . Prove that $QA = QB$.

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158. Prove that all the chords of a circle through a given point within it, the least is one which is bisected at that point.

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159. Prove that the diameter is the greatest chord in a circle.

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160. Bisector AD of $\angle BAC$ of $\triangle ABC$ passes through the centre O of the circumcircle of $\triangle ABC$ as shown in figure. Prove that $AB = AC$.

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161. In Figure, $AB \text{ and } AC$ are two equal chords of a circle whose centre is O. If $OD \perp AB \text{ and } OE \perp AC$, prove that $\triangle ADE$ is an isosceles triangle.

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162. In Figure, OA and OB ar respectively perpendiculars to chords CD and EF of a circle whose centre is O. If $OA = OB$, prove that $CE = DF$.

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163. Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5m drawn in a park. Reshma throws a ball to Salma, Salma to Mandip, Mandip to Reshma. If the distance between Reshma and Salma and between Salma and Mandip is 6m each, what is the distance between Reshma and Mandip?

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164. A circular park of radius 20m is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in his hands to talk each other. Find the length of the string of each phone.

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165. In Figure, calculate the measure of $\angle AOC$.

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166. $A,\ B\ and\ C$ are three points on a circle such that the angles subtended by the chords $AB\ and\ AC$ at the centre O are $90^0 and\ 110^0$, respectively. Determine $\angle BAC$.

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167. In Figure, ABC is a triangle in which $\angle BAC = 30^\circ$. Show that BC is the radius of the circumcircle of $ABC,$ whose centre is O.

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168. A chord of a circle is equal to the radius of the circle find the angle subtended by the chord at a point on the monor arc and also at a point on the major arc.

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169. In Figure, $\angle ABC = 69^0,\ \angle ACB = 31^0$, find $\angle BDC$

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170. In Figure, $\angle PQR = 100^0,$ where $P,\ Q\ and\ R$ are points on a circle with centre. O. Find $\angle OPR$

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171. In Fig. 10.39, A, B, C and D are four points on a circle. AC and BD intersect at a point E such that $\angle BEC\backslash\ = \backslash\ 130o$ and $\angle ECD\backslash\ = \backslash\ 20 \odot$ Find $\angle BAC$.

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172. BC is a chord with centre O. A is a point on an arc BC . Prove that: ∠BAC+∠OBC= 90 , if A is the point on the major arc.

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173. BC is a chord with centre O. A is a point on an arc BC . Prove that: ∠BAC−∠OBC= 90°.

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174. Prove that the circle drawn on any one of the equal sides of an isosceles triangle as diameter bisects the base. Given: A $\triangle ABC$ in which $AB = AC$ and a circle is drawn by taking AB as diameter which intersects the side BC of triangle at D. To Prove: $BD = DC$ Construction : Join AD.

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175. In Figure, $A,\ B,\ C$ are three points on a circle such that the angles subtended by the chords $AB\ and\ AC$ at the centre O are $80^0\ and\ 120^0$ respectively. Determine $\angle BAC$ and the degree measure of arc BPC

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176. In Figure, O is the centre of the circle and the measure of arc ABC is 100^0. Determine $\angle ADC \; and \; \angle ABC$

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177. In Figure, O is the centre of the circle. The angle subtended by the arc BCD at the centre is 140°. BC is produced to P. Determine $\angle BAD \; and \; \angle DCB$.

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178. In Figure, find $m \angle PQB$ where O is the centre of the circle

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179. Two circle intersect in A and B and AC and AD are respectively the diameters of the circles. Prove that C, B, D are collinear.

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180. Two circles are drawn with sides AB, AC of a triangle ABC as diameters. The circles intersect at a point D. Prove that D lies on BC.

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181. ABC and ADC are two right triangles with common hypotenuse AC. Prove that $\angle CAD = \angle CBD$.

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182. In the figure, P is the centre of the circle. Prove that: $\angle XPZ = 2\left(\angle XZY + \angle YXZ\right)$

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183. In a circle with centre O, chords $AB\ and\ CD$ intersect inside the circumference at E. Prove that $\angle AOC + \angle BOD = 2\angle AEC$

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184. C is a point on the minor arc AB of the circle, with centre O. Given ∠ACB = x° and ∠AOB = y°. Express y in terms of x. Calculate x, if ACBO is a parallelogram.

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185. In Figure, chord ED is parallel to the diameter AC of the circle. Given $\angle CBE = 65^\circ$, calculate $\angle DEC$.

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186. In Figure, $AB \, and \, CD$ are two chords of a circle, intersecting each other at P such that $AP = CP$. Show that $AB = CD$.

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187. If O is the circumcentre of a ABC and $OD \perp BC$, prove that $\angle BOD = \angle A$.

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188. In the given figure, a diameter PQ of a circle bisects the chord RS at the point O. If PS is parallel to RQ, prove that RS is also a diameter of the circle.

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189. In Figure, $AB = CD$. Prove that $BE = DE \, and \, AE = CE$, where E is the point of intersecting of $AD \, and \, BC$.

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190. Two diameters of a circle intersect each other at right angles. Prove that the quadrilateral formed by joining their end-points is a square.

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191. Prove that the circle drawn with any side of a rhombus as a diameter, passes through the point of intersection of its diagonals.

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192. AC and BD are chords of a circle that bisect each other. Prove that:

(i) AC and BD are diameters

(ii) ABCD is a rectangle.

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193. $ACandBD$ are chords of a circle that bisect each other. Prove that: $(i)\,ACandBD$ are diameters (ii)ABCD is a rectangle.

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194. ABC and ADC are two right triangles with common hypotenuse AC. Prove that $\angle CAD = \angle CBD$.

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195. D is a point on the circumcircle of ABC in which $AB = AC$ such that $B\ and\ D$ are on the opposite side of line AC. If CD is produced to a point E such that $CE = BD,$ prove that $AD = AE.$

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196. The bisector of $\angle B$ of an isosceles triangle ABC with $AB = AC$ meets the circumcircle of ABC at P as shown in Figure. If $AP\ and\ BC$

produced meet at Q, prove that $CQ = CA$.

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197. Bisectors of angles A, B and C of a triangle ABC intersect its circumcircle at D, E and F respectively. Prove that the angles of the triangle DEF are $90^\circ - \frac{1}{2}A, 90^\circ - \frac{1}{2}B$ and $90^\circ - \frac{1}{2}C$

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198. Prove that the mid-point of the hypotenuse of a right triangle is equidistant from its vertices.

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199. AB is a diameter of a circle with centre O and radius OD is perpendicular to AB. If C is any point on arc DB, find $\angle BAD$ and $\angle ACD$.

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200. In Figure, P, is any point on the chord BC of a circle such that $AB = AP$. Prove that $CP = CQ$.

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201. In Figure, AB is a diameter of the circle, CD is a chord equal to the radius of the circle. AC and BD when extended intersect at a point E. Prove that $\angle AEB$=60°

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202. In Figure, O is the centre of the circle. If $\angle APB = 50^0$, find $\angle AOB \text{ and } \angle OAB$

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203. In Figure, it is given that O is the centre of the circle and $\angle AOC = 150^\circ$. Find $\angle ABC$

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204. In Figure, O is the centre of the circle. Find $\angle BAC$

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205. If O is the center of the circle, find the value of x in each of the following figures:

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206. If O is the circumcentre of $\triangle ABC$ and $OD \perp BC$, prove that $\angle BOD = \angle A$

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207. In the figure, O is the center of the circle and BO is the bisector of $\angle ABC$ show that AB=BC

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208. In Figure, O is the centre of the circle, prove that $\angle x = \angle y + \angle z$

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209. In Figure, $O \, and \, O'$ are centres of two circles intersecting at $B \, and \, C$. ACD is a straight line, find x.

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210. In Figure, O is the centre of a circle and PQ is a diameter. If $\angle ROS = 40^0$, find $\angle RTS$

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211. In Figure, if $\angle ACB = 40^\circ$, $\angle DPB = 120^\circ$, find $\angle CBD$

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212. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

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213. In Figure, $PQRS$ is a cyclic quadrilateral. Find the measure of each of its angles.

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214. In Figure, if $\angle DBC = 70^\circ \ and \ \angle BAC = 30^\circ$, find $\angle BCD$. Further, if $AB = BC$, find $\angle ECD$

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215. In Figure, $ABCD$ is a cyclic quadrilateral; O is the centre of the circle. If $\angle BOD = 160^0$, find the measure of $\angle BPD$

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216. In Figure, ABC is an isosceles triangle with $AB = AC \ and \ m \angle ABC = 50^0$. Find $m \angle BDC \ and \ \angle BEC$

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217. In Figure, $ABCD$ is a cyclic quadrilateral whose side AB is a diameter of the circle through A, B, C, D. If $(\angle ADC) = 130^0$, find

$\angle BAC$

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218. In Figure, $C\ and\ D$ are points on the semi-circle described on BA as diameter. Given $m\angle BAD = 70^\circ\ and\ m\angle DBC = 30^\circ$. Calculate $\angle ABD\ and\ \angle BDC$.

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219. In Figure, O is the centre of the circle. The angle subtended by the arc BCD at the centre is $140^0 \dot{B}C$ is produced to P. Determine $\angle BAD\ and\ \angle DCP$

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220. In Figure, $BD = DC\ and\ \angle DBC = 25^0$ find the measure of $\angle BAC$

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221. Prove that any cyclic parallelogram is a rectangle.

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222. If diagonals of a cyclic quadrilateral are diameters of the circle through the vertices of the quadrilateral, prove that it is a rectangle.

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223. Two circles intersect at two points B and C. Through B, two line segments ABD and PBQ are drawn to intersect the circles at A, D and P, Q respectively (see Figure). Prove that $\angle ACP = \angle QCD$.

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224. $AC\ and\ BD$ are chords of a circle which bisect each other. Prove that

(i) $AC\ and\ BD$ are diameters

(ii) $ABCD$ is a rectangle

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225. $ABCD$ is a parallelogram. The circle through $A, BandC$ intersects CD produced at $E,$ prove that $AE = AD.$

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226. In Figure, $A,\ B,\ C\ and\ D,\ E,\ F$ are two sets of collinear points. Prove that $AD\ ||\ CF$

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227. In Figure, $ABCD$ is a cyclic quadrilateral. A circle passing through $A\ and\ B$ meets $AD\ and\ BC$ in the points $E\ and\ F$ respectively. Prove that $EF \mid\mid DC$

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228. ABC is an isosceles triangle in which $AB = AC$. If $D\ and\ E$ are the mid-points of $AB\ and\ AC$ respectively, Prove that the points $B,\ C,\ D\ and\ E$ are concyclic.

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229. D and E are points on equal sides AB and AC of an isosceles triangle ABC such that $AD = AE$. Prove that B, C, D, E are concylic.

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230. $DandE$ are, respectively, the points on equal sides $ABandAC$ of an isosceles triangle ABC such that $B, C, EandD$ are concyclic as shown in Figure. If O is the point of intersectionof $CDandBE,$ prove that AO is the bisector of line segment DE.

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231. $ABCD$ is a cyclic quadrilateral. $ABandDC$ are produced to meet in E. Prove that $EBC\sim EDA$.

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232. In an isosceles triangle ABC with $AB = AC,$ a circle passing through $B\ and\ C$ intersects the sides $AB\ and\ AC$ at $D\ and\ E$ respectively. Prove that $DE \| BC.$

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233. In Figure, $\angle A = 60^0 \; and \; \angle ABC = 80^0,$ find $\angle DPC \; and \; \angle BQC$

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234. AB is a diameter of a circle $C(O, \; r)$. Chord CD is equal to radius OC. If $AC \; and \; BD$ when produced intersect at $P,$ prove that $\angle APB$ is constant.

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235. $PQ \; and \; RS$ are two parallel chords of a circle and lines $RP \; and \; SQ$ intersect each other at O as shown in Figure. Prove that $OP = OQ$

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236. $ABCD$ is a cyclic quadrilateral whose diagonals $AC \; and \; BD$ intersect at P. If $AB = DC,$ prove that:

(i) $PAB \cong PDC$

(ii) $PA = PD \, and \, PC = PB$

(iii) $AD \, | \, | \, BC$

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237. P is a point on the side BC of a triangle ABC such that $AB = AP$. Through $A \, and \, C,$ lines are drawn parallel to $BC \, and \, PA,$ respectively, so as to intersect at D as shown in Figure. Show that $ABCD$ is a cyclic quadrilateral.

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238. ABC is a triangle in which $AB = AC \, and \, P$ is a point on AC. Through C a line is drawn to intersect BP produced at Q such that $\angle ABQ = \angle ACQ$. Prove that: $\angle AQC = 90^\circ + \frac{1}{2}\angle BAC$

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239. In any triangle ABC, if the angle bisector of $\angle A$ and perpendicular bisector of BC intersect, prove that they intersect on the circumcircle of the triangle ABC.

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240. Let the vertex of an angle ABC be located outside a circle and let the sides of the angle intersect equal chords AD and CE with the circle. Prove that $\angle ABC$ is equal to half the difference of the angles subtended by the chords AC and DE at the centre.

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241. In Figure, ABC is an equilateral triangle. Find $m\ \angle BEC$

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242. In Figure, O is the centre of the circle. If $\angle BOD = 160^\circ$, find the values of $x \ and \ y$

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243. In Figure $ABCD$ is a cyclic quadrilateral. If $\angle BCD = 100^0 and \angle ABD = 70^0$, find $\angle ADB$

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244. If $ABCD$ is a cyclic quadrilateral in which $AD \mid \mid BC$. Prove that $\angle B = \angle C$

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245. In Figure, O is the centre of the circle. Find $\angle CBD$

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246. $AB\ and\ CD$ are diameters of a circle with centre O. If $\angle OBD = 50^0$, find $\angle AOC$

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247. On a semi-circle with AB as diameter, a point C is taken, so that $m\ (\angle CAB) = 30^0$. Find $m\ (\angle ACB) and\ m(\angle ABC)$

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248. In a cyclic quadrilateral $ABCD$, if $AB\ ||\ CD\ and\ \angle B = 70^0$, find the remaining angles.

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249. In a cyclic quadrilateral $ABCD$, if $\angle A = 3\angle C$. Find $\angle A$

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250. In Figure, O is the centre of the circle and $\angle DAB = 50^0$. Calculate the values of $x \; and \; y$

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251. In Figure, if $\angle BAC = 60^0 \; and \; \angle BCA = 20^0$, find $\angle ADC$

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252. In Figure, if ABC is an equilateral triangle. Find $\angle BDC \; and \; \angle BEC$

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253. In Figure, O is the centre of the circle. If $\angle CEA = 30^0$, find the values of $x, \; y \; and \; z$

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254. In Figure, $\angle BAD = 78^0$, $\angle DCF = x^0 and \angle DEF = y^0$. Find the value of $x \ and \ y$

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255. In a cyclic quadrilateral $ABCD$, if $\angle A - \angle C = 60^0$, prove that the smaller of two is 60^0

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256. In Figure, $ABCD$ is a cyclic quadrilateral. Find the value of a and b.

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257. $ABCD$ is a cyclic quadrilateral in which: $BCisparalleltoAD$, $\angle ADC = 110^0 \ and \ \angle BAC = 50^0$. Find $\angle DAC$.

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258. Prove that the perpendicular bisectors of the sides of a cyclic quadrilateral are concurrent.

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259. Prove that the centre of the circle circumscribing the cyclic rectangle $ABCD$ is the point of intersection of its diagonals.

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260. Prove that the circle drawn with any side of a rhombus as a diameter, passes through the point of intersection of its diagonals.

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261. If the two sides of a pair of opposite sides of a cyclic quadrilateral are equal, prove that its diagonals are equal.

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262. $ABCD$ is a cyclic quadrilateral in which $BA\ and\ CD$ when produced meet in $E\ and\ EA = ED$. Prove that: (i)$ADisparalleltoBC$ (ii) $EB = EC$

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263. Prove that the angle in a segment greater than a semi-circle is less than a right angle.

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264. $ABCD$ is a cyclic trapezium with $AD \| BC$. If $\angle B = 70^0$, determine other three angles of the trapezium.

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265. Prove that the line segment joining the mid-point of the hypotenuse of a right triangle to its opposite vertex is half of the hypotenuse.

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266. $ABCD$ is a cyclic quadrilateral in which $AC \, and \, BD$ are its diagonals. If $\angle DBC = 55^0 \, and \, \angle BAC = 45^0$, find $\angle BCD$

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267. In Figure, two circles intersect at $A \, and \, B$. The centre of the smaller circle is O and it lies on the circumference of the larger circle. If

$\angle APB = 70^0$, find $\angle ACB$

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268. In Figure, two congruent circles with centres $O\ and\ O'$ intersect at $A\ and\ B$. If $\angle AO'B = 50^0$, then find $\angle APB$

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269. $ABCD$ is a cyclic quadrilateral in which $\angle BAD = 75^0$, $\angle ABD = 58^0 and\ \angle ADC = 77^0$, $AC\ and\ BD$ intersect at P. then, find $\angle DPC$

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270. In Figure, if $\angle AOB = 80^0 and\ \angle ABC = 30^0$, then find $\angle CAO$

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271. If O is the circumcentre of ABC, then find the value of $\angle OBC + \angle BAC$

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272. If Figure, AOC is a diameter of the circle and arc $AXB = \frac{1}{2}$ arc BYC. Find $\angle BOC$

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273. In Figure, A is the centre of the circle. $ABCD$ is a parallelogram and CDE is a straight line. Find $\angle BCD : \angle ABE$.

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274. In Figure, AB is a diameter of the circle such that $\angle A = 35^0 and \angle Q = 25^0$, find $\angle PBR$

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275. In Figure, $P\ and\ Q$ are centres of two circles intersecting at $B\ and\ C$. ACD is a straight line. Then, $\angle BQD =$

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276. In Figure, $ABCD$ is quadrilateral inscribed in a circle with centre O. CD is produced to E such that $\angle ADE = 95^0 and\ \angle OBA = 30^0$. Find $\angle OAC$.

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277. If the length of a chord of a circle is 16 cm and is at a distance of 15 cm from the centre of the circle, then the radius of the circle is 15 cm

(b) 16 cm (c) 17 cm (d) 34 cm

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278. The radius of a circle is 6 cm. The perpendicular distance from the centre of the circle to the chord which is 8 cm in length, is

A. $\sqrt{5}cm$

B. $2\sqrt{5}cm$

C. $2\sqrt{7}cm$

D. $\sqrt{7}cm$

Answer: B

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279. If O is the centre of a circle with radius r and AB is a chord of the circle at a distance $\frac{r}{2}$ from O, then $\angle BAO =$

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280. $ABCD$ is a cyclic quadrilateral such that $\angle ADB = 30^0 and \angle DCA = 80^0$, the $\angle DAB =$ (A)70^0 (b) 100^0 (c) 125^0 (d) 150^0

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281. A chord of length 14cm is at a distance of 6 cm from the center of the circle. The length of another chord at a distance of 2cm from the center of the circle is

A. 12 cm

B. 14 cm

C. 16 cm

D. 18 cm

Answer: D

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282. One chord of a circle is known to be 10 cm. The radius of this circle must be

A. 5 cm

B. greater than 5 cm

C. greater than or equal to 5 cm

D. less than 5 cm

Answer: C

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283. ABC is a triangle with B as right angle, $AC = 5\,cm\ and\ AB = 4\,cm.$ A circle is drawn with A as centre and AC as radius. The length of the chord of this circle passing through $C\ and\ B$ is (a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cm

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284. If $AB,\ BC\ and\ CD$ are equal chords of a circle with O as centre and AD diameter, then $\angle AOB =$ (a) 60^0 (b) 90^0 (c) 120^0 (d) none of these

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285. Let C be the mid-point of an arc AB of a circle such that $m\ \hat{A}B = 183^0$. If the region bounded by the arc ACB and line segment AB is denoted by S, then the centre O of the circle lies (a) in the interior of S (b) in the exterior of S on the segment AB (d) on AB and bisects AB

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286. In a circle, the major arc is 3 times the minor arc. The corresponding central angles and the degree measures of two arcs are (a) $90^0 and\ 270^0$ (b) $90^0 and\ 90^0$ (c) $270^0 and\ 90^0$ (d) $60^0 and\ 210^0$

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287. If $A\ and\ B$ are two points on a circle such that $m\left(\widehat{AB}\right) = 260^0$. A possible value for the angle subtended by arc BA at a point on the circle is (a)100^0 (b) 75^0 (c) 50^0 (d) 25^0

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288. An equilateral triangle ABC is inscribed in a circle with centre O. The measures of $\angle BOC$ is

A. 30°

B. 60°

C. 120°

D. 90°

Answer: C

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289. In a circle with centre O, AB and CD are two diameters perpendicular to each other. The length of chord AC is

A. $2AB$

B. $\sqrt{2}AB$

C. $\frac{1}{2}AB$

D. $\frac{1}{\sqrt{2}}AB$

Answer: D

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290. Two equal circles of radius r intersect such that each passes through the centre of the other. The length of the common chord of the circles is

$\sqrt{r}$ (b) $\sqrt{2}\,r$ AB (c) $\sqrt{3}\,r$ (d) $\frac{\sqrt{3}}{2}\,r$

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291. If AB is a chord of a circle, $P\ and\ Q$ are the two points on the circle different from $A\ and\ B,$ then which is correct.

(i) $\angle APB = \angle AQB$

(ii) $\angle APB + \angle AQB = 180^0$ or $\angle APB = \angle AQB$

(iii)$\angle APB + \angle AQB = 90^0$

(iv) $\angle APB + \angle AQB = 180^0$

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292. If two diameters of a circle intersect each other at right angles, then quadrilateral formed by joining their end points is a

A. Rhombus

B. rectangle

C. square

D. parallelogram

Answer: C

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293. If ABC is an arc of a circle and $\angle ABC = 135^0$, then the ratio of arc $\widehat{A}BC$ to circumference is (a) 1:4 (b) 3:4 (c) 3:8 (d) 1:2

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294. The chord of a circle is equal to its radius. The angle subtended by this chord at the minor arc of the circle is

A. 60°

B. 75°

C. 120°

D. 180°

Answer: A

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295. $PQRS$ is a cyclic quadrilateral such that PR is a diameter of the circle. If $\angle QPR = 67^0 \; and \; \angle SPR = 72^0,$ then $\angle QRS =$ (a) 41^0 (b) 23^0 (c) 67^0 (d) 18^0

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296. If $A,\ B,\ C$ are three points on a circle with centre O such that $\angle AOB = 90^0$ and $\angle BOC = 120^0,$ then $\angle ABC =$ (a)60^0 (b) 75^0 (c) 90^0 (d) 135^0

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297. $AB \; and \; CD$ are two parallel chords of a circle with centre O such that $AB = 6 \; cm \; and \; CD = 12 \; cm.$ The chords are on the same side of the centre and the distance between them is 3 cm. The radius of the circle is (a)$6 \; cm$ (b) $5\sqrt{2} \; cm$ (c) $7 \; cm$ (d) $3\sqrt{5} \; cm$

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298. In a circle of radious 17 cm, two parallel chords are drawn on opposite side of a diameter. The distance between the chords is 23 cm. If the length of one chord is 16 cm, then the length of the other is (a) 34 cm (b) 15 cm (c) 23 cm (d) 30 cm

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299. The greatest chord of a circle is called its (a) radius (b) secant (c) diameter (d) none of these

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300. Angle formed in minor arc of a circle is

A. less than 90°

B. less than 180°

C. more than 180°

D. none of these

Answer: B

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301. Number of circles that can be drawn through three non-collinear points is (a) 1 (b) 0 (c) 2 (d) 3

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302. In Figure, O is the centre of the circle such that $\angle AOC = 130^0$, then $\angle ABC =$ (a)130^0 (b) 115^0 (c) 65^0 (d) 165^0

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303. In Figure, if chords $AB\ and\ CD$ of the circle intersect each other at right angles, then $x + y =$ (a) 45^0 (b) 60^0 (c) 75^0 (d) 90^0

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304. In Figure, If $\angle ABC = 45^0$, then $\angle AOC =$ (a) 45^0 (b) 60^0 (c) 75^0 (d) 90^0

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305. In Figure, chords AD and BC intersect each other at right angles at a point P. If $\angle DAB = 35^0$, then $\angle ADC =$ (a) 35^0 (b) 45^0 (c) 55^0 (d) 65^0

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306. In Figure, O is the centre of the circle and $\angle BDC = 42^0$. The measure of $\angle ACB$ is (a)42^0 (b) 48^0 (c) 58^0 (d) 52^0

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