**MATHEMATICS**

**PAGEMAKER10**

**Circle**

Q1. Locus of the point given by the equations x = , y =

(–1 t 1) is a

(a) Straight line

(b) Circle

(c) Ellipse

(d) Hyperbola

L1Difficulty1

Qtag Mathematics

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Q2. The equation of the circle with origin as centre passing through the vertices of an equilateral triangle whose median m of length 3a is

(a) x2 + y2 = 9a2

(b) x2 + y2 = 16a2

(c) x2 + y2 = a2

(d) None of these

L1Difficulty1

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Q3. If the line 3x + 4y – 1 = 0, touches the circle (x – 1)2 + (y – 2)2 = r2, then the value of r will be

(a) 2

(b) 5

(c)

(d)

L1Difficulty1

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Q4. The locus of a point which divides the join of A(–1, 1) and a variable point P on the circle x2 + y2 = 4 in the ratio 3:2 is :

(a) 25(x2 + y2) + 20(x – y) + 28 = 0

(b) 25(x2 + y2) + 20(x – y) – 28 = 0

(c) 20(x2 + y2) + 25(x – y) + 28 = 0

(d) None of these

L1Difficulty1

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Q5. The abscissa of A and B are the roots of the equation x2 + 2ax – b2 = 0, and their ordinates are the roots of the equation y2 + 2py – q2 = 0. The equation of the circle with AB as diameter.

(a) x2 + y2 + 2ax + 2py – b2 – q2 = 0

(b) x2 + y2 + 2ax + py – b2 – q2 = 0

(c) x2 + y2+ 2ax + 2py + b2 + q2 = 0

(d) None of these

L1Difficulty1

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Q6. Chord of contact of the point (3, 2) w.r.t. the circle x2 + y2 = 25 meets the coordinate axes in A and B. The circumcentre of triangle OAB is

(a)

(b)

(c)

(d) None of these

L1Difficulty1

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Q7. The normal at the point (3, 4) on a circle cuts at the point (–1, –2). Then the equation of the circle is

(a) x2 + y2 + 2x – 2y – 13 = 0

(b) x2 + y2 – 2x – 2y – 11 = 0

(c) x2 + y2 – 2x + 2y + 12 = 0

(d) x2 + y2 – 2x – 2y + 14 = 0

L1Difficulty1

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Q8. The tangents are drawn from the points (4, 5) to the circle x2 + y2 – 4x – 2y – 11 = 0. The area of quadrilateral formed by these tangents and radii, is

(a) 15 sq. units

(b) 75 sq. units

(c) 8 sq. units

(d) 4 sq. units

L1Difficulty1

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Q9. If a straight line through C(–) making an angle of 135° with the x – axis cuts the circle x = 5 Cos , y = 5 Sin at points A and B, then the length of AB is

(a) 3

(b) 7

(c) 10

(d) None of these

L1Difficulty1

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Q10. The number of common tangents to the circles x2 + y2 = 4 and x2 + y2 = 4 and x2 + y2 – 6x – 8y = 24 is

(a) 0

(b) 1

(c) 3

(d) 4

L1Difficulty1

Qtag Mathematics

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**Solutions**

S1. Ans. (b)

Sol.

Suppose x = and y =

Squaring ad adding both,

we get x2 + y2 = a2

S2. Ans. (d)

Sol.

Centre (0, 0), radius = 3a × = 2a

Hence circle x2 + y2 = 4a2 as centroid divides median is the ratio of 2:1.

S3. Ans. (a)

Sol.

If the line 3x + 4y – 1 = 0 touches the circle (x – 1)2 + (y – 2)2 = r2, then the perpendicular from centre of circle on line is equal to the radius of circle i.e. = r or r = 2

S4. Ans. (b)

Sol.

Suppose a point on circle is B(x1, y1) and that which divides A and B, in 3:2 is P given by

h = , k = or = x1

= y1

As (x1 y1) lies on circle x2 + y2 = 4, we get on substituting, 25(x2 + y2) + 20(x – y) – 28 = 0

S5. Ans. (a)

Sol.

Let A (x1, y1) and B (x2, y2), then

x1 + x2 = –2a

x1x2 = –b2

y1 + y2 = 2p

y1 y2 = –q2

Now find centre and radius and hence the equation of circle.

S6. Ans. (d)

Sol.

Since S(3, 2) = 9 + 4 – 25 < 0, therefore (3, 2) lies inside the circle. So these exists no chord of contact and hence OAB does not exist.

S7. Ans. (b)

Sol.

Since normal passes through the centre of the circle.

the required circle is the circle with ends of diameter as (3, 4) and (–1, –2)

Its equations is (x – 3) (x + 1) + (y – 4) (y + 2) = 0

x2 + y2 – 2x – 2y – 11 = 0

S8. Ans. (c)

Sol.

Length of each tangent

L2 = (4)2 + (5)2 – (4 × 4) – (2 × 5) – 11

L = 2

r =

r = 4

Area = L × r = 8 sq. units

S9. Ans. (c)

Sol.

Line AB is x + y = 0, which is diameter of the circle x2 + y2 = 25. Its length = 2r = 10

S10. Ans. (b)

Sol.

Circles S1 = x2 + y2 = 22, S2 = (x – 3)2 + (y – 4)2 – 72

Centre C1 = (0, 0), C2 = (3, 4)

and radii r1 = 2; r2 = 7, C1 C2 = 5, r2 – r1 = 5

i.e. Circles touch internally, Hence there is only one common tangent.

**LEVEL-II**

Q1. The equation of the circle which touches both the axes and whose radius is is

(a)

(b)

(c)

(d)

L3Difficulty3

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Q2. The area of the circle whose centre is at (1, 2) and which passes through the point (4, 6) is

(a)

(b)

(c)

(d) None of these

L3Difficulty3

Qtag Mathematics

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Q3. The centres of the circles are

(a) Same

(b) Collinear

(c) Non-collinear

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q4. The equation of a circle which touches both axes and the line and whose centre lies in the third quadrant is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q5. If one end of a diameter of the circle be (3, 4), then the other end is

(a)

(b) (1, 1)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q6. If the equation represents a circle, then the values of and are

(a) 3, 1

(b) 2, 2

(c) 3, 2

(d) 3, 4

L3Difficulty3

Qtag Mathematics

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Q7. The equation of the circle passing through the origin and cutting intercepts of length 3 and 4 units from the positive axes, is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q8. If the length of tangent drawn from the point (5, 3) to the circle be 7, then

(a) 4

(b)

(c)

(d) 13/2

L3Difficulty3

Qtag Mathematics

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Q9. The line will be a tangent to the circle if

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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Q10. The angle between the two tangents from the origin to the circle is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

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**Solutions**

S1. Ans. (a)

Sol.

Required equation is

S2. Ans. (c)

Sol.

Obviously radius =

Hence the area is given by

S3. Ans. (b)

Sol.

Centres are , and and a line passing through any two points say and is and point ( lies on it. Hence points are collinear.

S4. Ans. (c)

Sol.

The equation of circle in third quadrant touching the coordinate axes with centre and radius is and we know

Hence the required equation is

**Trick :** Obviously the centre of the circle lies in III quadrant, which is given by

S5. Ans. (c)

Sol.

Centre is (2, 3). One end is (3, 4).

divides the join of and in ratio of

Hence is

S6. Ans. (c)

Sol.

In the equation of circle, there is no term containing and coefficient of and are equal. Therefore and

S7. Ans. (d)

Sol.

Obviously the centre of the circle is

Therefore, the equation of circle is

S8. Ans. (b)

Sol.

According to the condition,

S9. Ans. (b)

Sol.

Line is tangent, if .

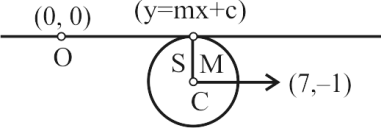
Now or is tangent, if

or

S10. Ans. (d)

Sol.

Any line through (0, 0) be and it is a tangent to circle , if

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Therefore, the product of both the slopes is

Hence the angle between the two tangents is .

**LEVEL-III**

Q1. A pair of tangents are drawn from the origin to the circle The equation of the pair of tangent is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q2. If and be the tangents to the circle drawn from the origin , then

(a) 11

(b)

(c)

(d) None of these

L5Difficulty5

Qtag Mathematics

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Q3. Equation of the pair of tangents drawn from the origin to the circle is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q4. If the line be a tangent to the circle , then the point of contact is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q5. If the length of the tangent from any point on the circle to the circle is 16 units, then the area between the two circles in sq. units is

(a) 32

(b) 256

(c) 8

(d) 16

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q6. A point inside the circle is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q7. is a chord of a circle of radius and the diameter of the circle lies along x-axis and one end of this chord in origin. The equation of the circle described on this chord as diameter is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q8. The locus of the middle points of those chords of the circle which subtend a right angle at the origin is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q9. The equation of the chord of the circle having as its mid-point is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q10. The length of the common chord of the circles and and , is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (c)

Sol.

Equation of pair of tangents is given by Here 0

S2. Ans. (b)

Sol.

Here the equation of (chord of contract) is

…(i)

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perpendicular distance from (3, 4) to line (i) is

.

S3. Ans. (d)

Sol.

Equation of pair of tangents is , where

S4. Ans. (c)

Sol.

Find points of intersection by simultaneously solving for and from and which comes out as

S5. Ans. (b)

Sol.

The length of tangent drawnj from any point on the circle to the circle is given circles and

length of tangent

=

difference in area

S6. Ans. (b)

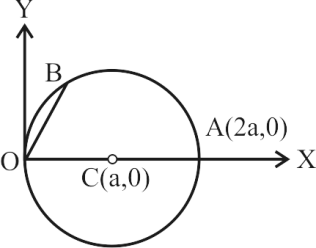
Sol.

Point is inside, outside or on the circle as is For point

S7. Ans. (b)

Sol.

Here the equation of circle is

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Now the point of intersection of circle and chord Put in equation of circle and solve it.

and are and .

Hence the equation of circle (as chord as diameter) is

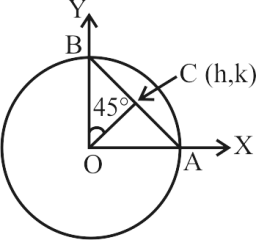
**Aliter :** Equation of circle

d Centre of this circle lies on we get .

S8. Ans. (c)

Sol.

Let the mid-point of chord is Also radius of circle is 2. Therefore

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Hence, locus is

S9. Ans. (c)

Sol.

is the equation of desired chord, hence

S10. Ans. (b)

Sol.

Let the equations of circle are

and

Then the equation of common chord is

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Here, and

Perpendicular distance from to the common chord

Now,

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