Equation of a Circle - Worksheet

Skill

Group A - State the radius of the circle

1) $x^2 + y^2 = 4$

2) $x^2 + y^2 = 9$

3) $x^2 + y^2 = 25$

4) $x^2 + y^2 = 36$

5) $x^2 + y^2 = 144$

6) $x^2 + y^2 - 144 = 0$

7) $x^2 + y^2 - 36 = 0$

8) $x^2 + y^2 - ¼ = 0$

9) $x^2 + y^2 = 1$

Group B - Write the equation of the circle

1) Radius = 2 , Centre = $(0, 0)$

2) Radius = 4 , Centre = $(0, 0)$

3) Radius = 3, Centre = $(0, 0)$

4) Radius = 6 , Centre = $(0, 0)$

5) Radius = 12, Centre = $(0, 0)$

6) Radius = 15, Centre = $(0, 0)$

7) Radius = 0.5, Centre =$(0, 0)$

8) Radius = $\sqrt{5}$, Centre = $(0, 0)$

9) Radius = $\sqrt{20}$, Centre =$(0, 0)$

Group C - Extension - State the centre and the radius of the circle

1) $(x - 2)^2 + (y + 2)^2 = 4$

2) $x^2 - 4x + 4 + y^2 + 4y + 4 = 4$

3) $(x + 3)^2 + (y - 5)^2 = 9$

4) $x^2 + 6x + 9 + y^2 - 10y + 25 = 9$

5) $x^2 = 9 - y^2$

6) $0 = 9 - y^2 - x^2$

7) $(x - \frac{3}{2})^2 + (y - \frac{5}{7})^2 = \frac{25}{16}$

8) $(x - \sqrt{7})^2 + y^2 = 8\sqrt{2}$

9) $(x - a)^2 + (y + b)^2 = c^2$

Equation of a Circle - Worksheet

Applied

1) Does $(4, 2)$ lie on the circle with the equation $x^2 + y^2 = 25$?

2) Does $(3, 9)$ lie on the circle with the equation $x^2 + y^2 = 90$?

3) Find where the circle $x^2 + y^2 = 36$ meets the x axis.

4) Find where the circle $x^2 + y^2 = 144$ meets the y axis.

5) Write down the equation of the circle with:

- a centre at $(0, 0)$
- a radius of $2\sqrt{2}$

6) Write down the equation of the circle with:

- a centre at $(0, 0)$
- a radius of 2.5

Give your answer in the form $x^2 + y^2 + c = 0$ where c is a constant.

Equation of a Circle - Exam Questions

1) A circle C has the equation $x^2 + y^2 = 10$

Point P lies on the circle and has an x coordinate of 1. Its y coordinate is positive.

The tangent P intersects the x-axis at point Q.

Find the coordinates of Q.

.....

(5 marks)

---

2) A circle C has its centre at $(0, 0)$

The circumference of the circle is 20π.

Find the equation of the circle.

.....

(4 marks)

Equation of a Circle - Exam Questions

3) The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point A $(2, 6)$. The line l crosses the x-axis at the point P.

Find the area of OAP.

.....cm^2

(5 marks)

Equation of a Circle - Answers

	Question	Answer
	Skill Questions	
Group A	State the radius of the circle **1)** $x^2 + y^2 = 4$ **2)** $x^2 + y^2 = 9$ **3)** $x^2 + y^2 = 25$ **4)** $x^2 + y^2 = 36$ **5)** $x^2 + y^2 = 144$ **6)** $x^2 + y^2 - 144 = 0$ **7)** $x^2 + y^2 - 36 = 0$ **8)** $x^2 + y^2 - ¼ = 0$ **9)** $x^2 + y^2 = 1$	 **1)** 2 **2)** 3 **3)** 5 **4)** 6 **5)** 12 **6)** 12 **7)** 6 **8)** 0.5 or $\frac{1}{2}$ **9)** 1
Group B	Write the equation of the circle **1)** Radius = 2 , Centre = $(0, 0)$ **2)** Radius = 4 , Centre = $(0, 0)$ **3)** Radius = 3, Centre = $(0, 0)$ **4)** Radius = 6 , Centre = $(0, 0)$ **5)** Radius = 12, Centre = $(0, 0)$ **6)** Radius = 15, Centre = $(0, 0)$ **7)** Radius = 0.5, Centre = $(0, 0)$ **8)** Radius = $\sqrt{5}$, Centre = $(0, 0)$ **9)** Radius = $\sqrt{20}$, Centre = $(0, 0)$	 **1)** $x^2 + y^2 = 4$ **2)** $x^2 + y^2 = 16$ **3)** $x^2 + y^2 = 9$ **4)** $x^2 + y^2 = 36$ **5)** $x^2 + y^2 = 144$ **6)** $x^2 + y^2 = 225$ **7)** $x^2 + y^2 = 0.25$ **8)** $x^2 + y^2 = 5$ **9)** $x^2 + y^2 = 20$

Equation of a Circle- Answers

Group C	State the centre and the radius of the circle **1)** $(x-2)^2+(y+2)^2=4$ **2)** $x^2-4x+4+y^2+4y+4=4$ **3)** $(x+3)^2+(y-5)^2=9$ **4)** $x^2+6x+9+y^2-10y+25=9$ **5)** $x^2=9-y^2$ **6)** $0=9-y^2-x^2$ **7)** $(x-\frac{3}{2})^2+(y-\frac{5}{7})^2=\frac{25}{16}$ **8)** $(x-\sqrt{7})^2+y^2=8\sqrt{2}$ **9)** $(x-a)^2+(y+b)^2=c^2$	**1)** Radius = 2 ,Centre = $(2,-2)$ **2)** Radius = 2, Centre = $(2,-2)$ **3)** Radius = 3 , Centre = $(-3,5)$ **4)** Radius = 3 , Centre = $(-3,5)$ **5)** Radius = 3, Centre = $(0,0)$ **6)** Radius = 3, Centre = $(0,0)$ **7)** Radius = $\frac{5}{4}$, Centre =$(\frac{3}{2},\frac{5}{7})$ **8)** Radius =3. 36 (2dp), Centre = $(\sqrt{7},0)$ **9)** Radius =c, Centre=(a,-b)

Equation of a Circle- Answers

	Question	Answer
	Applied Questions	
1)	Does $(4, 2)$ lie on the circle with the equation: $x^2 + y^2 = 25$	No because $4^2 + 2^2 \neq 25$
2)	Does $(3, 9)$ lie on the circle with the equation: $x^2 + y^2 = 90$	Yes, because $3^2 + 9^2 = 90$
3)	Find where the circle $x^2 + y^2 = 36$ meets the x axis	At x axis $y = 0$ Radius of circle is 6 Meets x axis at $(6, 0)$ and $(-6, 0)$
4)	Find where the circle $x^2 + y^2 = 144$ meets the y axis	At x axis $x = 0$ Radius of circle is 12 Meets x axis at $(0, 12)$ and $(0, -12)$
5)	Write down the equation of the circle with: • a centre at $(0, 0)$ • a radius of $2\sqrt{2}$	$(2\sqrt{2})^2 = 8$ $x^2 + y^2 = 8$
6)	Write down the equation of the circle with: • a centre at $(0, 0)$ • a radius of 2.5 Give your answer in the form $x^2 + y^2 + c = 0$ where c is a constant	$2.5^2 = 6.25$ or $\frac{25}{4}$ $x^2 + y^2 = \frac{25}{4}$ Rearrange equation $x^2 + y^2 - \frac{25}{4} = 0$

Equation of a Circle - Answers

	Question	Answer	
	Exam Questions		
1)	A circle C has the equation $x^2 + y^2 = 10$ Point P lies on the circle and has an x coordinate of 1. Its y coordinate is positive. The tangent P intersects the x-axis at point Q. Find the coordinates of Q	P $(1, 3)$ Gradient of OP is $\frac{3-0}{1-0} = 3$ Gradient of PQ is $-\frac{1}{3}$ PQ has equation of $y = -\frac{1}{3}x + \frac{10}{3}$ $0 = -\frac{1}{3}x + \frac{10}{3}$ $\frac{1}{3}x = \frac{10}{3}$ $x = 10$ Q $(10,\ 0)$	**(1)** **(1)** **(1)** **(1)** **(1)**
2)	A circle C has its centre at $(0, 0)$ The circumference of the circle is 20π. Find the equation of the circle	$20\pi = \pi \times 2r$ $r^2 = 100$ $x^2 + y^2 = their\ r^2$ $x^2 + y^2 = 100$	**(1)** **(1)** **(1)** **(1)**
3)	The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point $A\ (2, 6)$ The line l crosses the x axis at the point P. Find the area of OAP.	Centre of circle $(0, 0)$ Height of OAP : 2 $= -\frac{1}{3}x + \frac{20}{3}$ $x = 20$ $P(20, 0)$ Area of Triangle $= 0.5 \times 20 \times 6$ Area of OAP = 60	 **(1)** **(1)** **(1)** **(1)** **(1)**