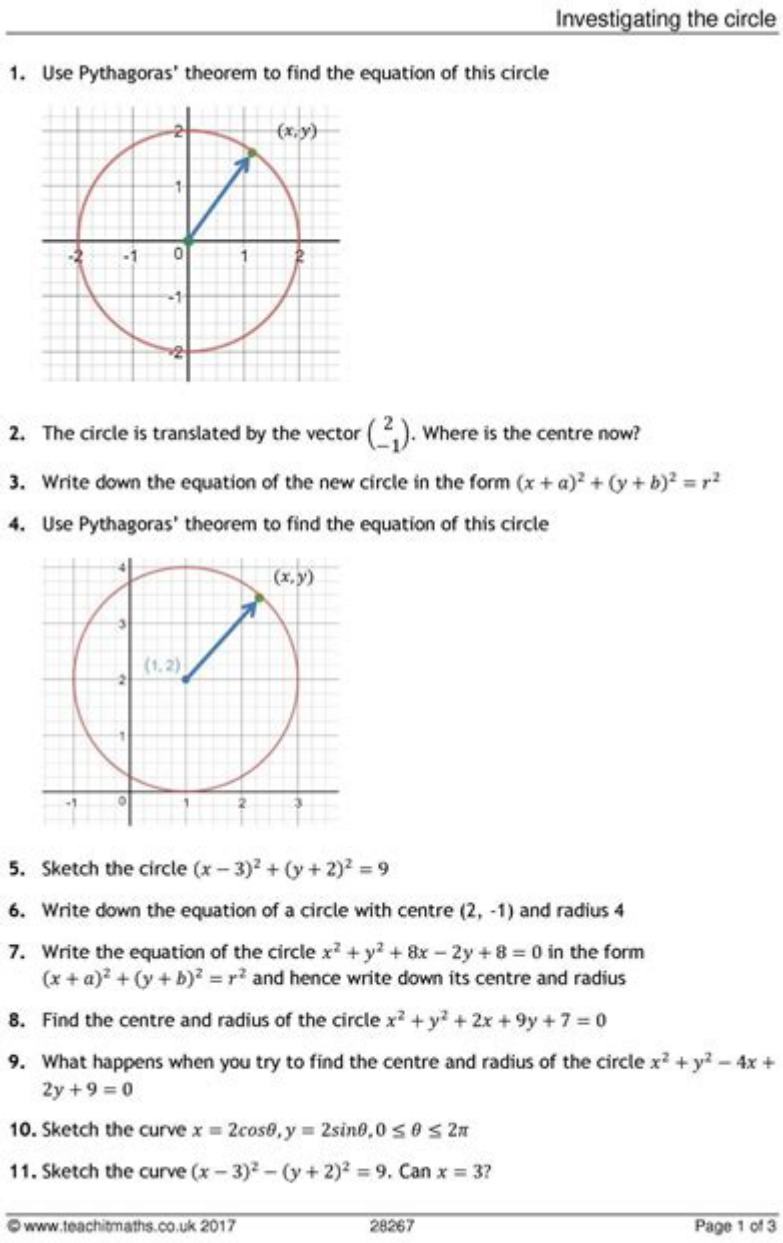
Equations Of Circles Worksheet With Answers



Investigating the circle

1. Use Pythagoras' theorem to find the equation of this circle

2. The circle is translated by the vector $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$. Where is the centre now?
3. Write down the equation of the new circle in the form $(x+a)^2+(y+b)^2=r^2$
4. Use Pythagoras' theorem to find the equation of this circle

5. Sketch the circle $(x-3)^2+(y+2)^2=9$
6. Write down the equation of a circle with centre (2, -1) and radius 4
7. Write the equation of the circle $x^2+y^2+8x-2y+8=0$ in the form $(x+a)^2+(y+b)^2=r^2$ and hence write down its centre and radius
8. Find the centre and radius of the circle $x^2+y^2+2x+9y+7=0$
9. What happens when you try to find the centre and radius of the circle $x^2+y^2-4x+2y+9=0$
10. Sketch the curve $x=2cos\theta, y=2sin\theta, 0\leq\theta\leq 2\pi$
11. Sketch the curve $(x-3)^2-(y+2)^2=9$. Can $x=3$?

Equations of Circles Worksheet with Answers

The study of circles is a fundamental aspect of geometry, and understanding the equations that represent them is essential for students and enthusiasts alike. This article will explore the equations of circles, how to derive them, and provide a comprehensive worksheet with answers to reinforce

learning. We will cover the standard form and general form of the circle's equation, examples of problems, and their solutions to enhance your understanding of this geometric shape.

Understanding the Circle

A circle is defined as the set of all points in a plane that are equidistant from a fixed point called the center. The distance from the center to any point on the circle is called the radius. The standard form of a circle's equation can be derived from these definitions.

The Standard Form of the Circle's Equation

The standard form of the equation of a circle with center (h, k) and radius r is given by:

$$
(x - h)^2 + (y - k)^2 = r^2
$$

- h and k are the coordinates of the center.
- r is the radius of the circle.

For example, if a circle has a center at (2, -3) and a radius of 5, the equation of the circle would be:

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

The General Form of the Circle's Equation

The general form of a circle's equation can be derived from its standard form. It is expressed as:

$$
x^2 + y^2 + Dx + Ey + F = 0
$$

Where D, E, and F are constants. To convert from the standard form to the general form, one can expand the standard equation:

$$
(x - h)^2 + (y - k)^2 = r^2
$$

Expanding this equation yields:

$$
x^2 - 2hx + h^2 + y^2 - 2ky + k^2 = r^2
$$

Rearranging gives:

$$
x^2 + y^2 - 2hx - 2ky + (h^2 + k^2 - r^2) = 0
$$

Thus, comparing coefficients, we can identify $D = -2h$, $E = -2k$, and $F = h^2 + k^2 - r^2$.

Worksheet: Equations of Circles

This section presents a worksheet with problems related to finding the equations of circles. Each question will focus on deriving the equation from given centers and radii, converting between standard and general forms, or identifying components from the equation.

Problems

1. Write the equation of a circle with center (4, 5) and radius 3.
2. Convert the standard equation $(x + 1)^2 + (y - 2)^2 = 36$ to general form.
3. Identify the center and radius of the circle given by the equation $x^2 + y^2 - 6x - 8y + 9 = 0$.
4. Find the equation of the circle with center (-3, 2) and radius 7.
5. Convert the general form equation $x^2 + y^2 + 4x - 10y + 1 = 0$ to standard form.
6. Determine the radius of the circle represented by the equation $(x - 1)^2 + (y + 4)^2 = 25$.
7. Write the equation of a circle with center (0, 0) and a radius of 10.
8. Find the center and radius of the circle given by $x^2 + y^2 + 2x - 4y + 4 = 0$.
9. Convert the equation $2x^2 + 2y^2 - 8x - 12y + 20 = 0$ to standard form.
10. Write the equation of a circle with center (1, -1) and radius 4.

Answers

1. The equation is $(x - 4)^2 + (y - 5)^2 = 9$.
2. The general form is $x^2 + y^2 + 2x - 4y - 27 = 0$.
3. The center is (3, 4) and the radius is 1.
4. The equation is $(x + 3)^2 + (y - 2)^2 = 49$.
5. The standard form is $(x + 2)^2 + (y - 5)^2 = 24$.
6. The radius is 5.
7. The equation is $x^2 + y^2 = 100$.

8. The center is (-1, 2) and the radius is 3.

9. The standard form is \((x - 2)^2 + (y - 3)^2 = 9\).

10. The equation is \((x - 1)^2 + (y + 1)^2 = 16\).

Conclusion

Understanding the equations of circles is an important aspect of geometry that has numerous applications in mathematics and real-life situations. This worksheet provides a structured approach to practicing and applying the concepts associated with circles. By working through the problems and reviewing the answers, students can reinforce their knowledge of how to derive and interpret the equations of circles. Whether it's in academic settings or personal study, mastering these equations is fundamental for further studies in geometry and algebra.

Frequently Asked Questions

What is the standard form of the equation of a circle?

The standard form of the equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the center and r is the radius.

How do you convert the general form of a circle's equation to standard form?

To convert from the general form $Ax^2 + Ay^2 + Bx + Cy + D = 0$ to standard form, complete the square for x and y terms.

What information can be derived from the equation $(x - 3)^2 + (y + 2)^2$

= 25?

The center of the circle is at (3, -2) and the radius is 5 (since $r^2 = 25$).

What is the radius of a circle with the equation $x^2 + y^2 - 10y + 25 = 0$?

First, rewrite it as $(x - 0)^2 + (y - 5)^2 = 0$. The radius is 0, indicating that this is actually a point circle at (0, 5).

If a circle's center is at (4, -1) and passes through the point (7, 2), how do you find its equation?

Calculate the radius using the distance formula: $r = \sqrt{[(7 - 4)^2 + (2 + 1)^2]} = \sqrt{18}$. The equation is $(x - 4)^2 + (y + 1)^2 = 18$.

How do you find the center and radius from the equation $x^2 + y^2 - 6x + 8y = 0$?

Complete the square: $(x - 3)^2 + (y + 4)^2 = 25$. The center is (3, -4) and the radius is 5.

What does the equation $(x + 1)^2 + (y - 3)^2 = 16$ represent?

This represents a circle with center at (-1, 3) and a radius of 4 (since $r^2 = 16$).

What are the steps to graph the equation of a circle?

Identify the center and radius, plot the center, use the radius to mark points in all directions, and then draw the circle.

How can you tell if two circles intersect based on their equations?

Two circles intersect if the distance between their centers is less than the sum of their radii and greater than the absolute difference of their radii.

What is the discriminant method for determining the relationship between two circles?

Find the equations of the circles in standard form and calculate the discriminant. If it's positive, they intersect; if zero, they're tangent; if negative, they don't intersect.

Equations Of Circles Worksheet With Answers

泰勒·斯威夫特（**Taylor Swift**） - 知乎
泰勒·斯威夫特（Taylor Swift），1989年12月13日出生于美国宾夕法尼亚州，美国流行音乐、乡村音乐创作型女歌手、音乐制作人、演员、慈善家。[1] 2006年发行首张录音室专辑《泰勒·斯威夫特》，获美国唱片业协会认证5倍白金唱片。2008年发行第二张录音室专辑《Fearless》，在美国公告牌专辑榜上获11 ...

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重录，就要说到2009年了，当时只有19岁的泰勒获得了最佳女歌手MV奖。当泰勒站在颁奖台上的时候，作为前辈的坎爷爬上了舞台，本来 …

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