Equation of A Circle

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Write the equation of the circle with centre (0, 0) and radius 6.

Step 1 · $x^2 + y^2 = r^2$ with r = 6

$x^2 + y^2 = 36$

Answer: $x^2 + y^2 = 36$

Check: (6, 0): 36 + 0 = 36 ✓

2. Now try one with the steps

Find the exact radius of the circle $x^2 + y^2 = 20$.

Step 1 · $r^2 = 20$

Step 2 · Simplify the surd

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Write the equation of the circle with centre (0, 0) and radius 5. [1]

2. Find the radius of the circle $x^2 + y^2 = 49$. [1]

3. Find the exact radius of the circle $x^2 + y^2 = 18$. [2]

4. Does the point (6, 8) lie on the circle $x^2 + y^2 = 100$? Show your working. [1]

5. Is the point (4, 4) inside, on or outside the circle $x^2 + y^2 = 30$? [2]

6. The point (k, 12) lies on $x^2 + y^2 = 169$, and $k > 0$. Find k. [2]

7. Write down the coordinates where $x^2 + y^2 = 64$ crosses the x-axis. [1]

8. A circle has centre (0, 0) and passes through (−2, 5). Write its equation. [2]

9. The point (3, 4) lies on $x^2 + y^2 = 25$. Find the gradient of the radius to this point. [1]

10. Find the gradient of the tangent to $x^2 + y^2 = 25$ at (3, 4). [1]

11. Find the equation of the tangent to $x^2 + y^2 = 25$ at (3, 4). [3]

12. Find the equation of the tangent to $x^2 + y^2 = 5$ at (2, −1). [3]

13. Find the equation of the tangent to $x^2 + y^2 = 13$ at (−2, 3). [3]

14. Where does the tangent in question 11 cross the y-axis? [1]

15. Show that (1, 7) lies on $x^2 + y^2 = 50$ and find the equation of the tangent at this point. [4]

4. Before you hand it in

$x^2 + y^2 = 49$ has radius 49

The equation is $x^2 + y^2 = r^2$, so $r = \sqrt{49} = 7$.

Tangent to $x^2 + y^2 = 25$ at (3, 4) has gradient 4/3

The tangent is PERPENDICULAR to the radius. Use the negative reciprocal: $-3/4$.

Circle with radius 3 written$^2 + y^2 = 3$

$x^2 + y^2 = 3^2 = 9$.

(4, 4) is inside $x^2 + y^2 = 30$ because $4 + 4 = 8 < 30$

Square each coordinate: $16 + 16 = 32$, which is more than 30, so the point is outside.