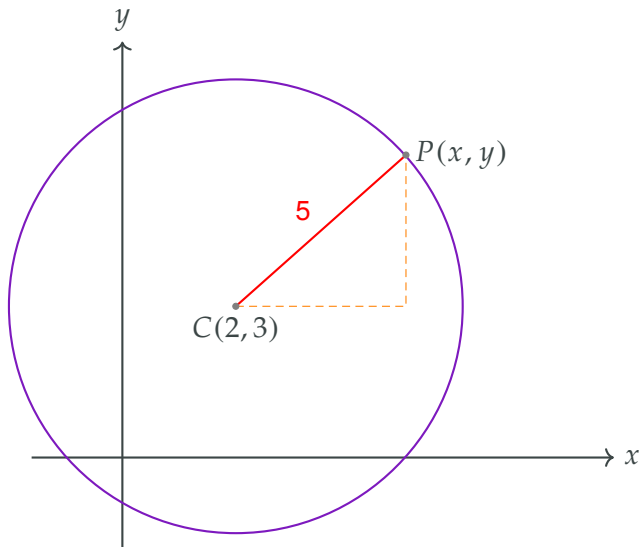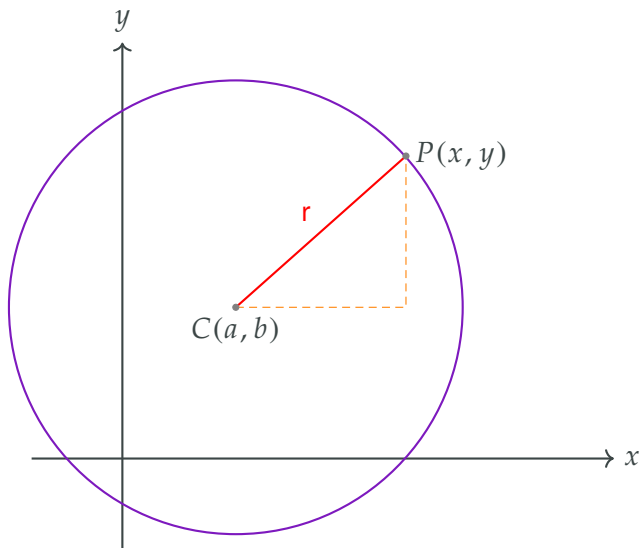circles

introduction

Circles

Circles

The equation of a circle with centre (a, b) and radius r is

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

Example

Example 1

Find the centre and radius of

a) $(x - 4)^2 + (y - 7)^2 = 36$

b) $(x + 4)^2 + (y - 7)^2 = 62$

c) $x^2 + (y + 3)^2 = 60$

Example

Example 1

Find the centre and radius of

a) $(x - 4)^2 + (y - 7)^2 = 36$

b) $(x + 4)^2 + (y - 7)^2 = 62$

c) $x^2 + (y + 3)^2 = 60$

a. $(4, 7), r = 6$

b. $(-4, 7), r = \sqrt{62}$

c. $(0, -3), r = 2\sqrt{15}$

Example

Example 2

Find the equation of the circle centred at $(4, -6)$ with a radius of 9.

Example

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Find the equation of the circle centred at $(4, -6)$ with a radius of 9.

$(x - 4)^2 + (y + 6)^2 = 81$

completing the square

Exercise

Write the following in the form $p(x + q)^2 - r$ where p, q and r are constants.

a) $x^2 + 4x$

b) $y^2 - 6y + 2$

c) $3x^2 + 12x + 23$

Exercise

Write the following in the form $p(x + q)^2 - r$ where p, q and r are constants.

a) $x^2 + 4x$

b) $y^2 - 6y + 2$

c) $3x^2 + 12x + 23$

a. $(x + 2)^2 - 4$ b. $(y - 3)^2 - 7$ c. $3(x + 2)^2 + 11$

sketching circles

Example

Example 3

Sketch the graph of $x^2 + y^2 - 4x + 6y - 87 = 0$

Example

Example 3

Sketch the graph of $x^2 + y^2 - 4x + 6y - 87 = 0$

$(x - 2)^2 + (y + 3)^2 = 10^2$

tangents and circles

Example

Example 4

Find the tangent to the circle $x^2 + y^2 - 4x - 6y - 87 = 0$ at $(8, 11)$.

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Find the tangent to the circle $x^2 + y^2 - 4x - 6y - 87 = 0$ at $(8, 11)$.

circle: $(x - 2)^2 + (y - 3)^2 = 10^2$
$m_1 = \frac{4}{3}$
tangent: $y = -\frac{3}{4}x + 17$ or $3x + 4y - 68 = 0$