Circles and other simple relations

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. State the centre and radius of $(x-4)^2+(y+1)^2=9$. [2 marks]

Read the bracket signs and take the positive square root of 9.

Answer: Centre $(4,\,-1)$, radius 3.

2. Write the equation of a circle centred at $(-2,3)$ with radius 5. [2 marks]

Insert $h=-2$, $k=3$ and $r^2=25$.

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

3. Does $(3,4)$ lie on $x^2+y^2=25$? Explain. [2 marks]

$3^2+4^2=9+16=25$.

Answer: Yes.

4. Find the x-intercepts of $(x-1)^2+y^2=9$. [2 marks]

Set $y=0$: $(x-1)^2=9$, so $x-1=\pm3$.

Answer: $(-2,0)$ and $(4,0)$.

5. Write the lower semicircle of $x^2+y^2=16$, including domain and range. [2 marks]

Select the negative square-root branch.

Its x-values run across the diameter, while its outputs run from -4 to 0.

Answer: $y=-\sqrt{16-x^2}$; domain $[-4,4]$, range $[-4,0]$.

6. A circular sprinkler reaches 6 m from a nozzle at $(2,1)$ on a metre grid. Give its boundary equation and decide whether $(7,4)$ lies inside. [2 marks]

Its squared distance from the nozzle is $5^2+3^2=34<36$.

Thus its distance is less than 6 m.

Answer: Boundary $(x-2)^2+(y-1)^2=36$; $(7,4)$ is inside.