

19) Use the technique of completing the square to find the standard form of the equation of this circle:

$$\begin{aligned}(x^2 - 12x) + 15 + (y^2 + 8y) - 1 &= 20 \\(x^2 - 12x + 36) - 36 + 15 + (y^2 + 8y + 16) - 16 - 1 &= 20 \\(x - 6)^2 - 21 + (y + 4)^2 - 17 &= 20 \\(x - 6)^2 + (y + 4)^2 &= 58\end{aligned}$$

Standard form: _____ center: $(6, -4)$ radius: $\sqrt{58}$

Use the information provided to write the standard form of the equation of each circle:

20) $8x + x^2 - 2y = 64 - y^2$

$$x^2 + 8x + 16 + y^2 - 2y + 1 = 64 + 17$$

$$(x+4)^2 + (y-1)^2 = 81$$

21) $137 + 6y = -y^2 - x^2 - 24x$

$$(x^2 + 24x + 144) - 144 + (y^2 + 6y + 9) - 9 + 137 = 0$$

$$(x+12)^2 + (y+3)^2 = 16$$

22) $x^2 + y^2 + 14x - 12y + 4 = 0$

$$(x^2 + 14x + 49) - 49 + (y^2 - 12y + 36) - 36 + 4 = 0$$

$$(x+7)^2 + (y-6)^2 = 81$$

23) $y^2 + 2x + x^2 = 24y - 120$

$$(x^2 + 2x + 1) - 1 + (y^2 - 24y + 144) - 144 = -120$$

$$(x+1)^2 + (y-12)^2 = 25$$

24) $x^2 + 2x + y^2 = 55 + 10y$

$$(x^2 + 2x + 1) - 1 + (y^2 - 10y + 25) - 25 = 55$$

$$(x+1)^2 + (y-5)^2 = 81$$

25) $8x + 32y + y^2 = 263 - x^2$

$$(x^2 + 8x + 16) - 16 + (y^2 + 32y + 256) - 256 = 263$$

$$(x+4)^2 + (y+16)^2 = 535$$