

8.1 Parabola day 3 page 641-642 50, 52, 54, 55, 67-70 all

50. Completing the square produces $2\left(y - \frac{7}{6}\right) = (x - 1)^2$.

The vertex is $(h, k) = \left(1, \frac{7}{6}\right)$ so the focus is

$(h, k + p) = \left(1, \frac{7}{6} + \frac{1}{2}\right) = \left(1, \frac{5}{3}\right)$, and the directrix is

$y = k - p = \frac{7}{6} - \frac{1}{2} = \frac{2}{3}$. $p = \frac{2}{3}$

52. Completing the square produces $-4\left(x - \frac{13}{4}\right) = (y - 1)^2$. The vertex is

$(h, k) = \left(\frac{13}{4}, 1\right)$ so the focus is

$(h + p, k) = \left(\frac{13}{4} - 1, 1\right) = \left(\frac{9}{4}, 1\right)$, and directrix $x = \frac{17}{4}$

54. $h = 1, k = -3$, and the parabola opens to the right, so $(y + 3)^2 = 4p(x - 1)$. Using $\left(\frac{11}{2}, 0\right)$, we find

$(0 - 3)^2 = 4p\left(\frac{11}{2} - 1\right) \Rightarrow 4p = 9 \cdot \frac{2}{9} = 2$. The equation for the parabola is: $(y + 3)^2 = 2(x - 1)$.

55. $h = 2, k = -1$ and the parabola opens down so $(x - 2)^2 = 4p(y + 1)$. Using $(0, -2)$, we find that $(0 - 2)^2 = 4p(-2 + 1)$, so $4 = -4p$ and $p = -1$.

The equation for the parabola is $(x - 2)^2 = -4(y + 1)$.

67. The word "oval" does not denote a mathematically precise concept. The answer is D.

68. $(0)^2 = 4p(0)$ is true no matter what p is. The answer is D.

69. The focus of $y^2 = 4px$ is $(p, 0)$. Here $p = 3$, so the answer is B.

70. The vertex of a parabola with equation $(y - k)^2 = 4p(x - h)$ is (h, k) . Here, $k = 3$ and $h = -2$. The answer is D.

Work sheet

- 1) parabola $(y+3)^2 = \frac{1}{2}(x+13)$
- 2) ellipse $\frac{x^2}{4} + y^2 = 1$
- 3) Circle $x^2 + y^2 = 4$
- 4) ellipse $\frac{y^2}{16} + \frac{x^2}{9} = 1$
- 5) parabola $(x+1)^2 = y + b$
- 6) ellipse $\frac{(y+1)^2}{9} + \frac{(x-5)^2}{4} = 1$
- 7) circle $(x-8)^2 + y^2 = 68$
- 8) ellipse $\frac{(x+3)^2}{4} + \frac{(y-7)^2}{1} = 1$
- 9) parabola $(x-2)^2 = 8(y-4)$
- 10) circle $(x+\frac{5}{2})^2 + (y+\frac{3}{2})^2 = 9$