

Practise, Apply, Solve 7.6U, page 602

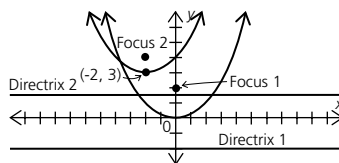
- focus: $(0, -4)$ directrix: $y = 4$
 - focus: $(-\frac{15}{4}, 0)$ directrix: $x = -\frac{15}{4}$
 - focus: $(0, \frac{1}{4})$ directrix: $y = -\frac{1}{4}$
 - focus: $(0, \frac{1}{8})$ directrix: $y = -\frac{1}{8}$
 - focus: $(2, 0)$ directrix: $x = -2$
 - focus: $(0, \frac{1}{40})$ directrix: $y = -\frac{1}{40}$
- vertex: $(0, 4)$, opens upward
 - vertex: $(2, 0)$, opens to the right
 - vertex: $(0, -12)$, opens upward
 - vertex: $(3, 0)$, opens upward
 - vertex: $(3, 2)$, opens downward
 - vertex: $(-2, 1)$, opens to the right
- $(y - 2)^2 = 4(x - 1)$, vertex: $(1, 2)$, opens to the right
 - $x^2 = 4(y + 2)$, vertex: $(0, -2)$, opens upward
 - $(x - 1)^2 = 4(y - 1)$, vertex: $(1, 1)$, opens upward
 - $(y - 3)^2 = 2(x - 1)$, vertex: $(1, 3)$, opens to the right
 - $(y - 1)^2 = 8(x + 2)$, vertex: $(-2, 1)$, opens to the right
 - $(x - 2)^2 = 2(y + 10)$, vertex: $(2, -10)$, opens upward
- Refer to the vertex and direction of opening given in Question 3 when drawing the parabolas.
 - through $(2, 0)$ and $(2, 4)$
 - through $(2\sqrt{2}, 0)$ and $(-2\sqrt{2}, 0)$
 - through $(3, 2)$ and $(-1, 2)$
 - through $(5.5, 0)$ and $(5.5, 6)$
 - through $(15, 1 + 2\sqrt{34})$ and $(15, 1 - 2\sqrt{34})$
 - through $(2 + 2\sqrt{5}, 0)$ and $(2 - 2\sqrt{5}, 0)$
 - $D = \{x | x \geq 1, x \in \mathbf{R}\}$, $R = \mathbf{R}$
 - $D = \mathbf{R}$, $R = \{y | y \geq 1, y \in \mathbf{R}\}$
 - $D = \{y | y \geq -2, y \in \mathbf{R}\}$, $R = \mathbf{R}$
 - $D = \{x | x \geq -1, x \in \mathbf{R}\}$, $R = \mathbf{R}$
 - $D = \mathbf{R}$, $R = \{y | y \geq -10, y \in \mathbf{R}\}$
 - $D = \mathbf{R}$, $R = \{y | y \geq -10, y \in \mathbf{R}\}$
- Answers will vary.
- $y^2 = 16x$
- $y^2 = 12x$
 - $x^2 = 8y$
 - $y^2 = -16x$
 - $y^2 = -2x$
- $y^2 = -2x$
 - $(-\frac{1}{2}, 0)$
 - $x = \frac{1}{2}$
- The bulb should be at the focus $(8, 0)$.
- $f > 2.25$ m
 - 1.5 m $\leq f \leq 2.25$ m
 - $f < 1.5$ m
- 301.6 cm²
- 125 cm
- $y = (x - 2)^2 - 2$: parabola opens up, vertex $(2, -2)$, y-intercept at $(0, 2)$, x-intercepts at $(2 - \sqrt{2}, 0)$ and $(2 + \sqrt{2}, 0)$;
 $y = 2 + \sqrt{x + 2}$, $y = 2 - \sqrt{x + 2}$: parabola opens right, vertex $(-2, 2)$, through $(2, 4)$ and $(2, 0)$; take the square root of both sides, then add 2 to both sides.

14. (a) $y^2 = 12(x + 1)$ (b) $x^2 = 6(y - 2.5)$

(c) $(x - 1)^2 = 4(y - 1)$

15. $\frac{(x - 1)^2}{9} - \frac{(y - 6)^2}{16} = 1$

16.



17. 10 m

18. $(x - 4)^2 = -(y - 3)$

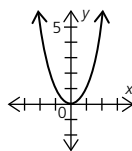
19. (a) Similarities: both equations have h s and k s and an $(x - h)^2$. Differences: second equation has $4p$ and $(y - k)$ in brackets whereas k is on the other side of the first equation.

(b) Start with the second form: $(x - h)^2 = 4p(y - k)$;

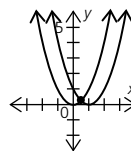
$\frac{1}{4p}(x - h)^2 = y - k$; $\frac{1}{4p}(x - h)^2 + k = y$. If $a = \frac{1}{4p}$, then we have $a(x - h)^2 + k = y$, which is same as first equation.

20. Parabolas can intersect in four ways:

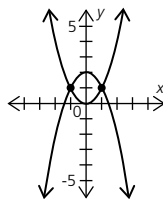
infinite points of intersection



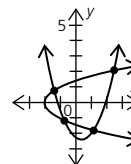
one point of intersection



two points of intersection



and four points of intersection.



21. $(-\frac{1}{3}, -\frac{20}{9})$ and $(3, -10)$