

Chapter 10

Conic Sections: READINESS FOR COLLEGE MATHEMATICS TEXT

CIRCLES

PROBLEM SET A

1. $(x - 4)^2 + (y + 1)^2 = 36$

3. $(x - 3)^2 + (y - 1)^2 = 25$

5. $(x - 3)^2 + (y - 8)^2 = 9$

7. $(x - 3)^2 + (y + 2)^2 = 81$

9. $C(0, 5); r = 4$

11. $C(-3, 0); r = 6$

13. $C\left(\frac{5}{2}, \frac{1}{2}\right); r = \frac{\sqrt{26}}{2}$

2. $x^2 + (y + 6)^2 = 32$

4. $(x + 1)^2 + (y - 5)^2 = 26$

6. $(x - 5)^2 + (y + 1)^2 = 49$

8. $(x - 5)^2 + (y + 3)^2 = 25$

10. $C(3, -7); r = 2\sqrt{5}$

12. $C(1, -4); r = 5$

14. $C(-1, 3); r = \frac{3\sqrt{6}}{2}$

PROBLEM SET B

15. $(x - 5)^2 + (y - 1)^2 = 400$

16. $(x - 2)^2 + (y + 3)^2 = 17$

17. Two solutions: $x^2 + y^2 = 25$ and $x^2 + y^2 = 225$

18. $(x - 4)^2 + (y + 6)^2 = 16; (x + 4)^2 + (y - 18)^2 = 16$

19. $(x - 5)^2 + (y - 5)^2 = 25$

PROBLEM SET C

20. $C\left(\frac{5}{\tan 22.5^\circ}, 5\right)$ or $C(5 + 5\sqrt{2}, 5)$

21. $(x - 6)^2 + (y - 7)^2 = 25$

22. $x^2 + \left(\frac{8\sqrt{15}}{2}\right)^2$

ELLIPSES**PROBLEM SET A**

1. $C(0, 0)$, $M = 20$, $m = 16$ Foci $(-6, 0)$ and $(6, 0)$
2. $C(0, 0)$, $M = 26$, $m = 10$ Foci $(0, -12)$ and $(0, 12)$
3. $C(4, -1)$, $M = 26$, $m = 24$ Foci $(4, 4)$ and $(4, -6)$
4. $C(-3, 0)$, $M = 10$, $m = 8$ Foci $(0, 0)$ and $(-6, 0)$
5. $C(0, -5)$, $M = 12$, $m = 4\sqrt{5}$ Foci $(4, -5)$ and $(-4, -5)$
6. $C(4, 3)$, $M = 10\sqrt{2}$, $m = 2$ Foci $(-3, 3)$ and $(11, 3)$
7. $C(0, 0)$, $M = 10$, $m = 4$
8. $C(0, 0)$, $M = 4$, $m = 2\sqrt{2}$
9. $C(-1, 3)$, $M = 6$, $m = 2$
10. $C(0, -2)$, $M = 10$, $m = 4$
11. $C(3, -5)$, $M = 4\sqrt{5}$, $m = 6$
12. $C(-2, 3)$, $M = 4\sqrt{2}$, $m = 2\sqrt{5}$
13. $\frac{x^2}{25} + \frac{y^2}{16} = 1$
14. $\frac{x^2}{25} + \frac{y^2}{169} = 1$

PROBLEM SET B

15. $\frac{(x-2)^2}{64} + \frac{(y-10)^2}{100} = 1$
16. $\frac{(x+3)^2}{13} + \frac{(y-5)^2}{9} = 1$
17. $M = 20$, $m = 16$
18. a) $A = 4x\sqrt{16-x^2}$ b) $\text{Max} = 32$

PROBLEM SET C

19. $\frac{(x-3)^2}{9} + \frac{(y-9)^2}{81} = 1$ or $\frac{(x+3)^2}{9} + \frac{(y+9)^2}{81} = 1$
20. $\frac{5+5\sqrt{5}}{4}$

HYPERBOLAS

PROBLEM SET A

1. $y = \pm \frac{3}{2}x, (\pm\sqrt{13}, 0)$
2. $y = \pm \frac{5}{4}x, (0, \pm\sqrt{41})$
3. $y = \pm \frac{3}{4}(x \pm 3) \pm 2; (3, 3), (3, -7)$
4. $y = \pm \frac{1}{5}(x + 3); (3 \pm \sqrt{26}, 0)$
5. $y = \pm \frac{\sqrt{2}}{2}(x + 4) + 2; (4 \pm 2\sqrt{3}, 2)$
6. $y = \pm \frac{\sqrt{2}}{2}(x + 2) \pm 3; (2, 3 \pm \sqrt{30})$
7. $C(-2, 5), t = 2, c = 4$
8. $C(-1, -4), t = 6, c = 10$
9. $C(-3, 0), t = 2\sqrt{6}, c = 6$
10. $C(1, -3), t = 2\sqrt{5}, c = 4$
11. $\frac{x^2}{64} \pm \frac{y^2}{36} = 1$
12. $\frac{(x \pm 2)^2}{36} \pm \frac{(y \pm 4)^2}{144} = 1$
13. $\frac{(x+2)^2}{9} \pm \frac{(y+5)^2}{16} = 1$
14. $\frac{(y+2)^2}{4} \pm \frac{(x+1)^2}{44} = 1$

PROBLEM SET B

15. $\frac{(y+1)^2}{16} - \frac{(x+3)^2}{36} = 1$ or $\frac{(x+3)^2}{81} - \frac{(y+1)^2}{36} = 1$
17. $(\sqrt{2}, \sqrt{2})$ and $(-\sqrt{2}, \sqrt{2})$
18. $\frac{x^2}{16} - \frac{y^2}{\tan^2 22.5} = 1$ or $\frac{x^2}{16} - \frac{y^2}{\tan^2 67.5} = 1$ $\tan 22.5^\circ$ can be replaced by the value $\sqrt{2} - 1$ and $\tan 67.5^\circ$ can be replaced by $\sqrt{2} + 1$.

PARABOLAS**PROBLEM SET A**

1. $V(0, 0); F(0, 3); y = -3$
2. $V(0, 0); F(-2, 0); x = 2$
3. $V(0, 0); F(\frac{1}{8}, 0); x = \frac{1}{8}$
4. $V(0, 0); F(0, \frac{1}{16}); y = \frac{1}{16}$
5. $V(-3, 1); F(-3, 2); y = 0$
6. $V(-2, -5); F(2, -5); x = -6$
7. $V(1, 2); F(\frac{13}{12}, 2); x = \frac{11}{12}$
8. $V(1, 2); F(1, \frac{39}{20}); y = \frac{41}{20}$
9. $x^2 = 12y$
10. $y^2 = -20x$
11. $(y - 1)^2 = -8(x - 3)$
12. $(x - 2)^2 = 12(y - 3)$
13. $V(3, 1)$ and $F(3, -1)$
14. $V(-1, 3)$ and $x = 3$

PROBLEM SET B

16. $(y - 8)^2 = 12(x - 4)$ or $(y - 8)^2 = -12(x - 10)$

17. $(x + 4)^2 = 8(y + 3)$

PROBLEM SET C

19. $(x + 3)^2 = 16(y + 1)$ or $(x + 3)^2 = -4(y - 4)$

20. $(y - 2)^2 = 16(x + 1)$

21. $A = \frac{4xc^2}{2c} \frac{x^3}{2c}$

**SECOND-DEGREE EQUATIONS
PROBLEM SET A**

1. Parabola, $x = 2(y+1)^2$

2. Ellipse, $\frac{(x+1)^2}{4} + \frac{(y+2)^2}{16} = 1$

3. Hyperbola, $\frac{(y+1)^2}{4} \pm \frac{(x+2)^2}{9} = 1$

4. Parabola, $-4(y + 1) = (x+2)^2$

5. Point, $(-3, 2)$

6. Intersecting lines, $y = \pm 2(x + 3)$

7. Circle, $(x + \frac{1}{2})^2 + (y \pm 3)^2 = 4$

8. Hyperbola, $\frac{(x+3)^2}{4} \pm \frac{(y+1)^2}{\frac{9}{4}} = 1$

9. $x^2 - 16y = 0$

10. $x^2 - 3y^2 - 40y - 48 = 0$

11. $3x^2 + 4y^2 - 28x + 32 = 0$

12. $y^2 + 4x - 6y - 3 = 0$

13. $\frac{2\sqrt{2}}{3}$

14. $\frac{\sqrt{6}}{4}$

PROBLEM SET B

15. $x = \pm 6.25$

16. $x = \frac{3}{2}$

17. $(x - 7)^2 + (y - 3)^2 = 25$ where $y \neq -2$

18. $2x^2 + 2xy + 2y^2 + 12x + 12y - 36 = 0$

19. $11x^2 - 16xy - y^2 + 36x + 32y - 436 = 0$

PROBLEM SET C

20. $x = 0.75$

21. $\frac{(x+7)^2}{25} + \frac{(y - 7)^2}{100} = 1$