Algebra II Sixth Six Weeks Exam Review (Chapters 10 and 11)

Please show all work and answers on **separate paper**. A calculator will be allowed on this test. The test will contain ~30 total questions. Test reviews are due on test day - **NO LATE REVIEWS ACCEPTED**.

- 1. Write an equation for a graph that is the set of all points in the plane that are equidistant from the point F(-5, 0) and the line x = 5.
- 2. Write an equation of a parabola with a vertex at the origin and a focus at (0, -7).
- 3. Identify the vertex, focus, and directrix of the graph of $y = \frac{1}{24} (x + 4)^2 5$.
- 4. Write an equation of a circle with center (-2, 6) and radius 8.
- 5. Find the center and radius of the circle with equation $(x + 5)^2 + (y + 4)^2 = 36$.
- 6. An elliptical track has a major axis that is 46 yards long and a minor axis that is 30 yards long. Find an equation for the track if its center is (0, 0) and the major axis is the *x*-axis.
- 7. Write an equation of the ellipse with foci at $(0, \pm 10)$ and vertices at $(0, \pm 12)$.
- 8. Find an equation that models the path of a satellite if its path is a hyperbola, a = 42,000 km, and c = 66,000 km. Assume that the center of the hyperbola is the origin and the transverse axis is horizontal.
- 9. Find the equation of a hyperbola with a = 256 units and c = 347 units. Assume that the transverse axis is horizontal. (*hint: "transverse axis" is the axis that contains the vertices and foci*)

Identify the conic section. If it is a parabola, give the vertex. If it is a circle, give the center and radius. If it is an ellipse or a hyperbola, give the center and foci.

- 10. $5x^2 + 11y^2 50x + 88y + 246 = 0$ 11. $10x^2 - 3y^2 + 100x - 18y + 193 = 0$
- 12. $x^2 + y^2 + 10x + 8y = -16$
- 13. Identify the vertex, focus and the directrix of the graph of $x^2 8x 28y 124 = 0$.

Describe the pattern in the sequence. Find the next three terms.

- 14.
 8, 11, 14, 17, ...

 15.
 5, 20, 80, 320, ...

 16.
 625, 250, 100, 40,...
- 17. Suppose you drop a tennis ball from a height of 13 feet. After the ball hits the floor, it rebounds to 90% of its previous height. How high will the ball rebound after its third bounce? Round to the nearest tenth.
- 18. Write a <u>recursive</u> formula for the sequence 3, -3, -9, -15, -21, Then find the next term.
- 19. Write a <u>recursive</u> formula for the sequence 15, 26, 48, 92, 180, Then find the next term.
- 20. Write an <u>explicit</u> formula for the sequence 7, 11, 15, 19, 23, ... Then find a_{14} .
- 21. Is the formula $a_n = -4n(n-1)$ is *explicit* or *recursive*? Find the first five terms of the sequence.

Is the sequence arithmetic? If so, identify the common difference.

- 22. 15, 20, 25, 30, ... 23. 11, 18, 39, 74, ... 24. -2.4, 9.8, 22, 34.2, ...
- 25. Find the missing term of the arithmetic sequence 26, 📃 , 30,...

Is the sequence geometric? If so, identify the common ratio.

26. 4, -12, 36, -108, ... 27. 6, -24, -96, -216, ... 28. $\frac{1}{3}, \frac{2}{9}, \frac{4}{27}, \frac{8}{81}, \frac{16}{243}, \dots$

Write the explicit formula for the sequence. Then find the fifth term (a_5) in the sequence.

29. $a_1 = -4, r = -3$ 30. $a_1 = 120, r = 0.3$

Find the missing term of the geometric sequence.

31. 48, , 432, ... 32. 1250, , 50, ...

Use the finite sequences given in #33 and #34. Write the related series. Then evaluate the series.

- 33. 26, 29, 32, 35, 38, 41, 44 34. 18, 20, 22, 24, 26, 28, 30
- 35. The sequence 29, 32, 35, 38, 41, ..., 59 has 11 terms. Evaluate the related series.
- 36. For the series $\sum_{k=4}^{13} 8k$, find the first term <u>and</u> the last term.
- 37. Use summation notation to write the series 49 + 54 + 59 + ... for 14 terms.
- 38. Use summation notation to write the series 2 + 4 + 6 + 8 + ... for 10 terms.
- 39. Evaluate the series $\sum_{n=1}^{\infty} (n+5)$. 40. Evaluate the series $\sum_{n=3}^{10} 8n$.
- 41. Justine earned \$22,000 during the first year of her job at city hall. After each year she received a 2% raise. Find her total earnings during the first <u>five years</u> on the job.
- 42. A rubber ball dropped on a hard surface takes a sequence of bounces, each one $\frac{3}{5}$ as high as the preceding one. If this ball is dropped from a height of 10 feet, what is the total vertical distance it has traveled after it hits the surface the 5th time?

Does the infinite geometric series diverge or converge? Explain.

43. $\frac{1}{5} + \frac{1}{10} + \frac{1}{20} + \frac{1}{40} + \dots$ 44. $3 + 9 + 27 + 81 + \dots$

Evaluate the infinite geometric series. Round to the nearest hundredth if necessary.

- 45. $8 + 4 + 2 + \dots$ 46. $1 + 0.1 + 0.01 + \dots$
- 47. A radio station has a broadcast area in the shape of a circle with equation $x^2 + y^2 = 6,400$, where the constant represents square miles.
 - **a.** Graph the equation and state the radius in miles.
 - **b.** What are the intercepts of the circle?
 - c. What is the area of the region in which the broadcast from the station can be picked up?



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1.
$$x = -\frac{1}{20}y^2$$

2. $y = -\frac{1}{28}x^2$
3. vertex (-4, -5), focus (-4, 1), directrix at $y = -11$
4. $(x + 2)^2 + (y - 6)^2 = 64$
5. (-5, -4); 6
6. $\frac{x^2}{529} + \frac{y^2}{225} = 1$
7. $\frac{x^2}{44} + \frac{y^2}{144} = 1$
8. $\frac{x^2}{(1,764,000,000)} - \frac{y^2}{(2,592,000,000)} = 1$
9. $\frac{x^2}{65536} - \frac{y^2}{54873} = 1$
10. ellipse with center (5, -4), foci at (5 ± $\sqrt{6}$, -4)
11. hyperbola with center (-5, -3), foci at (-5 ± $\sqrt{13}$, -3)
12. circle; center (-5, -4); radius = 5
13. vertex (4, -5), focus(4, 2), directrix at $y = -12$
14. Add 3; 20, 23, 26.
15. Multiply by 4; 1280, 5120, 20,480.
16. Divide by 2.5; 16, 6.4, 2.56.
17. 9.5 feet
18. $a_n = a_{n-1} - 6$, where $a_1 = 3$; -27
19. $a_n = 2a_{n-1} - 4$, where $a_1 = 15$; 356
20. $a_n = 4n + 3$; 59
21. explicit; 0, -8, -24, -48, -80

22. yes, 5

24. yes, 12.2 25. 28

26. yes, -3 27. no

28. yes, $\frac{2}{3}$

23. no

29. $a_n = -4 \cdot (-3)^{n-1}; -324$ 30. $a_n = 120 \cdot (0.3)^{n-1}; 0.972$ 31. 144 32. 250 33. 26 + 29 + 32 + 35 + 38 + 41 + 44 = 24534. 18 + 20 + 22 + 24 + 26 + 28 + 30 = 16835. 484 36. First term: 32; Last term: 104 37. $\sum_{n=1}^{14} (44 + 5n)$ 38. $\sum_{n=1}^{10} 2n$ 39. 76 40. 416 41. \$114,488.88 42. $36\frac{14}{125}$ feet 43. It converges; it has a sum. 44. It diverges; it does not have a sum.

45. 16

4)

46. 1.11



The radius of the circle is 80 miles. **b.** (0, 80), (80, 0), (0, -80), (-80, 0) c. about 20,100 square miles