

ALGEBRA II

Second Semester Exam Review

Name _____

1. Simplify.

a. $81^{\frac{3}{4}}$

b. $16^{-\frac{3}{2}}$

c. $(\sqrt[3]{-64})^4$

d. $(-32)^{-\frac{3}{5}}$

2. Solve.

a. $(2x - 7)^{\frac{1}{2}} = 5$

b. $(3x)^{-\frac{2}{3}} = 16$

3. Simplify.

a. $\sqrt[4]{256xy^4}$

b. $\sqrt{\frac{4x^2y}{9z^2}}$

c. $\sqrt[3]{54x^6y^{24}}$

4. If $f(x) = 2x - 1$ and $g(x) = x^2 + x - 4$, find:

a. $f(-3)$

b. $g(4)$

c. $f(g(\frac{1}{2}))$

5. Find the inverse of:

a. $f(x) = -3x + 4$

b. $f(x) = \frac{1}{4}x - \frac{1}{4}$

c. $f(x) = \sqrt{2x} + 3$

6. Solve.

a. $6(x+3)^{\frac{3}{5}} = 384$

b. $(2x+3)^{\frac{2}{3}} = 4$

c. $\frac{2}{3}x^{\frac{1}{2}} = 1$

7. Simplify.

a. $(3e^{-3x})^{-1}$

b. $\sqrt{4e^{2x}}$

c. $\frac{6e^{3x}}{4e}$

8. Simplify.

a. $\log_7 343$

b. $\log_{25} 5$

c. $\log_{\frac{1}{4}} \frac{1}{4}$

9. Write as a single logarithm.

a. $\ln 16 - \ln 4$

b. $3\ln x + \ln 5$

c. $4\log_{16} 12 - 4\log_{16} 2$

10. Expand each logarithm.

a. $\log 9x$

b. $\ln \frac{3y^4}{x^3}$

c. $\log \sqrt[4]{x^3}$

11. Find the log to three decimal places.

a. $\log_3 8$

b. $\log_5 10$

c. $\log_4 20$

12. Solve.

a. $4\log_3 x = 28$

b. $\log(5 - 3x) = \log(4x - 9)$

c. $\log_2 x = -1$

13. Solve.

a. $10^{x-3} = 100^{4x-5}$

b. $8^{5x} = 16^{3x+4}$

c. $36^{x-9} = 6^{2x}$

14. Suppose y varies directly as x .

a. If $y = 7$ when $x = 2$, find y when $x = 8$.

b. If $y = 15$ when $x = 9$, find x when $y = -5$.

15. Suppose z varies jointly (directly) as x and y . If $z = 6$ when $x = 3$ and $y = 8$, find z when $x = -4$ and $y = 7$.
16. Find the product of
 a. $(3 + 5i)(2 - 4i)$ b. $3i(2 - 6i)$ c. $-2i(-3 + 7i)$ d. $(2 - 2i)(3 - 3i)$
17. Solve over the set of complex numbers.
 a. $(x + 5)^2 = -36$ b. $-3(x - 2)^2 = 12$ c. $(x + 4)^2 = -12$ d. $5(2x - 3)^2 = -80$
18. Find the distance between the given points.
 a. $(4, -3)$ and $(6, 2)$ b. $(-10, 12)$ and $(-6, -14)$ c. $(-5, 0)$ and $(-2, -2)$
19. Find the center of each circle.
 a. $x^2 + y^2 - 12x + 18y - 4 = 0$ b. $3x^2 + 3y^2 + 3x + 3y - 1 = 0$ c. $x^2 + y^2 - 2x + 6y + 9 = 0$
20. Find the equation of the parabola with vertex at the origin and the given focus or directrix.
 a. focus: $(-2, 0)$ b. directrix: $y = -4$ c. directrix: $x = \frac{1}{4}$
21. Find the foci of each ellipse.
 a. $\frac{x^2}{81} + \frac{y^2}{4} = 1$ b. $\frac{x^2}{121} + \frac{y^2}{100} = 1$ c. $6x^2 + 3y^2 = 24$
22. Find the equation of the ellipse with the given foci and sum of focal radii.
 a. foci: $(0, \pm 2)$; 10 b. foci: $(\pm\sqrt{77}, 0)$; 18 c. foci: $(0, \pm\sqrt{21})$; 10
23. Find the equation of the hyperbola with the given foci and vertices.
 a. foci: $(\pm 3, 0)$; vertices: $(\pm 2, 0)$ b. foci: $(0, \pm 6)$; vertices: $(0, \pm 1)$ c. foci: $(\pm 5, 0)$; vertices: $(\pm 4, 0)$
24. Write an equation for the hyperbola with vertices at $(0, -3)$ and $(0, 3)$ and asymptotes $y = 2x$ and $y = -2x$.
25. Which conic is represented by the equation?
 a. $x^2 + 36y^2 - 16x - 72y + 64 = 0$ b. $x^2 + y^2 - 2x + 6y + 9 = 0$
 c. $x^2 + 6x - 2y + 13 = 0$ d. $-x^2 + y^2 - 2x - 12y + 31 = 0$
26. What is the next term in the sequence?
 a. 4, 9, 16, 25, ... b. 4, 2, 0, ... c. $\frac{1}{2}, 1, \frac{3}{2}, \dots$
27. Find the indicated term for each sequence.
 a. $t_n = (n + 1)^3$; t_4 b. $t_n = (-1)^n$; t_7 c. $t_n = \frac{n}{n+1}$; t_5
28. Determine whether each sequence is arithmetic, geometric, or neither?
 a. $5, \frac{5}{2}, \frac{5}{4}, \frac{5}{8}, \dots$ b. $-5, 5, 7, -7, \dots$ c. $3, 6, 9, 12, \dots$

29. Find the indicated sum of the arithmetic series.

a. $S_{20}; 40 + 37 + 34 + 31 + \dots$

b. $S_{28}; -6 + (-2) + 2 + 6 + \dots$

30. Find the indicated sum of the geometric series.

a. $S_{10}; 1 + 4 + 16 + 64 + \dots$

b. $S_{14}; -2 + 3 + \left(-\frac{9}{2}\right) + \frac{27}{4} + \dots$

31. Find the common ratio for each infinite geometric series.

a. $S = 16; t_1 = 12$

b. $S = \frac{3}{4}; t_1 = 1$

c. $S = -9; t_1 = -5$

32. Five books are taken from a shelf and laid in a stack on a table. In how many different orders can the books be stacked?

33. In how many ways can 4 marbles be selected from a box of 24 without replacement?

34. You have forgotten the combination to your locker. There are 40 numbers on the lock, and you are sure that all three of the numbers in your combination are different. How many possible locker combinations are there?

35. Find the value of c that makes the equation a perfect square trinomial. (Complete the square.) Then write the expression as the square of a binomial.

a. $x^2 + 10x + c$

b. $x^2 - 5x + c$

c. $x^2 + \frac{4}{5}x + c$

36. Solve.

a. $x^2 + 6x = 10x - 7$

b. $x^2 + 7x = -4$

c. $2w^2 = 3(w - 2)^2$

37. Simplify.

a. $\frac{5}{2 + \sqrt{3}}$

b. $\frac{8}{4 - 2\sqrt{3}}$

c. $\frac{-3}{3\sqrt{5} + 5}$

38. Solve.

a. $2 + 3\sqrt{x} = 8$

b. $\sqrt{t - 2} = 4 - t$

c. $x = \sqrt{x + 2}$

39. Find the following if $y + 2 = \frac{1}{2}(x - 3)^2$:

a. vertex

b. opens up/down

c. width compared to $y = x^2$

d. focus

40. Find the missing vertex, focus, or directrix, given the other two.

a. $V(3, 2), F(5, 2)$

b. $V(1, 2), D: y = 6$

c. $D: x = -3, F(1, -2)$

41. Find the sum of the series:

$$\sum_{n=1}^{16} 3n + 2$$

42. How much will a \$4000 investment be worth after 5 years if it is invested at 8% interest compounded quarterly?

43. How long will it take an investment of \$1000 to triple in value if it is invested at 6% compounded monthly?

44. An investor plans to have \$100,000 twenty years from now. He has \$12,500 now. What interest rate compounded twice a year, is needed to reach his goal?

45. Suppose s varies directly as r and inversely as t , and $s = 10$ when $r = 5$ and $t = 3$, for what value of t will $s = 3$ and $r = 4$?

1. a. 27 b. $\frac{1}{64}$ c. 256 d. $\frac{1}{8}$
2. a. $x = 16$ b. $x = \frac{1}{192}$
3. a. $4y\sqrt[4]{x}$ b. $\frac{2x\sqrt{y}}{3z}$ c. $3x^2y^8\sqrt[3]{2}$
4. a. -7 b. 16 c. $-\frac{15}{2}$
5. a. $f^{-1}(x) = \frac{-x+4}{3}$ b. $f^{-1}(x) = 4x + 1$
 c. $f^{-1}(x) = \frac{x^2-6x+9}{2}$
6. a. $x = 1021$ b. $x = \frac{5}{2}$ c. $x = \frac{9}{4}$
7. a. $\frac{e^{3x}}{3}$ b. $2e^x$ c. $\frac{3e^{3x-1}}{2}$
8. a. 3 b. $\frac{1}{2}$ c. 1
9. a. $\ln 4$ b. $\ln 5x^3$ c. $\log_{16} 1296$
10. a. $\log 9 + \log x$ b. $\ln 3 + 4\ln y - 3\ln x$
 c. $\frac{3}{4}\log x$
11. a. 1.893 b. 1.431 c. 2.161
12. a. 2187 b. No Solution c. $\frac{1}{2}$
13. a. 1 b. $\frac{16}{3}$ c. No Solution
14. a. 28 b. -3
15. -7
16. a. $26 - 2i$ b. $18 + 6i$ c. $14 + 6i$ d. $-12i$
17. a. $-5 \pm 6i$ b. $2 \pm 2i$ c. $-4 \pm 2i\sqrt{3}$
 d. $\frac{3}{2} \pm 2i$
18. a. $\sqrt{29}$ b. $2\sqrt{173}$ c. $\sqrt{13}$
19. a. (6, -9) b. $(-\frac{1}{2}, -\frac{1}{2})$ c. (1, -3)
20. a. $x = -\frac{1}{8}y^2$ b. $y = \frac{1}{16}x^2$ c. $x = -y^2$
21. $(\pm\sqrt{77}, 0)$ b. $(\pm\sqrt{21}, 0)$ c. $(0, \pm 2)$
22. a. $\frac{x^2}{21} + \frac{y^2}{25} = 1$ b. $\frac{x^2}{81} + \frac{y^2}{4} = 1$ c. $\frac{x^2}{4} + \frac{y^2}{25} = 1$
23. a. $\frac{x^2}{4} - \frac{y^2}{5} = 1$ b. $\frac{y^2}{1} - \frac{x^2}{35} = 1$ c. $\frac{x^2}{16} - \frac{y^2}{9} = 1$

24. $\frac{y^2}{9} - \frac{x^2}{4} = 1$
25. a. ellipse b. circle c. parabola
 d. hyperbola
26. a. 36 b. -2 c. $\frac{5}{2}$
27. a. 125 b. -1 c. $\frac{5}{6}$
28. a. Geometric b. Neither c. Arithmetic
29. a. 230 b. 1344
30. a. 349,525 b. $\frac{953.317}{4096}$
31. a. $\frac{1}{4}$ b. $-\frac{1}{3}$ c. $\frac{4}{9}$ 32. 120
33. 255,024
34. 59,280
35. a. 25; $(x+5)^2$ b. $\frac{25}{4}; (x-\frac{5}{2})^2$ c. $\frac{4}{25}; (x+\frac{2}{5})^2$
36. a. $2 \pm i\sqrt{3}$ b. $-\frac{7}{2} \pm \frac{\sqrt{33}}{2}$ c. $6 \pm 2\sqrt{6}$
37. a. $10 - 5\sqrt{3}$ b. $8 + 4\sqrt{3}$ c. $\frac{15-9\sqrt{5}}{20}$
38. a. 4 b. 3 c. 2
39. a. (3, -2) b. up c. wider d. (3, -1)
40. a. D: $x = 1$ b. F: (1, -2) c. V: (-1, -2)
41. 440
42. \$5943.79
43. 18.4 years
44. 10.67%
45. $t = 8$

Vocabulary: Asymptotes, Center, Change of Base, Circle, Complex Number, Composition, Conjugate, Direct/Inverse/Joint Variation, Directrix, Discriminant, Ellipse, Equation, Exponential, Foci, Hyperbola, Imaginary Number, Logarithm, Parabola, Radical, Sequence, Series, Vertex, Vertices