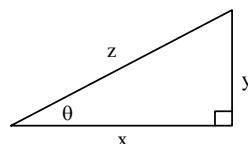


ALGEBRA AND TRIGONOMETRY SELF-DIAGNOSTIC EXAM

Do not use a calculator, book, or notes for any part of the exam. The suggested time to complete the exam is 90 minutes; however, make sure to attempt every problem.

1. Simplify: $\frac{(x^2yz^{-2})^3}{(xy^2z)^2}$
2. An equivalent algebraic expression to $m^{(4x-7y)}$ is:
3. Factor: $2y^4 - 32x^4$.
4. Simplify: $\frac{x}{x^2 + 5x + 6} - \frac{2}{x^2 + 3x + 2}$
5. After rationalizing the denominator of $\frac{3}{1-\sqrt{2}}$, an equivalent expression is:
6. Simplify: $\frac{\sqrt[5]{64x^5y^{-1}}}{\sqrt[5]{2y^4}}$
7. Simplify: $32^{4/5}$
8. Solve for x : $(x+a)(x-b) = x^2 - 1$
9. After clearing the numerator and denominator of fractions, $\frac{2x+\frac{1}{4}}{3x-\frac{1}{5}}$ is equivalent to:
10. Given: $1 - 5x = \sqrt{6x-7}$, find all real values of x which satisfy the equation.
11. The radius of a circular fountain is 10 ft. A sidewalk of uniform width is constructed around the outside of the fountain and has an area of 69π ft². How wide is the sidewalk?
12. A train leaves a station and travels north at a speed of 75 mph. Two hours later, a second train leaves on a parallel track traveling north at 125 mph. How far from the station will the faster train overtake the slower train?
13. Use "completing the square" to rewrite $x^2 - 4x + 3 = 0$ in the form $(x-c)^2 = d$.
14. Write an equation for y in terms of x assuming that y is proportional to x and $y = 42$ when $x = 6$.
15. Given the system of equations $\begin{cases} 4x + 2y = 14 \\ 2x - 8y = 8 \end{cases}$, find the value of y :
16. Given: $f(x) = 3 + x^2$, find $f(x+h) - f(x)$.
17. Given: $f(x) = \sqrt{x^2 - 9}$, find $f(x-3)$.

18. What is the domain of the function $y = \frac{5}{\sqrt{9-x}}$?
19. Find the slope-intercept form of the line through (1,4) and (3,-2).
20. Temperature T in degrees Fahrenheit is given by $T = \frac{9}{5}C + 32$ where C is temperature in degrees Celsius. What is the Celsius equivalent to 77°F?
21. Given $g(2) = 4$ and $f(x) = x/2$, find $f(g(2))$.
22. Find the point(s) of intersection of the curves $x^2 + y^2 = 1$ and $y + x = 0$.
23. Given $f(x) = -3x^2 - 18x - 15$, find the vertex and the maximum or minimum value.
24. Solve for x : $2 \leq 5 - 2x \leq 22$
25. Solve for x : $|3x - 2| - 6 \geq 0$
26. Solve for x : $x^2 - 35 \leq 1$
27. Find the roots of $f(x) = (x^2 - 7x + 12)^2$ and state the multiplicity of each.
28. Solve for x : $e^{-4x} = e$.
29. Solve for x : $3^{4x+1} - 5 = 22$.
30. Is the point $(\frac{-\sqrt{35}}{6}, \frac{-1}{6})$ inside, outside, or on the unit circle?
31. Find z , given that:
 $\sin(z) = -\cos(z)$ and $\frac{3\pi}{2} \leq z \leq 2\pi$
32. Given $f(x) = \sin(4x)$, find $f\left(\frac{\pi}{4}\right)$.
33. Given: $2\sin(x) = 1$, and $90^\circ \leq x \leq 180^\circ$. Find x .
34. Complete the trigonometric identity: $\sin(\pi - \theta) =$
35. Given $\sin(x) = -3/5$ and x is in Quadrant III, find $\tan(x)$.
36. If a circle has radius 10 ft, what central angle θ corresponds to an arc of length $110\pi/6$ ft?
37. In the figure, $\cot(\theta)$ is defined by what ratio?
38. What is the period of $y = \sin(-2x)$?



39. Simplify the expression $\left(\frac{\cot \theta \sec \theta}{\csc^2 \theta} \right)$:
40. Simplify the expression $(\sec t - \tan t)(\sec t + \tan t)$:

Self – Diagnostic Exam Solutions

1. $\frac{x^4}{yz^8}$

2. $\frac{m^{4x}}{m^{7y}}$

3. $2(y^2 + 4x^2)(y - 2x)(y + 2x)$

4. $\frac{x-3}{x^2+4x+3}$ or $\frac{x-3}{(x+1)(x+3)}$

5. $-3(1 + \sqrt{2})$

6. $\frac{2x}{y}$

7. 16

8. $\frac{ab-1}{a-b}$

9. $\frac{40x+5}{60x-4}$

10. There are no real solutions

11. 3 feet

12. 375 miles

13. $(x-2)^2 = 1$

14. $y = 7x$

15. $-\frac{1}{9}$

16. $2xh + h^2$

17. $\sqrt{x^2 - 6x}$

18. All x less than 9

19. $y = -3x + 7$

20. $25^\circ C$

21. 2

22. $(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$ and $(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

23. Vertex :(-3,12); maximum :12

24. $-\frac{17}{2} \leq x \leq \frac{3}{2}$

25. $x \geq \frac{8}{3}$ or $x \leq -\frac{4}{3}$

26. $-6 \leq x \leq 6$

27. Roots :3 and 4; each has multiplicity 2

28. -0.25

29. 0.5

30. The point is on the unit circle

31. $\frac{7\pi}{4}$

32. 0

33. 150°

34. $\sin(\theta)$

35. $\frac{3}{4}$

36. $\frac{11\pi}{6}$

37. $\frac{x}{y}$

38. π

39. $\sin(\theta)$

40. 1

Problems Numbered:	Topics Covered:
1-7	Basic concepts of Algebra
8-15	Equations, Inequalities, and Problem Solving
16-22	Functions and Graphs
23-27	Polynomial and Rational Functions
28-29	Exponential and Logarithmic Functions

30-40	Trigonometric Functions and Identities
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