

Pre-Calculus Skills Inventory

- Find the slope of the line passing through the points $(7, -4)$ and $(-6, -7)$.
- Find the slope of the line passing through $(-11, 7)$ and $(-6, 10)$.

Simplify the expression. Give your answer in exponential form.

3. $6^9 x 6^1$

Simplify the expression.

4. $(-3x^{-2})^{-3}$

5. $\frac{6x^2}{y^3} \cdot \frac{y^{-2}x^3}{9x^2}$

6. $\frac{x^2 - x - 12}{x^2 + x - 20}$

7. $(5^5 \cdot 7^3)^2$

Simplify:

8. $\frac{25^{1/6}}{25^{2/3}}$

9. $(5^{4/5} \cdot 5^{4/5})^{-10}$

Simplify:

10. $\sqrt[3]{40} \cdot 4\sqrt[3]{5}$

Write the expression in simplest form.

11. $\sqrt[4]{64}$

12. $\sqrt[3]{81}$

Simplify:

13. $\left(\frac{g^9}{h^6}\right)^{2/3}$

14. Simplify $\left(\frac{1}{100}\right)^{1/2}$.

15. What is the value of $125^{-1/3}$?

Simplify the expression. Write your answer using only positive exponents.

16. $(x^{-2/5}y^{1/3})^{15}$

17. $\sqrt[3]{x^6y^{30}}$

Simplify the expression.

18. $2\sqrt[3]{128} + 3\sqrt[3]{1024}$

Simplify the expression. Assume all variables are positive.

19. $\sqrt[5]{\frac{x^{10}}{y^{20}}}$

20. $\sqrt[3]{6x^3y^7} \cdot \sqrt[3]{4x^5}$

21. $\frac{x^{3/4}y^2}{xy^{1/2}}$

Multiply the expressions. Simplify the result.

22. $(x-4) \cdot \frac{x+3}{x^2-16}$

23. $\frac{2x-3}{(x+3)^2} \cdot \frac{x^2+4x+3}{4x^2-9}$

Divide the expressions. Simplify the result.

24. $\frac{3k^3}{6z^3} \div \frac{k^7}{z^7}$

25. $\frac{x^2+11x+28}{x^2-16} \div \frac{x+7}{x-7}$

Perform the indicated operation(s) and simplify.

26. $\frac{5}{3(x-5)} + \frac{7}{3(x-5)}$

27. Sketch the graph of $x^2 + y^2 = 10$.**Write a rule for the n th term of the arithmetic sequence.**

28. $-12, -5, 2, 9, \dots$

29. Write a rule for the n th term of the arithmetic sequence.
 $(-2), 2, 6, \dots$

30. Find the sum of the finite geometric series. Round your result to two decimal places.

$$\sum_{n=1}^{10} 4 \left(\frac{3}{2} \right)^{n-1}$$

31. Identify the next three terms in the sequence.
 $3, 9, 27, 81, \dots$ 32. Find the common ratio of the geometric sequence.
 $-\frac{1}{3}, 1, -3, 9, \dots$ 33. Given that $\tan \theta = \frac{2}{9}$ and $0 < \theta < \frac{\pi}{2}$, find the values of the other five trigonometric functions of θ .

Simplify the expression.

34. $\cos \left(\frac{\pi}{2} - x \right) \sec x$

35. $\csc^2 \left(\frac{\pi}{2} - x \right) - 1$

36. $\csc x \cos(-x)$

37. $\frac{\sin^2(-x)}{\tan^2 x}$

38. $\frac{\cos(-x)}{\sec x} + \sin^2(-x)$

39. $\sin\left(\frac{\pi}{2} - x\right) \sec x$

40. $\cos\left(\frac{\pi}{2} - x\right) \sec x$

Verify the identity.

41. $\frac{\sin x}{1 + \cos x} = \frac{1 - \cos x}{\sin x}$

42. $\tan^2 x (\csc^2 x - 1) = 1$

43. $\cos x \cot x + \sin x = \csc x$

44. $\cos^2 x - \cos^4 x = \sin^2 x - \sin^4 x$

45. $\frac{5 - 5\sin x}{-6\cos x} = \frac{5\cos x}{-6(1 + \sin x)}$

46. Solve $9\cos x + 3 = 0$ in the interval $0^\circ \leq x \leq 360^\circ$.

47. Solve $4\cos^2 x - 1 = 0$ in the interval $0 \leq x < 2\pi$.

48. Suppose the depth of the tide in a certain harbor can be modeled by $y = 21 + 5 \cos\left(\frac{\pi}{6} t\right)$, where y is the water depth in feet and t is the time in hours. Consider a day in which $t = 0$ represents 12:00 midnight. For that day, when are high and low tide and what is the depth of each?

49. Solve $4\sin^2 x = 2$.

50. Solve $2\sin^2 x + 3\sin x - 4 = 0$ in the interval $0 \leq x < \pi$.