

This self-test uses the basics that you should know from the prerequisites (intermediate algebra) for Math 121. This self-test is to be taken with **NO calculator** and no additional notes. You should be try to score yourself honestly to assess your abilities, which may save you stress and problems later.

Solve the following equations for x :

1. $4x - 3 = 7 - x$,

2. $x^2 + 7 = 1 - 5x$,

3. $2 - 0.3x = 2.1x + 5.6$,

4. $3x^2 - 10 = 8 + 3x$,

5. $\frac{2}{x+4} = \frac{4}{2-x}$,

6. $\frac{3}{x-4} = 2 - \frac{1}{x+2}$,

7. $\frac{x}{3} + 4 = \frac{2x}{5} - \frac{7}{2}$,

8. $\frac{2}{x(x+2)} = \frac{1}{2x+3}$,

9. $10^{x-3} = 100$,

10. $\frac{1}{2^{x+2}} = 8$,

11. $\log_{10}(x+20) = 3$,

12. $\log_2 32 = x - 1$,

13. $2^7 + 2^7 = 2^x$,

14. $\log(x+4) - \log(2) = \log(x)$,

15. $|2x+4| = 16$,

16. $\left|\frac{x}{2} - 3\right| = 2x + \frac{1}{3}$,

17. $3x - 4 < 5$,

18. $x^2 - 2x - 3 \geq 0$,

19. $x^2 + 2x < 5$,

20. $\frac{2}{x} < -\frac{4}{x+6}$.

21. Find the equation of the line through the points $(1, 7)$ and $(3, -1)$. Sketch the graph of this line.

22. Find the equation of the line passing through the origin and parallel to the line $3x - 5y = 7$. Sketch the graph of both lines.

23. Find the equation of the line passing through $(1, 2)$ and perpendicular to the line $y = 4 - 2x$. Sketch the graph of both lines.

24. Find the equation of a line passing through $(-3, 4)$ with a slope of $-\frac{1}{3}$. Sketch the graph of the line and determine the x and y -intercepts.

25. Consider the quadratic function given by $y = 12 - x - x^2$. Find the x and y -intercepts and the vertex. Sketch the graph of this function.

26. Consider the quadratic function given by $y = x^2 - 4x + 1$. Find the x and y -intercepts and the vertex. Sketch the graph of this function.

27. Graph the line $y = 4 - 2x$ and the quadratic $y = x^2 - 4$. Find the x and y -intercepts for both of these functions. Determine the points of intersection (both x and y values). Sketch the graphs of these functions.

Simplify the following expressions so that all exponents are positive and each variable only appears in the numerator or denominator.

28. $\frac{(x + 1)^3 y^{-2}}{y(x + 1)^2}$,

29. $\frac{x^3 y^2 z^{-1}}{x y^{-2} z^2}$.

Evaluate the following:

30. $(9^{4/5})^{5/8}$,

31. $(4^{-1/2}) \left(\frac{1}{8}\right)^{-2/3}$,

32. $\frac{(27)^{1/3}}{\left(\frac{1}{3}\right)^{-1}}$.

33. Let $f(x) = 2x - 1$ and $g(x) = x^2 + 4$. Find $f(g(x))$.

34. Let $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x+3}$. Find $f(g(1))$ and $g(f(1))$.

35. Let $f(x) = \frac{2}{x+3}$. Evaluate and simplify

$$\frac{f(1+h) - f(1)}{h}.$$

36. The formula for compound interest is given by

$$P = P_0(1+r)^n,$$

where P is the amount of capital, P_0 is the initial investment, r is the interest rate (per year), and n is the number of years.

a. Take the formula above and solve for the interest rate r in terms of the other variables, P , P_0 , and n .

b. Take the formula above and solve for the interest rate n in terms of the other variables, P , P_0 , and r .

c. Find the amount of capital you have after 2 years if you start with \$10,000 that is invested with an interest rate of 4%.

37. A rectangle has one side that is twice the length of the other side. If the area of the rectangle is 24 cm^2 , then find the dimensions of the rectangle.

38. An isosceles triangle has its two equal sides having a length of 5 cm and its base with a length of 6 cm. Find the area of this triangle.

39. A population grows by 5% each year. If the initial population is 20,000, then find the population after two years.

40. The cost of electricity has increased by a factor of 300% in the last 6 months. If a typical monthly bill was \$85, how much is it now?

41. On dining out, a 15% tip is considered a standard reward for service. How much would the tip be on a \$28 meal? If you only have dollars, then round to the nearest dollar and give the amount that you should leave at the table.

42. a. Two friends agree to take their children to Legoland. Thelma lives in San Diego, and consequently drives the entire 30 miles at 75mph. Louise is visiting California from the midwest and plans to drive the 60 miles from Disneyland at the speed limit of 60 mph (probably with her hands over her eyes). If they plan to meet at 10am, when the park opens, at what time does each person have to leave?

b. Once Thelma, with her 2 children, and Louise, with her 5 children, get to Legoland, they have to pay (!) to enter. Cost is \$38 per adult and \$32 per child. There is a 10% discount when they purchase more than 4 tickets. How much does it cost them to enter the park?

43. The rainfall in San Diego for each month averages 1.8, 1.53, 1.77, 0.79, 0.19, 0.07, 0.02, 0.1, 0.24, 0.37, 1.45 and 1.57 inches. What is the mean (average) rainfall in inches each month?

44. a. If you have a yard (in San Diego, see Problem above) which is 50 ft by 200 ft, what is the volume of rain in cubic inches, which falls on it each year? There are approximately 230 cubic inches in a gallon.

b. Assuming it takes 1.25 gallons to flush the toilet, how many times a year can the native rainfall be used to flush the toilet for this landowner?

45. You have \$4.70 for some comic books. Some cost 25 cents and some cost 40 cents. The number of 40 cent comic books is two more than the number of 25 cent comic books. How many comic books of each kind do we buy? (One answer can be found at www.csun.edu/hcth014/comics/cbl.html.)

46. Point A is twice as far from point C as point B is from A. If the distance from point B to point C is 5 inches, how far is point A from point C?

Calvin and Hobbes

by Bill Watterson



47. Mr. Jones lives 50 miles away from you. You both leave home at 5:00 and drive toward each other. Mr. Jones travels at 35 mph, and you drive at 40 mph. At what time will you pass Mr. Jones on the road?



48. An open rectangular box (no top) is constructed from 12 square feet of material. If the bottom is square and the height is one foot, then determine the dimensions of this box and the volume that it holds.

49. Four black cows and three brown cows give as much milk in five days as three black cows and five brown cows give in four days. Which kind of cow is the better milker, black or brown?

50. A man has twenty coins consisting of dimes and quarters. If the dimes were quarters and the quarters were dimes, he would have ninety cents more than he has now. How many dimes and quarters does he have?

Peanuts



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