

MATH 1316 Prerequisite Study Sheet

1. A ladder is leaning up against the side of a house. If the bottom of the ladder is 7 feet from the house and the ladder is 14 feet long, how far up the side of the house is the top of the ladder?
2. Recall the geometrical theorem that says that the ratios of the corresponding sides in similar triangles are equal. Suppose that you want to measure the height of a building. To do this, you measure the building's shadow and find that it is 50 feet long. You also measure the shadow of a 4-foot stake and find its shadow to be 3.5 feet long. How tall is the building?
3. Find the distance between the two points: $(-1, 5)$ and $(2, 12)$.
4. Find an equation for the line through the points $(-3, 2)$ and $(5, 1)$.
5. Sam Jones has a total of \$5000 invested in two accounts, one at 5% per year and the other at 7% per year. The total amount of interest earned each year is \$320. How much is in each account?
6. The price of a microwave oven has been discounted by 15%. The sale price is \$339.15. What is the original price of the microwave oven?

In 7-14, solve for x .

7. $2x - (3 - x) = 5 + 6x$

12. $\frac{(x^2 - 9)(2x + 7)}{(x - 1)^2} = 0$

8. $2x^2 + x = 15$

13. $\frac{2}{x} = \frac{3}{x - 2} - 1$

9. $2x^2 + x = 16$

10. $p = 33(20 - 6x)$

14. $\frac{x + 4}{x + 3} + 2 = \frac{1}{x + 3}$

11. $2x^2 + h = 2k$

In 15 and 16, tell whether each system has none, only one, or many solutions. If it has only one, solve it.

15. $9x - 3y = -1$
 $3x + 6y = -5$

17. For the function $f(x) = 3x^2 - x + 5$,

a. Find $f(-2)$ b. Find $f(r + s)$

16. $x - y = 1$
 $-2x + 2y = 5$

18. Divide and simplify:

$$\frac{2x - 10}{16 - x^4} \div \frac{4x^2 - 16x - 20}{x^2 + 4x + 4}$$

19. Graph $x^2 - 6x + y^2 + 4y + 12 = 0$ 20. Graph $f(x) = x^2 + x - 2$ on the interval $[-5, 5]$.

21. If you're given an equation with variables x and y and you want to find the x and y intercepts of the graph of the equation, how should you do it?

22. Simplify: $\frac{(a-b)^2}{\left(\frac{1}{a} - \frac{1}{b}\right)}$

23. Simplify: $\frac{(4x^{1/3}y^{7/6})^3}{x^2}$

24. Simplify: $(2a^{-1} - b^{-1})^{-1}$

25. Solve for r : $\frac{E}{e} = \frac{R+r}{r}$

Topic names and answers:

1. Pythagorean theorem: height is $\sqrt{147}$

2. Similar triangles: 57.14 feet

3. Distance formula: $\sqrt{58}$

4. Straight lines: $x + 8y = 13$

5. Interest word problem: \$1500 at 5%, \$3500 at 7%

6. Percentages: \$399

7. Linear equations: $x = -\frac{8}{3}$

8. Quadratic equations, factorable: $\left(\frac{5}{2}, -3\right)$

9. Quadratic equations, general:

$$x = \frac{-1 \pm \sqrt{129}}{4}$$

10. Formulas or literal equations (linear):

$$x = \frac{10}{3} - \frac{1}{198}p$$

11. Formulas or literal equations (quadratic):

$$x = \pm \frac{1}{2} \sqrt{4k - 2h}$$

12. Rational equations: $\left(3, -3, -\frac{7}{2}\right)$

13. Rational equations: $(4, -1)$

14. Rational equations (notice how to check for extraneous roots): \emptyset

15. Systems of equations: $\left(-\frac{1}{3}, -\frac{2}{3}\right)$

16. Systems of equations: No solution

17. Function notation: 19 and

$$3r^2 + 6rs + 3s^2 - r - s + 5$$

18. Factoring and rational expressions:

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

19. Graphing circles: circle, center at $(3, -2)$, radius 1

20. Graphing quadratic functions: a parabola, opening upward, with x intercepts at -1 and 2.

21. Graphing lines If you have the graph, simply look for the intercepts. With the equation, set $y = 0$ and solve for x to find the x-intercepts. Set $x = 0$ and solve for y to find the y-intercepts.

22. Rational expressions: $-ab(a-b)$

23. Rational exponents: $\frac{64y^{7/2}}{x}$

$$\frac{1}{\frac{2}{a} - \frac{1}{b}} = \frac{ab}{2b-a}$$

24. Rational exponents:

25. Formulas or literal equations (rational):

$$r = \frac{eR}{E-e} \text{ or } r = \frac{-eR}{e-E}$$