

Please note that Quiz 4 will also cover all material covered on Quizzes 1-3.

1. Simplify each of the following expressions.

a) $m^2 \cdot m^3$ b) $(m^2)^3$ c) $\frac{(a^3b^2)^3}{ab^4}$ d) $\frac{3^{2x-1}}{9^{x-1}}$ e) $\frac{(-p^2)^3 q^5}{(-p)^2 q^4}$ f) $\left(-\frac{2x^3y}{y^4}\right)^2 \left(\frac{2x^3y^2}{-8x^5y^2}\right)^3$

2. Let $M = 2^{100}$. Write each of the following expressions in terms of M .

a) $2^{100} - 2^{101} + 2^{102} - 2^{103}$ b) $2^{103} - 5 \cdot 2^{102}$ c) 4^{100} d) 2^{200} e) 2^{500} f) 2^{99}

3. Solve each of the following systems of linear equations.

a) $\begin{cases} 3x - 2y = 12 \\ 2x - y = 4 \end{cases}$ b) $\begin{cases} x + 5y = 3 \\ y = -\frac{1}{5}x + \frac{3}{5} \end{cases}$ c) $\begin{cases} 2x - y = 6 \\ x = \frac{1}{2}y + 1 \end{cases}$

4. Re-write the decimal $0.1\overline{74}$ as a fraction of two integers.

5. Simplify each of the following expressions.

a) $(5a - 1)^2$ d) $(2 - \sqrt{3})(5\sqrt{3} + 1)$ f) $(\sqrt{7} - 2)^3$
 b) $(3x^5 + 4y)(3x^5 - 4y)$
 c) $\sqrt{125} - 3\sqrt{80} + \sqrt{45}$ e) $(\sqrt{7} - 2)^2$ g) $(\sqrt{5} - \sqrt{2})^2$

6. Rationalize the denominator in each of the following expressions.

a) $\frac{3}{\sqrt{5}}$ b) $\frac{1}{\sqrt{10} - 3}$ c) $\frac{2}{\sqrt{7} + 1}$ d) $\frac{6}{2 - \sqrt{12}}$ e) $\frac{2}{\sqrt{5} - \sqrt{3}}$

7. Find the exact value of $-x^2 + 4x + 6$ if $x = 2 - \sqrt{3}$.

8. Completely factor each of the following **by completing the square as shown in class and the handouts**.

a) $60x - 6x^2 + 2250$ b) $15a^3 - 8a^4 + a^5$ c) $6x^2 - 24x + 78$ d) $22x + 3x^2 - 16$

9. Completely factor each of the following over the real numbers.

a) $9x^2 - 16y^{10}$ b) $5x^2 + 10x$ c) $900x + 15x^2 - 3x^3$ d) $32x^4 - 2$

10. Graph the line $2x - 3y = -12$.

11. Solve each of the following equations. Make sure to check your solution(s).

a) $2x^3 = 20x^2 + 1750x$ e) $8a + 2a^2 = 42$
 b) $\frac{3x + 17}{2} = x - 1 + \frac{x + 19}{2}$ f) $8x^3 = 50x^2$
 c) $\frac{2}{3}(x - 7) = \frac{4}{5}(x + 1)$ g) $8p^3 = 50p$
 d) $7x^2 + (x + 3)(2x - 1) = (3x + 1)^2$ h) $2 - (3 - x)(2x + 5) = (x - 1)(2x - 1)$
 i) $2x^2 = 2x$

12. a) One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the perimeter is 64 ft.

b) One side of a rectangle is 12 ft shorter than three times the other side. Find the sides if the area is 63 ft^2 .

13. Find the distance between $(7, -2)$ and $(3, 3)$.

14. Today a cab ride costs a flat fee of \$3.25 and then \$1.8 per mile. We take a ride that costs \$23.05. How far was our destination?

15. Compute the exact value of the area of the triangle with sides 10 cm, 10 cm, and 8 cm long.
16. Find all numbers such that if we cube the number, we get back the same number.
17. The hypotenuse of a right triangle is 74 cm. The difference between the other two sides is 46 cm. Find the sides of the triangle.
18. We throw an object upward from the top of a 1024 ft tall building. The height of the object, (measured in feet) t seconds after we threw it is
- $$h(t) = -16t^2 + 192t + 1024$$
- a) Where is the object 2 seconds after we threw it?
b) How long does it take for the object to hit the ground?
19. A farmer has some chickens and cows. One day he was asked: "*How many chickens and how many cows do you have?*" His answer was: "*All together, there are 73 heads and 188 legs*". How many chickens and how many cows does the farmer have?
20. A total of \$20 000 is to be invested in bonds and stocks. If the amount invested in bonds is to be \$4500 more than the amount invested in stocks, how much money is invested in each category?
21. Sally worked 50 hours last week and made \$660 for the week. For every hour worked over 40 her job pays time and a half. What is Sally's regular hourly pay rate?
22. An arch is in the shape of a semicircle. At a point along the base 4 feet from an end of the arch, the height of the arch is 12 feet. Find the maximum height of the arch.
23. a) Compute the exact value of the area of an equilateral triangle with sides 12 meters.
b) Express the area of an equilateral triangle in terms of x , where each sides is x units long.
24. We have 200 coins in a jar, all dimes and quarters. How many dimes do we have if the total value of all coins is \$40.55?

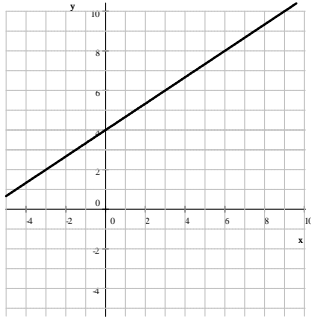
Answers

1. See handout Exponents.) a) m^5 b) m^6 c) a^8b^2 d) 3 e) $-p^4q$ f) $-\frac{1}{16y^6}$
2. a) $-5M$ b) $-12M$ c) M^2 d) M^2 e) M^5 f) $\frac{M}{2}$
3. See handout on system of equations. a) $(-4, -12)$ b) this system is dependent, there are infinitely many solutions
c) this system is inconsistent, there is no solution
4. See handout Decimals and Fractions. $\frac{173}{990}$
5. See handout Radical Expressions. a) $25a^2 - 10a + 1$ b) $9x^{10} - 16y^2$ c) $-4\sqrt{5}$ d) $9\sqrt{3} - 13$
e) $11 - 4\sqrt{7}$ f) $-50 + 19\sqrt{7}$ g) $7 - 2\sqrt{10}$
6. See handout Radical Expressions.
a) $\frac{3\sqrt{5}}{5}$ b) $\sqrt{10} + 3$ c) $\frac{\sqrt{7} - 1}{3}$ d) $-\frac{3\sqrt{3} + 3}{2}$ e) $\sqrt{5} + \sqrt{3}$
7. See handout Radical Expressions. 7
8. See handout on completing the square 1,2, and 3.
a) $-6(x - 25)(x + 15)$ b) $a^3(a - 3)(a - 5)$ c) $6(x^2 - 4x + 13)$ d) $3(x + 8)\left(x - \frac{2}{3}\right) = (x + 8)(3x - 2)$

9. See handout Factoring 1.

a) $(3x - 4y^5)(3x + 4y^5)$ b) $5x(x + 2)$ c) $-3x(x + 15)(x - 20)$ d) $2(4x^2 + 1)(2x + 1)(2x - 1)$

10. See handout Graphing Lines.



11. See handouts Linear Equations, The Zero Product Rule, Factoring A, and Factoring 1.

a) 35, 0, and -25 b) identity, all real numbers are solution c) -41
 d) -4 e) -7, 3 f) $\frac{25}{4}, 0$ g) $-\frac{5}{2}, 0, \frac{5}{2}$ h) 7 i) 0, 1

12. a) 9 ft by 23 ft See handout linear word problems

b) 7 ft by 9 ft See handout factoring 1

13. $\sqrt{41}$ see handout Pythagorean Theorem

14. 11 miles see handout linear word problems

15. $8\sqrt{21} \text{ cm}^2$ see handout Pythagorean Theorem

16. a) -1, 0, 1 see handout Factoring 1 17. 24 cm, 70 cm, 74 cm see handout Pythagorean Theorem

18. a) 1344 ft b) 16 seconds see handout Factoring 1

19. 52 chickens and 21 cows 20. \$7750 in stocks and \$12 250 in bonds See handout on system of equations

21. \$12 see handout linear word problems 22. 20 ft see handout Pythagorean Theorem

23. a) $36\sqrt{3}$ b) $\frac{\sqrt{3}}{4}x^2$ see handout Pythagorean Theorem 24. 63 See handout on system of equations

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