

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. Solve each of the following word problems.

a) 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?

b) 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?

c) 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?

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

6. 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) $(\sqrt{5} - \sqrt{2})^2$

7. 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) $\frac{2}{\sqrt{5} - \sqrt{3}}$

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

9. Factor $22x + 3x^2 - 16$ by completing the square.

10. a) Solve the equation $x^2 + 2 = 6x$ by completing the square.

b) Use exact values to check your solution(s).

11. 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) $32x^4 - 2$

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

13. 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) $2x^2 = 2x$

14. 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 perimeter is 63 ft².

15. 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?

16. Find all numbers such that if we cube the number, we get back the same number.

17. 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?

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 on system of equations.

a) 52 chickens and 21 cows b) 7750 in stocks and 12 250 in bonds c) \$12

5. See handout Decimals and Fractions. $\frac{173}{990}$

6. 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) $7 - 2\sqrt{10}$

7. 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) $\sqrt{5} + \sqrt{3}$

8. See handout Radical Expressions. 7

9. See handout Completing the Square - Part 3. $3(x+8)\left(x-\frac{2}{3}\right) = (x+8)(3x-2)$

10. See handout Completing the Square - Part 4.

a) $x_1 = 3 - \sqrt{7}$ and $x_2 = 3 + \sqrt{7}$

b) If $x = 3 - \sqrt{7}$, then

$$\text{LHS} = (3 - \sqrt{7})^2 + 2 = 9 + 7 - 6\sqrt{7} + 2 = 18 - 6\sqrt{7} \quad \text{and}$$

$$\text{RHS} = 6(3 - \sqrt{7}) = 18 - 6\sqrt{7}$$

So $x = 3 - \sqrt{7}$ works. And if $x = 3 + \sqrt{7}$, then

$$\text{LHS} = (3 + \sqrt{7})^2 + 2 = 9 + 7 + 6\sqrt{7} + 2 = 18 + 6\sqrt{7} \quad \text{and}$$

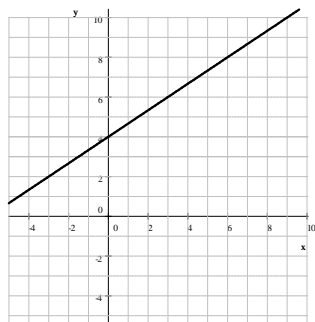
$$\text{RHS} = 6(3 + \sqrt{7}) = 18 + 6\sqrt{7}$$

So $x = 3 + \sqrt{7}$ also works.

11. See handout Factoring 1.

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

12. See handouts Graphing Lines .



13. See handouts Linear Equations 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

14. a) 9 ft by 23 ft See handout Wordproblems 1.

b) 7 ft by 9 ft See handout factoring 1

15. see handout word problems 1 11 miles

16. a) -1, 0, 1 see handout Factoring 1

17. a) 1344 ft b) 16 seconds