1. Simplify each of the following expressions.

   a) $(-2)^4$
   b) -2^4
   c) a^3a^4
   d) $(a^3)^4$
   e) $(2a^3)(2a)^2$
   f) $\dfrac{8a^2}{16a^3}$
   g) $\dfrac{(8a)^2}{16a^3}$
   h) $(-2x)^2(-2x^2)$
   i) $\dfrac{-3x^4}{(-3x)^2}$
   j) $2^{143}\cdot 2^{143}$
   k*) $2^{143}+2^{143}$

2. Simplify each of the following expressions.

   a) $x^3\cdot x^5$ b) $(x^3)^5$ c) $\dfrac{(x^3)^6}{x^2}$ d) $\dfrac{(2x^4)^3}{2x^3\cdot x}$ e) $\dfrac{(-2x)^2x^3}{(-2x)^5}$ f) $\left(-\dfrac{2a}{3b^2}\right)^2\left(\dfrac{3ab^2}{-a^2b}\right)^3$

3. Simplify each of the following expressions.

   a) $3(2x-5)-4x-3$
   b) $3(2x-5)-4(x-3)$
   c) $(2a-7)(3a+1)$
   d) $(5m^3-2)(5m^3+2)$
   e) $(5m^3-2)^2$
   f) $(3q-2)^2-2(q-1)^2$
   g) $2x-5-(x-1)^2$
   h) $\dfrac{1}{a}-\dfrac{a}{b}$
   i) $3(a-2)^2-(2a-1)(a+3)$

4. Convert each of the following decimal to a fraction. You do NOT have to simplify the fraction.

   a) 2.04 b) $0.\overline{24}$ c) $4.\overline{175}$ d) $0.1\overline{76}$

5. Completely factor each of the following.

   a) $2x^2+18$
   b) x^4-1
   c) $9x^{10}-49$
   d) $(3a-b)^2-(2a+b)^2$
   e) $3a^3-27ab^2$
   f) $2p^4-162$
   g) $20x+5x^3$

6. Solve each of the following equations. Make sure to check your solutions.

   a) $2(x-1)-(x-4)=3(x+8)$
   b) $\dfrac{3}{4}(x-2)=\dfrac{2}{3}(x+6)-3$
   c) $2(3m-2)-3(2m+1)=-7$
   d) $\dfrac{3-x}{4}-\dfrac{10-3x}{5}=x+2$
   e) $(x-1)(3x+2)=3(x-2)^2-14$
   f) $y-(y-3)^2=4-(y+1)(y-1)$
   g) $2(a-5)-3(a+2)=5(a+3)-7$
   h) $\dfrac{2}{3}(x-1)=\dfrac{3}{5}(x-4)+1$
   i) $(b+5)(b-2)(2b+11)=0$
   j) $\dfrac{x+2}{4}-\dfrac{x-3}{5}=20-x$
   k) $x^5=4x^3$
   l) $x^5=4x^4$
   m) $\dfrac{3x+1}{5}-\dfrac{2x-1}{3}=2x-16$
   n) $(2x+1)(2x-5)=(x-2)(4x-1)$
   o) $(3y-1)^2-(y-2)^2=2(2y-1)^2+1$
   p) $2(x-3)^2=(x-2)^2+x(x-8)$

7. Find all numbers such that
   a) If we square the number, we get back the same number.
   b) If we raise the number to the third power, the result is four times the original number.

8. Graph each of the following.

   a) $y=2x-3$ b) $2x+3y=6$ c) $x=-4$ d) $y=5$

9. Simplify each of the following expressions.

   a) $(3\sqrt{5}-1)(2\sqrt{5}-3)$
   b) $\sqrt{2}(5\sqrt{2}-3)$
   c) $(\sqrt{3}-1)^2$
   d) $(\sqrt{3}-1)^3$
   e) $(2\sqrt{7}+5)(2\sqrt{7}-5)$
   f) $(2\sqrt{7}-3)^2$
   g) $(2-\sqrt{5})^3(2+\sqrt{5})^3$

10. Rationalize the denominator in each of the given expression.

a) $\dfrac{6}{\sqrt{5}-2}$ b) $\dfrac{1}{\sqrt{3}-2}$ c) $\dfrac{\sqrt{5}}{\sqrt{8}-2\sqrt{5}}$

11. Find the exact value of $2x^2-5x+1$ if $x=1+\sqrt{2}$.

Answers

1. For examples with detailed solutions and more practice, see handout Exponents.

a) 16 b) -16 c) a^7 d) a^{12} e) $8a^5$ f) $\dfrac{1}{2a}$ g) $\dfrac{4}{a}$ h) $-8x^4$ i) $-\dfrac{x^2}{3}$ j) 2^{286} k) 2^{144}

2. For examples with detailed solutions and more practice, see handout Exponents.

a) x^8 b) x^{15} c) x^{16} d) $4x^8$ e) $-\dfrac{1}{8}$ f) $-\dfrac{12}{ab}$

3. a) $2x-18$ b) $2x-3$ c) $6a^2-19a-7$ d) $25m^6-4$ e) $25m^6-20m^3+4$

f) $7q^2-8q+2$ g) $-x^2+4x-6$ h) $\dfrac{b-a^2}{ab}$ i) $a^2-17a+15$

4. For examples with detailed solutions and more practice, see handout Fractions and Decimals.

a) $\dfrac{204}{100}$ b) $\dfrac{24}{99}$ c) $4\dfrac{175}{999}=\dfrac{4171}{999}$ d) $\dfrac{175}{990}$

5. For examples with detailed solutions and more practice, see handout Factoring A.

a) $2\left(x^2+9\right)$ b) $\left(x^2+1\right)(x+1)(x-1)$ c) $\left(3x^5-7\right)\left(3x^5+7\right)$ d) $5a(a-2b)$

e) $3a(a+3b)(a-3b)$ f) $2\left(p^2+9\right)(p+3)(p-3)$ g) $5x\left(x^2+4\right)$

6. For more examples with detailed solutions and practice, see handout Review of Linear Equations and the Zero Product Rule and Factoring A.

a) -11 b) 30 c) $\mathbb{R}$ (all real numbers) d) -5 e) 0 f) 2 g) -4 h) -11 i) $2,-5,-\dfrac{11}{2}$

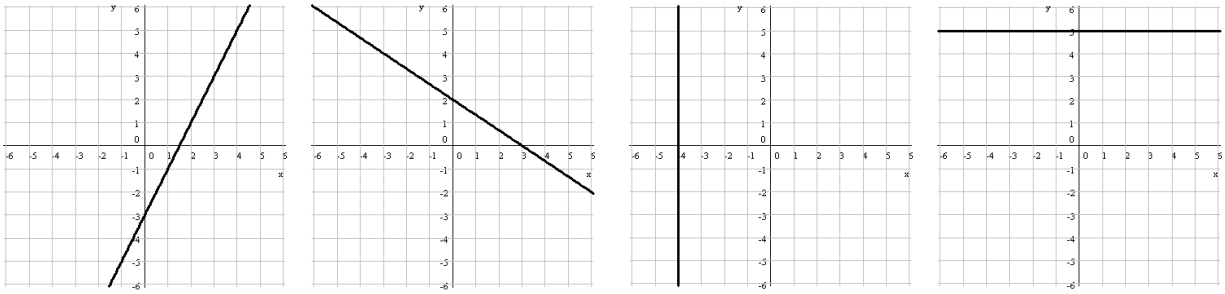
j) 18 k) $-2,0,2$ l) $0,4$ m) 8 n) 7 o) 1 p) there is no solution

7. For more examples with detailed solutions and practice, see handout Factoring A.

a) $0,1$ b) $-2,0,2$

8. For more examples with detailed solutions and practice, see handout Graphing Lines.

a) $y=2x-3$ b) $2x+3y=6$ c) $x=-4$ d) $y=5$



For problems 9-10., see handout Radical Expressions.

9. a) $33-11\sqrt{5}$ b) $10-3\sqrt{2}$ c) $4-2\sqrt{3}$ d) $6\sqrt{3}-10$ e) 3 f) $37-12\sqrt{7}$ g) -1

10. a) $6\sqrt{5}+12$ b) $-\sqrt{3}-2$ c) $\dfrac{-\sqrt{10}-5}{6}$ 11. $2-\sqrt{2}$

Last revised: August 29, 2019