Review Problems

1. Simplify each of the following expressions.

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

2. 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) $\left(5m^3-2\right)\left(5m^3+2\right)$
   e) $\left(5m^3-2\right)^2$
   f) $(3q-2)^2-2(q-1)^2$
   g) $2x-5-(x-1)^2$
   h) $\dfrac{1}{a}-\dfrac{a}{b}$
   i) $3(a-2)^2-(2a-1)(a+3)$

3. 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) $0.1\overline{76}$

4. Completely factor each of the following.

   a) $3a^3-27ab^2$ b) $2p^4-162$ c) $20x+5x^3$

5. 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) $2x^2-10x-28$

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

   a) $2(a-5)-3(a+2)=5(a+3)-7$
   b) $\dfrac{2}{3}(x-1)=\dfrac{3}{5}(x-4)+1$
   c) $(b+5)(b-2)(2b+11)=0$
   d) $\dfrac{x+2}{4}-\dfrac{x-3}{5}=20-x$
   e) $\dfrac{3x+1}{5}-\dfrac{2x-1}{3}=2x-16$
   f) $(2x+1)(2x-5)=(x-2)(4x-1)$
   g) $(3y-1)^2-(y-2)^2=2(2y-1)^2+1$
   h) $2(x-3)^2=(x-2)^2+x(x-8)$
   i) $0.3x-0.4(x+0.5)=-0.3x-0.2$

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. We throw an object upward from the top of a 1200 ft tall building. The height of the object, (measured in feet) t seconds after we threw it is

$$h(t)=-16t^2+160t+1200$$

   a) Where is the object 3 seconds after we threw it?
   b) How long does it take for the object to hit the ground?

9. The area of a rectangle is $1260\,\text{m}^2$. Find the dimensions of the rectangle if we know that one side is 48 m longer than three times the other side.

10. Graph each of the following.

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

11. Let A denote the number 5^{2016}. Express each of the following in terms of A.

a) 5^{2017} b) $5^{2016} - 5^{2017} + 5^{2018}$ c) 5^{2015} d) 25^{2016}

Answers

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

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

2.) 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) $\frac{b - a^2}{ab}$ i) $a^2 - 17a + 15$

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

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

4.) For examples with detailed solutions and more practice, see handout Factoring 1.

a) $3a\,(a + 3b)\,(a - 3b)$ b) $2\left(p^2 + 9\right)(p + 3)\,(p - 3)$ c) $5x\left(x^2 + 4\right)$

5.) For examples with detailed solutions and more practice, see the handouts on completing the square.

a) $-6\,(x - 25)\,(x + 15)$ b) $a^3\,(a - 3)\,(a - 5)$ c) $6\left(x^2 - 4x + 13\right)$ d) $2\,(x - 7)\,(x + 2)$

6.) For more examples with detailed solutions and practice, see handout Linear Equations and More Equations.

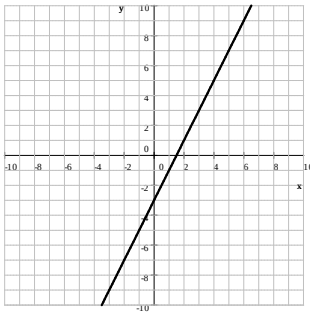
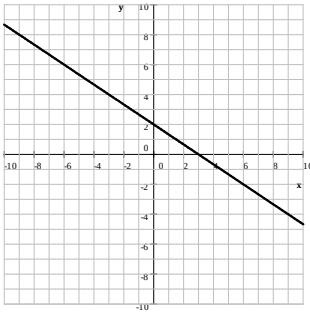
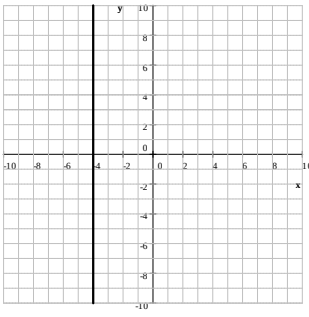
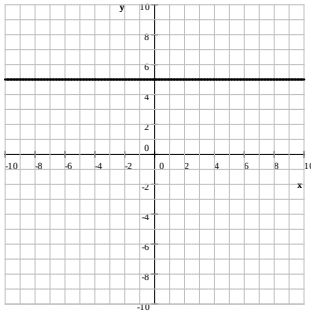
a) -4 b) -11 c) $2, -5, -\frac{11}{2}$ d) 18 e) 8 f) 7 g) 1 h) no solution i) 0

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

7.) a) $0, 1$ b) $0, 2, -2$ 8.) a) 1536 ft b) 15 9.) 14 m by 90 m

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

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

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

a) $5A$ b) $21A$ c) $\frac{A}{5}$ d) A^2