

Principles of Calculus

Summer Work

Name: _____

*Please follow the directions as indicated. This packet is **due on the first day of classes**. This assignment is worth 10 points and will be graded upon your arrival to school.*

Properties and Operations with Polynomials

Name each polynomial by degree and number of terms.

1) $-10x$

2) $-10r^4 - 8r^2$

3) 7

4) $9a^6 + 3a^5 - 4a^4 - 3a^2 + 9$

5) $-3n^3 + n^2 - 10n + 9$

6) $7x^2 - 9x - 10$

7) $-4b$

8) $-9 + 7n^3 - n^2$

9) Critical thinking: Why is it impossible to have a linear trinomial with one variable?

Simplify each expression.

10) $(4m^4 - m^2) + (5m^2 + m^4)$

11) $(5x + x^4) - (3x^4 + 4x)$

12) $(5 + 7x^3 + 3x^2) + (-12 + 5x + 6x^2)$

13) $(4 + 3x^2 + 8x^3) + (-7x^3 + 12x^5 + 6x^2)$

$$14) (13m^4 + 2) + (m^4n^2 + 2 - 2m^4) - (-13m^2n^3 + 5m^4)$$

$$15) (-10mn^3 - 4n^4) - (-2n^4 - 7mn^3 - 6n^3) - (5n^3 + 6mn^3)$$

Find each product.

$$16) (2n + 3)(n - 2)$$

$$17) (5v - 1)(4v + 3)$$

$$18) (2r - 2)(-r - 7)$$

$$19) (3x + 5)(3x - 6)$$

$$20) (-4x^2 - 5x - 1)(4x^2 - 6x - 2)$$

$$21) (x^2 - 2x - 8)(-x^2 + 3x - 5)$$

$$22) (-4m - 4n)(-6m - 6n)$$

$$23) (8u + 4v)(6u + 6v)$$

Critical thinking questions:

$$24) \text{Simplify: } (a + b)(c + d)$$

$$25) \text{Simplify and then classify by degree and number of terms: } 2x + 3x^2(4x - 5)$$

Properties of Exponents:

Simplify. Your answer should contain only positive exponents.

1) $(x^{-2}x^{-3})^4$

2) $(x^4)^{-3} \cdot 2x^4$

3) $(n^3)^3 \cdot 2n^{-1}$

4) $(2v)^2 \cdot 2v^2$

5) $\frac{2x^2y^4 \cdot 4x^2y^4 \cdot 3x}{3x^{-3}y^2}$

6) $\frac{2y^3 \cdot 3xy^3}{3x^2y^4}$

7) $\frac{x^3y^3 \cdot x^3}{4x^2}$

8) $\frac{3x^2y^2}{2x^{-1} \cdot 4yx^2}$

9) $\frac{x}{(2x^0)^2}$

10) $\frac{2m^{-4}}{(2m^{-4})^3}$

Complex Numbers

Simplify.

1) $i + 6i$

2) $3 + 4 + 6i$

3) $3i + i$

4) $-8i - 7i$

5) $-1 - 8i - 4 - i$

6) $7 + i + 4 + 4$

7) $-3 + 6i - (-5 - 3i) - 8i$

8) $3 + 3i + 8 - 2i - 7$

9) $4i(-2 - 8i)$

10) $5i \cdot -i$

11) $5i \cdot i \cdot -2i$

12) $-4i \cdot 5i$

13) $(-2 - i)(4 + i)$

14) $(7 - 6i)(-8 + 3i)$

15) $7i \cdot 3i(-8 - 6i)$

16) $(4 - 5i)(4 + i)$

17) $(2 - 4i)(-6 + 4i)$

18) $(-3 + 2i)(-6 - 8i)$

19) $(8 - 6i)(-4 - 4i)$

20) $(1 - 7i)^2$

21) $6(-7 + 6i)(-4 + 2i)$

22) $(-2 - 2i)(-4 - 3i)(7 + 8i)$

23) $5i + 7i \cdot i$

24) $(6i)^3$

25) $6i \cdot -4i + 8$

26) $-6(4 - 6i)$

27) $(8 - 3i)^2$

28) $3 + 7i - 3i - 4$

29) $-3i \cdot 6i - 3(-7 + 6i)$

30) $-6i(8 - 6i)(-8 - 8i)$

Critical thinking questions:

31) How are the following problems different?

Simplify: $(2 + x)(3 - 2x)$

Simplify: $(2 + i)(3 - 2i)$

32) How are the following problems different?

Simplify: $2 + x - (3 - 2x)$

Simplify: $2 + i - (3 - 2i)$

Factoring Trinomials

Factor each completely.

1) $x^2 - 7x - 18$

2) $p^2 - 5p - 14$

3) $m^2 - 9m + 8$

4) $x^2 - 16x + 63$

5) $7x^2 - 31x - 20$

6) $7k^2 + 9k$

7) $7x^2 - 45x - 28$

8) $2b^2 + 17b + 21$

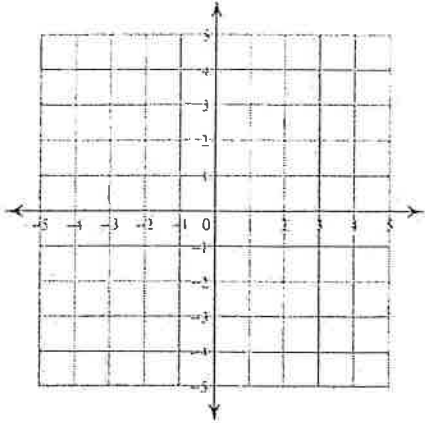
9) $5p^2 - p - 18$

10) $28n^4 + 16n^3 - 80n^2$

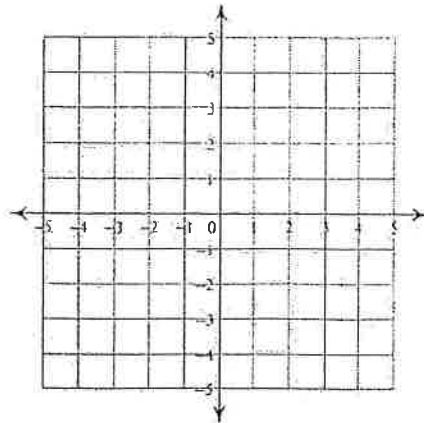
Systems of Equations

Solve each system by graphing.

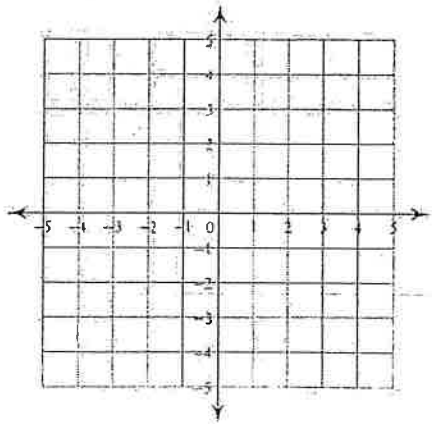
1) $y = -3x + 4$
 $y = 3x - 2$



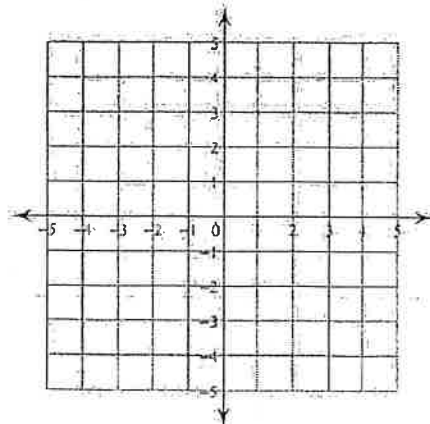
2) $y = x + 2$
 $x = -3$



3) $x - y = 3$
 $7x - y = -3$



4) $4x + y = 2$
 $x - y = 3$



Solve each system by substitution.

5) $y = 4x - 9$
 $y = x - 3$

6) $4x + 2y = 10$
 $x - y = 13$

7) $y = -5$
 $5x + 4y = -20$

8) $x + 7y = 0$
 $2x - 8y = 22$

$$\begin{aligned} 9) \quad & 6x + 8y = -22 \\ & y = -5 \end{aligned}$$

$$\begin{aligned} 11) \quad & 7x + 2y = -19 \\ & -x + 2y = 21 \end{aligned}$$

$$\begin{aligned} 13) \quad & -7x + 4y = 24 \\ & 4x - 4y = 0 \end{aligned}$$

$$\begin{aligned} 10) \quad & -7x + 2y = 18 \\ & 6x + 6y = 0 \end{aligned}$$

$$\begin{aligned} 12) \quad & 3x - 5y = 17 \\ & y = -7 \end{aligned}$$

$$\begin{aligned} 14) \quad & 4x - y = 20 \\ & -2x - 2y = 10 \end{aligned}$$

Solve each system by elimination.

$$\begin{aligned} 15) \quad & 8x - 6y = -20 \\ & -16x + 7y = 30 \end{aligned}$$

$$\begin{aligned} 16) \quad & 6x - 12y = 24 \\ & -x - 6y = 4 \end{aligned}$$

$$\begin{aligned} 17) \quad & -8x - 10y = 24 \\ & 6x + 5y = 2 \end{aligned}$$

$$\begin{aligned} 18) \quad & -24 - 8x = 12y \\ & 1 + \frac{5}{9}y = -\frac{7}{18}x \end{aligned}$$

$$\begin{aligned} 19) \quad & -4y - 11x = 36 \\ & 20 = -10x - 10y \end{aligned}$$

$$\begin{aligned} 20) \quad & -9 + 5y = -4x \\ & -11x = -20 + 9y \end{aligned}$$

$$\begin{aligned} 21) \quad & 0 = -2y + 10 - 6x \\ & 14 - 22y = 18x \end{aligned}$$

$$\begin{aligned} 22) \quad & -16y = 22 + 6x \\ & -11y - 4x = 15 \end{aligned}$$

$$\begin{aligned} 23) \quad & -16 + 20x - 8y = 0 \\ & 36 = -18y - 22x \end{aligned}$$

$$\begin{aligned} 24) \quad & -\frac{5}{7} - \frac{11}{7}x = -y \\ & 2y = 7 + 5x \end{aligned}$$

Critical thinking questions:

25) Write a system of equations with the solution $(4, -3)$.

- 1) The school that Lisa goes to is selling tickets to the annual talent show. On the first day of ticket sales the school sold 4 senior citizen tickets and 5 student tickets for a total of \$102. The school took in \$126 on the second day by selling 7 senior citizen tickets and 5 student tickets. What is the price each of one senior citizen ticket and one student ticket?

- 2) Flying with the wind a plane went 183 km/h. Flying into the same wind the plane only went 141 km/h. Find the speed of the plane in still air and the speed of the wind.

- 3) Castel and Gabriella are selling pies for a school fundraiser. Customers can buy apple pies and lemon meringue pies. Castel sold 6 apple pies and 4 lemon meringue pies for a total of \$80. Gabriella sold 6 apple pies and 5 lemon meringue pies for a total of \$94. What is the cost each of one apple pie and one lemon meringue pie?

- 4) The school that Imani goes to is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 3 senior citizen tickets and 3 child tickets for a total of \$69. The school took in \$91 on the second day by selling 5 senior citizen tickets and 3 child tickets. What is the price each of one senior citizen ticket and one child ticket?

- 5) Ming and Carlos are selling cookie dough for a school fundraiser. Customers can buy packages of chocolate chip cookie dough and packages of gingerbread cookie dough. Ming sold 8 packages of chocolate chip cookie dough and 12 packages of gingerbread cookie dough for a total of \$364. Carlos sold 1 package of chocolate chip cookie dough and 4 packages of gingerbread cookie dough for a total of \$93. Find the cost each of one package of chocolate chip cookie dough and one package of gingerbread cookie dough.

- 6) Kayla's school is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 3 senior citizen tickets and 5 child tickets for a total of \$70. The school took in \$216 on the second day by selling 12 senior citizen tickets and 12 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

Simplifying Rational Expressions

Simplify each expression.

$$1) -\frac{36x^3}{42x^2}$$

$$2) \frac{16r^2}{16r^3}$$

$$3) \frac{16p^2}{28p}$$

$$4) \frac{32n^2}{24n}$$

$$5) -\frac{70n^2}{28n}$$

$$6) \frac{15n}{30n^3}$$

$$7) \frac{2r-4}{r-2}$$

$$8) \frac{45}{10a-10}$$

$$9) \frac{x^2-4}{3x^2-12x}$$

$$10) \frac{15a-3}{24}$$

$$11) \frac{v-5}{v^2-10v+25}$$

$$12) \frac{x+6}{x^2+5x-6}$$

13) $\frac{27}{27x + 18}$

14) $\frac{v^3 - 7v - 30}{v^2 - 5v - 24}$

15) $\frac{x^2 + 8x + 12}{x^2 + 3x - 18}$

16) $\frac{x^2 - 11x + 18}{x^2 + 2x - 8}$

17) $\frac{b^2 + 3b - 28}{b^2 - 49}$

18) $\frac{v^2 - 3v - 40}{v^2 - 11v + 24}$

19) $\frac{4n - 4}{6n - 20}$

20) $\frac{v^2 - 5v - 14}{v^2 + 4v + 4}$

21) $\frac{6v^3 + 42v^2}{2v^2 + 26v + 84}$

22) $\frac{x^3 - x^2 - 42x}{2x^2 - 20x + 42}$

23) $\frac{2v^2 + 10v - 48}{8v + 64}$

24) $\frac{9x^2 + 81x}{x^3 + 8x^2 - 9x}$

25) $\frac{x^2 + 2x - 80}{2x^3 - 24x^2 + 64x}$

26) $\frac{3r^2 - 39r + 90}{r^2 - 3r - 70}$

Simplify each expression.

$$1) \frac{u-v}{8v} + \frac{6u-3v}{8v}$$

$$2) \frac{m-3n}{6m^3n} - \frac{m+3n}{6m^3n}$$

$$3) \frac{5}{a^2+3a+2} + \frac{5a+1}{a^2+3a+2}$$

$$4) \frac{5}{10n^2+16n+6} + \frac{n-6}{10n^2+16n+6}$$

$$5) \frac{r+6}{3r-6} + \frac{r+1}{3r-6}$$

$$6) \frac{x+2}{2x^2+13x+20} - \frac{x+3}{2x^2+13x+20}$$

$$7) \frac{6}{x-1} - \frac{5x}{4}$$

$$8) 6 - \frac{x+5}{(7x-5)(x+4)}$$

$$9) \frac{3}{x+7} + \frac{4}{x-8}$$

$$10) \frac{3}{4v^2+4v} - \frac{7}{2}$$

$$11) \frac{7}{3} - \frac{8}{12x-8}$$

$$12) \frac{5}{n+5} + \frac{4n}{2n+6}$$

$$13) \frac{2x}{5x+4} + \frac{6x}{2x+3}$$

$$14) \frac{2}{3x^2+12x} + \frac{8}{2x}$$

Rational Equations

Solve each equation. Remember to check for extraneous solutions.

$$1) \frac{1}{4x} - \frac{1}{4} = \frac{1}{2}$$

$$2) \frac{5v-5}{v} - \frac{5v+15}{v} = 1$$

$$3) \frac{5a+20}{6a} + \frac{1}{a} = \frac{3}{2a}$$

$$4) \frac{2}{m^2} = \frac{1}{m} + \frac{1}{m^2}$$

$$5) 1 + \frac{4}{r-2} = \frac{5}{r-2}$$

$$6) \frac{n-1}{2n} = 1 + \frac{1}{2n}$$

$$7) \frac{5}{k} = \frac{1}{k} - 1$$

$$8) \frac{5}{b} = \frac{1}{b} + 4$$

$$9) \frac{4}{n+1} - \frac{1}{n^2+7n+6} = \frac{3}{n^2+7n+6}$$

$$10) \frac{1}{r-1} + 4 = \frac{2}{r-1}$$

$$11) \frac{3v^2+21v+18}{v^2+2v} = \frac{1}{v} - \frac{1}{v^2+2v}$$

$$12) \frac{v^2-5v+4}{v^2-6v} = \frac{1}{v^2-6v} + \frac{1}{v}$$

$$13) \frac{b+1}{b^2-2b} + \frac{6b^2-24b+18}{b^2-2b} = \frac{2b-4}{b}$$

$$14) \frac{5}{b^2+b} = \frac{b+4}{b} + \frac{1}{b^2+b}$$

$$15) \frac{1}{n^2+11n+30} = \frac{1}{n+5} - 4$$

$$16) \frac{n}{n+5} = \frac{n+4}{2n+10} + \frac{n^2+6n+8}{2n^2+10n}$$

Properties of Logarithms

Expand each logarithm.

1) $\log \frac{2}{3}$

2) $\log (3 \cdot 11)$

3) $\log (6 \cdot 7)$

4) $\log (5 \cdot 11)$

5) $\log (7 \cdot 8)$

6) $\log \frac{12}{11}$

7) $\log \sqrt[3]{x}$

8) $\log \sqrt{x}$

9) $\log (a \cdot b)$

10) $\log x^5$

11) $\log (u \cdot v)^6$

12) $\log (ab^5)$

Condense each expression to a single logarithm.

13) $\log 6 - \log 5$

14) $\log 12 + \log 5$

15) $\log 6 + \log 7$

16) $\log 12 - \log 11$

17) $3 \log x$

18) $6 \log a$

19) $\log a - \log b$

20) $\frac{\log x}{2}$

21) $\log x + 5 \log y$

22) $6 \log u - 6 \log v$

23) $4 \log x + 4 \log y$

24) $\log u + \log v + \log w$

Critical thinking questions:

25) $2(\log 2x - \log y) - (\log 3 + 2 \log 5)$

26) $\log x \cdot \log 2$