***Section* 1.1 – *Polynomials and Factoring***

***Polynomials***

**Adding and Subtracting Polynomials**

**Properties of Real numbers**

For all real numbers *a*, *b*, and *c*:

 ***Commutative properties***



 ***Associative properties***



 ***Distributive properties***

***Add or subtract as indicated***

1. 







1. 





1. 





Multiply

1. 





1. 





1. 









Find 







Find 













Perform the indicated operations: ******





Perform the indicated operations: ******





Perform the indicated operations: ******

 



***Factoring***

**Prime Factorization**

A process that allows us to write a composite number as a product of two or more prime numbers.

Tree

10

2 5 10 = 2 *x* 5

72 = 2. 36

= 2. 6. 6

= 2. 2. 3. 2. 3

= 23 32

**The Greatest Common Factor (GCF)**

The largest factor that two or more numbers (or terms) have in common

***Find GCF*** (18, 36)

18: 2. 9 36: 2. 18

2. 3. 3 2. 2. 3. 3

18: 2 32 → 1, 2, 3, 6, 9, **18**

36: 22 32 → 1, 2, 3, 4, 6, 9, 12, **18**, 36 GCF (18, 36) = 18 (is the greatest common factor)

***Find GCF*** (27, 45)

27 = 33

45 = 32 5

32 GCF (27, 45) = 9

***Find*** GCF (40, 56)

40 = 23 5

56 = 23 7

23 GCF (40, 56) = 8

***Find GCF*** (80, 60)

80 = 24 5

60 = 22 3 5

22 5 GCF (80, 60) = 20

***Factor out the greatest common factor***

|  |  |
| --- | --- |
| **12** | 2 . 2 . 3 |
| **18** | 2 . . 3 . 3 |
|  | 2 . 3 |

1. 



1. 



**Factoring Trinomial**

***Factor ***

|  |  |
| --- | --- |
| ***Product***  15 | ***Sum***  8 |
| 15 *x* 1 | 15 + 1 |
| 3 *x* 5 | 3 + 5 |



***Factor ***



**Special Factorization**











***Factor***

1. 





1. 

 *can’t be factored (in real number) it is prime.*

1. 



1. 





1. 





1. 



1. 







1. 







***Factor: ***



***Factor: ***



***Factor: ***





***Factor: ***









***Section* 1.2 – *Exponents***

**Integer Exponents**

*Definition of exponent*

 a appears as a factor n times

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |

1. 



1. 



1. 



1. 



1. 



1. 



1. 



1. 





1. 







1. 







1. 







1. 











Calculations with exponents

1. 
2. 
3. 
4.  *is not a real number*

***Rational Exponents***



***Calculations with Exponents***

1.  











1.  







1.  







Simplify

1. 











1. 









1. 











Simplify

1. 





1. 



1. 







**Radicals**



1. 



1. 
2. 



1. 



**Properties**











Simplify

1. 







1. 





1. 







1. 





1. 





1. 







***Section* 1.3 − Fractions and Rationalization**

***Fraction* (*Basic*)**







1. 



1. 





Simplify: 





Simplify: 







If the denominators are the same ⇒ add the numerators



If the denominators are the same ⇒ subtract the numerators



If the denominators are not the same

⇒ Find Least Common Denominator (LCD) and convert so that the fractions have the same denominators

***LCD:*** is the smallest whole number that is a multiple of each

 LCD (8, 12)

8 = 23

12 = 22 3

23 3 = 24 LCD (8, 12) = 24











LCD (75, 50) 75 = 53

50 = 2 52

2 53 = 150 LCD (75, 50) = 150

















































****

** **

















***Find***:

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

**Operations with Fractions**

A rational expression is proper if the degree of numerator is less than the degree of denominator

A rational expression is improper if the degrees of numerator is greater than or equal the degree of denominator

















***Example***

Perform each indicated operation & simplify

1. 
2. 





***Example***

Perform each indicated operation & simplify

1.  





1.  





***Example***

Perform each indicated operation & simplify

1. 









1. 



***Example***

Perform each indicated operation & simplify



















**Rationalization Techniques**

1. If the denominator is , multiply by 
2. If the denominator is , multiply by 
3. If the denominator is , multiply by 



***Example***

Simplify by rationalizing the denominator

1. 



1. 



1. 







***Example***

Simplify 







***Example***

Simplify 



***Example***

Simplify 







***Example***

Simplify 







***Example***

Simplify 





***Example***

Rationalize the denominator or numerator

1.  



1.  







1. 











***Example***







***Example***

 









***Example***







***Exercise***

Perform each indicated operation & simplify 

***Solution***









***Exercise***

Perform the operation and simplify: 

***Solution***

 









***Exercise***

Perform the operation and simplify: 

***Solution***







***Exercise***

Perform the operation and simplify: 

***Solution***

 







***Exercise***

Simplify the fraction: 

***Solution***









 



***Exercise***

Simplify: 

***Solution***













***Exercise***

Simplify the expression: 

***Solution***













***Exercise***

Simplify the expression: 

***Solution***









***Exercise***

Simplify the expression: 

***Solution***









***Exercise***

Simplify the expression: 

***Solution***









***Exercise***

Simplify the expression: 

***Solution***











***Exercise***

Simplify the expression: 

***Solution***









***Section* 1.4 − Equations and Application**

***Linear Equations***

A ***linear equation*** in one variable is an equation that is equivalent to one of the form 

**Equation-Solving Principles**

Addition Principle: If *a = b* is true ⇒ 

Multiplication Principle: If *a = b* is true ⇒ 

***Solve the following equations***

1. 





1. 





***Solve: ***







 *Divide both sides by 5*



**The Zero-Product Principle**:

If *ab* = 0. then *a* = 0 or *b* = 0.

***Solve ***

  


 

 

 

***Quadratic Formula***



***Solve  ***











 

 

 

***Solve ***















**Equations with Fractions**

|  |  |
| --- | --- |
| 10 | 2 5 |
| 15 | 3 5 |
| 20 | 2 2 5 |
| 5 | 5 |
|  | **2 2 3 5 = 60** |

***Solve ***











***Solve  ***

Conditions: 









***Solve  ***













 

 

Solution: 

***Slopes and Equations of Lines***

**Slope of a line** *(Definition)*

The slope of a line is defined as the vertical change (the *rise*) over the horizontal change (the *run*) as one travels along the line.



Find the slope of the line through each pair point

1. 







1. 





= 0

1. 



 Which is undefined → line is vertical.

**Equations of a Line**



This *linear equation* is called the *slope-intercept form* of the equation of a line.

***Point-Slope Form***



***Example***

Find the equation of the line through  with slope 

*Solution*

















***Example***

Find the equation of the line that passes through the point  and has slope 

*Solution*







 



**Parallel Lines** (//)

Two lines are parallel if and only if they have the same slope, or they are both vertical. 

***Example***

Find the equation of the line that passes through the point  and is parallel to the line 

*Solution*





















**Perpendicular Lines** (⊥)

Two lines are perpendicular if and only if the product of their slope is . 

***Example***

Find the slope of the line L perpendicular to the line having the equation 

*Solution*



 → Slope = 5

Slope of the line L = 

***Linear Functions and Applications***

**Linear Function**

A relationship *f* defined by



For real numbers *m* and *b*, is a ***linear function***

***Example***

*Let* ***. Find , , , and ***

*Solution*

















