

Decatur City Schools

Mathematics Department
Summer Course Work
in preparation for
Analytical Math

Completion of this summer
work is required on the first
day of the 2019 - 2020 school
year.

Student Name: _____

Decatur High School
Mathematics Department

Summer Workbook
Analytical Math
Topics

1. Solving Quadratic Equations
2. Algebraic Expression, Sets, Mathematical Models, and Real Numbers
3. Exponents
4. Radicals and Rational Exponents
5. Radicals and Rational Exponents (Continued)
6. Polynomials
7. Polynomials (Continued)
8. Rational Expressions
9. Unit Circle

All pages MUST show the work in order for the work to be accepted. If more paper is needed, the work may go on the back of each page or neatly on a separate page.

Completion of this booklet is required by the first day of the school year.

We suggest students complete 1 section each week of the summer.

Video links to each topic can be found using Google or Khan Academy.

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Dear Parents and Guardians:

Attached are the summer curriculum review materials for *Analytical Math*. This booklet was prepared by the Decatur City Schools Math Department and contains topics that reflect content learned in prerequisite courses. These materials must be completed and brought to class on the first class day of school.

Your child is required to complete this booklet over the summer. A test based on the material in the packet will be given to your child during the second week of school. It will count as the first test of the year and the grade will be determined as follows:

Completion of the packet on time will count 20% of the grade
Performance on the test will count 80% of the grade.

Thank you for your cooperation.

Sincerely,

Decatur City School Mathematics Department

Topic: Solving Quadratic Equations (using any Method)

1. $5x^2 - 20x = 0$; factor

2. $x^2 - 3x - 10 = 0$; factoring

3. $2x^2 + x = 1$; Factoring

4. $5x^2 + 15 = 51$; square root property

5. $x^2 - 6x - 11 = 0$; complete the square

6. $3x^2 - 3x - 4 = 0$; quadratic formula

Topic: Algebraic Expression, Sets, Mathematical Models, and Real Numbers

1. Evaluate

$$3 + 6(x - 2)^2 \text{ for } x = 4$$

2. Find the intersection of two sets

$$\{3,4,5,6,7\} \cap \{3,7,8,9\}$$

3. Find the union of two sets

$$\{3,4,5,6,7\} \cup \{3,7,8,9\}$$

Consider the following numbers:

$$\{-7, -3/4, 0.006, \sqrt{5}, \pi, 7.33, \sqrt{81}\}$$

List the numbers in the set that are:

- | | | |
|---------------------|-----------------------|-----------------|
| a. natural numbers | b. whole numbers | c. integers |
| d. rational numbers | e. irrational numbers | f. real numbers |

5. Find the distance between -17 and 4 on the real number line.

6. Simplify:

$$3(4x - 5) - (7x + 2)$$

Topic: Exponents

1. Multiply the expression using the product rule:

$$(-5x^3y^2)(-2x^{-11}y^{-2})$$

2. Divide the expression using the quotient rule:

$$\frac{7x^5y^6}{28x^{15}y^{-2}}$$

3. Use the negative-exponent rule to write the expression with a positive exponent. Simplify if possible

$$3a^{-9}y^4$$

4. Simplify using the power rule

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

5. Simplify:

$$(-5b)^3$$

6. Simplify:

$$\left(\frac{3a}{b^5}\right)^{-2}$$

Topic: Radicals and Rational Exponents

1. Simplify using the product rule for square roots

$$\sqrt{2x}\sqrt{10x}$$

2. Simplify using the quotient rule for square roots

$$\frac{\sqrt{96x^3}}{\sqrt{2x}}$$

3. Add

$$4\sqrt{72} - 2\sqrt{48}$$

4. Subtract

$$6\sqrt{18} - 6\sqrt{12x}$$

5. Rationalize the Denominator

$$\frac{5}{\sqrt{12}}$$

6. Rationalize the Denominator

$$\frac{6}{3 - \sqrt{2}}$$

Topic: Radicals and Rational Exponents (Continued)

1. Simplify

$$\frac{\sqrt[3]{125}}{8}$$

2. Subtract

$$5\sqrt[3]{81} - 4\sqrt[3]{3}$$

3. Simplify Rational Exponents

$$-81^{\frac{1}{4}}$$

4. Simplify Rational Exponents

$$(-27)^{\frac{1}{3}}$$

5. Simplify

$$64^{\frac{2}{3}}$$

6. Simplify

$$\sqrt[6]{x^3}$$

Topic: Polynomials

1. Add

$$(-6x^3 + 7x^2 - 9x + 3) + (14x^3 + 3x^2 - 11x - 7)$$

2. Subtract

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

3. Multiply

$$(5x - 2)(4x^2 + 3x - 5)$$

4. Multiply

$$(3x - 5)(2x + 1)$$

5. Multiply

$$(7x + 4y)(7x - 4y)$$

6. Multiply

$$(3x - 5y)^2$$

Topic: Polynomials (Continued)

1. Multiply:

$$(7x - 3)^2$$

2. Multiply:

$$(7x - 6y)(3x - y)$$

3. Multiply:

$$(2x + 4y)^2$$

4. Multiply:

$$(x + 4)^3$$

5. Subtract

$$(x^3 - 4x^2y + 5xy^2 - y^2) - (x^3 - 6x^2y + y^2)$$

6. Multiply:

$$(3xy^2 - 4y)(3xy^2 + 4y)$$

Topic: Rational Expressions

1. Find all the numbers that must be excluded from the domain of the rational expression:

$$\frac{7}{x+9}$$

2. Find all the numbers that must be excluded from the domain of the rational expression:

$$\frac{x}{x^2-121}$$

3. Simplify:

$$\frac{x^3+2x^2}{x+2}$$

4. Simplify:

$$\frac{x^2-2x}{x^2+4x+1}$$

5. Multiply:

$$\frac{x^2+6x+9}{x^2-4} \cdot \frac{x+3}{x-2}$$

6. Divide

$$\frac{x^2-5x-24}{x^2-x-12} \div \frac{x^2-10x+16}{x^2+x-6}$$

Fill in the unit Circle below: Use the pre-filled parts as a guide.

