

## Students entering 9th grade Math Extended or Extended Advanced:

In order to keep our current math skills sharp, please complete this summer review packet. Use your previous class notes and work, websites such as Khan Academy and IXL and other math reference books for guides. Please complete before the first day of school in August 2022. You will be tested on this material when you return to school. If there are topics you are struggling with, please use the extra resources provided to practice!

Show all work, graphs and solutions clearly on a **separate** sheet of paper. Your work should be numbered and organized so it is easy to read. Solutions are not provided with this packet.

Have a good summer!

CDS Mathematics Department

## Formulas:

|                           |  |
|---------------------------|--|
| Quadratic Formula         | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   |
| Pythagorean Theorem       | $c^2 = a^2 + b^2$  |
| Midpoint, Distance, Slope | $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right), d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}, m = \frac{y_2-y_1}{x_2-x_1}$ |
| Equation of line          | $y = mx + b \quad Ax + By = C$ , where $A, B, C \in \mathbb{Z}$ and $A > 0$  |
| Area of a Triangle        | $A = \frac{1}{2} bh$   |

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## Simplifying Expressions

| Topic                   | Extra Help   | Extra Practice (IXL)                            |
|-------------------------|--|---|
| Factoring               | <a href="https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-strategy/v/strategy-in-factoring-quadratics-1">https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-strategy/v/strategy-in-factoring-quadratics-1</a>  | Algebra 1<br>AA.2, AA.3,<br>AA.4, AA.5          |
| Multiplying polynomials | <a href="https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-binomials-2/v/multiplying-binomials">https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-binomials-2/v/multiplying-binomials</a><br><a href="https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-polynomials-by-binomials/v/more-multiplying-polynomials">https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-polynomials-by-binomials/v/more-multiplying-polynomials</a> | Algebra 1<br>Z.4, Z.8, Z.9                      |
| Index Laws (Exponents)  | <a href="https://www.khanacademy.org/math/algebra2/exponential-growth-and-decay-alg-2/equivalent-forms-of-exponential-expressions/v/simplifying-an-exponential-expression">https://www.khanacademy.org/math/algebra2/exponential-growth-and-decay-alg-2/equivalent-forms-of-exponential-expressions/v/simplifying-an-exponential-expression</a>  | Algebra 1<br>V.3, V.4,<br>V.5, V.6,<br>V.7, V.8 |
| Radical Operations      | <a href="https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/adding-and-simplifying-radicals">https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/adding-and-simplifying-radicals</a><br><a href="https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/multiply-and-simplify-a-radical-expression-2">https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/multiply-and-simplify-a-radical-expression-2</a>   | Algebra 1<br>EE.4, EE.5,<br>EE.6, EE.7          |

## Solving Equations:

| Topic                          | Extra Help  | Extra Practice IXL                       |
|--------------------------------|---|--|
| Solving Linear Equations       | <a href="https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/algebra-linear-equations-1">https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/algebra-linear-equations-1</a>       | Algebra 1<br>J.4, J.5, J.11              |
| Solving Quadratics             | <a href="https://www.khanacademy.org/math/algebra/quadratics">https://www.khanacademy.org/math/algebra/quadratics</a>   | Algebra 1<br>BB.6, BB.8,<br>BB.10, BB.11 |
| Solving Radical Equations      | <a href="https://www.khanacademy.org/math/algebra2/radical-equations-and-functions">https://www.khanacademy.org/math/algebra2/radical-equations-and-functions</a>   | Algebra 1<br>FF.4                        |
| Solve absolute value Equations | <a href="https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-equations/v/absolute-value-equations">https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-equations/v/absolute-value-equations</a> | Algebra 1<br>L1                          |
| Systems of Equations           | <a href="https://www.khanacademy.org/math/algebra/systems-of-linear-equations">https://www.khanacademy.org/math/algebra/systems-of-linear-equations</a>   | Algebra 1<br>U.2, U.8,<br>U.10, U.14     |

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1) Simplify:  $\frac{x^4 y^3 z^{-3}}{x^2 y^2 z^4}$

13) Simplify:  $6xy^5 \div 9x^2y^5$

2) Solve:

$$4x - 5y = 8$$

$$3x - 4y = 12$$

14) Simplify:  $\frac{x^2 + 7x + 10}{x^2 + x - 2} \div \frac{x^2 + 4x - 5}{x^2 + 2x - 3}$

3) Simplify:

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

15) Solve:  $\frac{x+3}{44} = \frac{42}{33}$

4) What is the minimum of:  $y = x^2 - 6x + 11$

16) Simplify:  $(2x^6)^{-1}$

5) Multiply:  $(3x + 1)(x^2 + 2x - 4)$

17) Simplify:  $(3a^5b)(5a^2b^2)(4a^4)$

6) Create a line perpendicular to:  $y = \frac{-5}{3}x + 3$

18) Jose has **16** coins that total **\$1.80**. If he has only **nickels and quarters**, how many quarters does he have?

7) Simplify:  $\sqrt{75} + \sqrt{12}$

8) Graph  $3x + 4y \leq 8$  by shading above or below the line.

19) Nick worked **16 hours** last week. He earned **\$5 per hour** at a local bakery and **\$5.50 per hour** at a fast food restaurant. If he earned a total of **\$82**, how many **hours** did he work at the **bakery**?

9) Solve for x:  $3x - 4 < 17$ ?

20) Factor:  $18x^3 - 63x^2$

10) Find  $f(-5)$  when  $f(x) = -x^2 - 2x$

21) Translate the following sentence into an equation. **The product of eight and four less than n is 36.**

11) The function:  $f(x) = x^2 - 2x + 3$  belongs to which family of functions?

12) Which property is represented by:

$$4(6 * 3) = (4 * 6) * 3$$

22) Simplify:  $12(3/4x + 1/3) - 1/2(12x - 6)$

33) Factor completely:  $16 - x^2$

23) Solve for x:  $-2 - x + x^2 = 0$

34) Find the equation of a line passing through the following points: **(3, -5) and (-6,13)**

24) Solve  $15x^2 - x = 2$

35) Solve by substitution:  
 $y = 2x - 1$   
 $-6x + 5y = 3$

25) Find the **constant of variation** if **y varies directly as x** and **y = 19** when **x = 95**.

36) Simplify:  $\frac{n-9}{36} - \frac{n-35}{108}$

26) Solve:  
 $2x + y = -6$   
 $3x - 2y = -2$

37) Find the vertex of:  $y = 2x^2 - 12x + 15$

27) Expand and simplify  $(2x-1)^2$

38) Simplify using exponents:  $a^*a*r*d*v*a*r*k$

28) Find the slope and y-intercept of the line whose equation is:  $y = -2x - 3$

39) Solve:  $\frac{x}{4} - \frac{x+4}{5} = 1$

29) Simplify:  $3r + 7(r-4)$

40) Simplify:  $\frac{6}{\sqrt{3}}$

30) Evaluate:  $\frac{a+15b}{c}$  if  $a = -9, b = 9, c = -3, d = 2$

41) Three pens and two notebooks cost \$8.25. Two pens and three notebooks cost \$8.00. How much are two pens and two notebooks?

31) Solve:  $\sqrt{2x-7} = 5$

42) Solve:  $b - 3b = 24$

32) Solve for b in the equation  $c + by = a$ .

**OPTIONAL PROBLEMS (extended advanced required): #43-49**

43)

What is the value of  $2 - (-2)^{-2}$ ?

- (A)  $-2$     (B)  $\frac{1}{16}$     (C)  $\frac{7}{4}$     (D)  $\frac{9}{4}$     (E)  $6$

44)

Marie does three equally time-consuming tasks in a row without taking breaks. She begins the first task at 1:00 PM and finishes the second task at 2:40 PM. When does she finish the third task?

- (A) 3:10 PM    (B) 3:30 PM    (C) 4:00 PM    (D) 4:10 PM    (E) 4:30 PM

45)

David, Hikmet, Jack, Marta, Rand, and Todd were in a 12-person race with 6 other people. Rand finished 6 places ahead of Hikmet. Marta finished 1 place behind Jack. David finished 2 places behind Hikmet. Jack finished 2 places behind Todd. Todd finished 1 place behind Rand. Marta finished in 6th place. Who finished in 8th place?

- (A) David    (B) Hikmet    (C) Jack    (D) Rand    (E) Todd

46)

Four siblings ordered an extra large pizza. Alex ate  $\frac{1}{5}$ , Beth  $\frac{1}{3}$ , and Cyril  $\frac{1}{4}$  of the pizza. Dan got the leftovers. What is the sequence of the siblings in decreasing order of the part of pizza they consumed?

- (A) Alex, Beth, Cyril, Dan  
 (B) Beth, Cyril, Alex, Dan  
 (C) Beth, Cyril, Dan, Alex  
 (D) Beth, Dan, Cyril, Alex  
 (E) Dan, Beth, Cyril, Alex

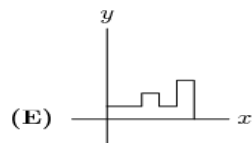
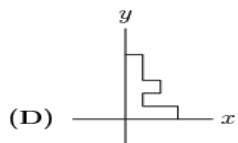
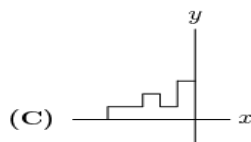
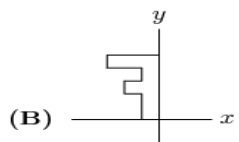
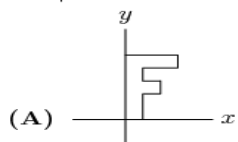
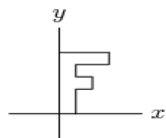
47)

Marley practices exactly one sport each day of the week. She runs three days a week but never on two consecutive days. On Monday she plays basketball and two days later golf. She swims and plays tennis, but she never plays tennis the day after running or swimming. Which day of the week does Marley swim?

- (A) Sunday    (B) Tuesday    (C) Thursday    (D) Friday    (E) Saturday

48)

The letter F shown below is rotated  $90^\circ$  clockwise around the origin, then reflected in the  $y$ -axis, and then rotated a half turn around the origin. What is the final image?



49)

Consider the operation "minus the reciprocal of," defined by  $a \diamond b = a - \frac{1}{b}$ . What is

$((1 \diamond 2) \diamond 3) - (1 \diamond (2 \diamond 3))$ ?

- (A)  $-\frac{7}{30}$     (B)  $-\frac{1}{6}$     (C)  $0$     (D)  $\frac{1}{6}$     (E)  $\frac{7}{30}$