Name:_____

Algebra 2 / Honors Algebra 2

Summer work 2026

This workbook contains problems designed to ensure the student's readiness for Algebra 2. The ten topics covered in this packet are concepts that should be mastered before entering Algebra 2. Assistance with the packet will be provided at the beginning of the school year. Completion of this packet over the summer before beginning Algebra 2 will be of great value to helping students successfully meet the academic challenges awaiting them in Algebra 2 and beyond.

Topics Covered in this Packet:

1. Order of Operations
2. Fractions
3. Exponents
4. Radicals
5. Simplifying Expressions
6. Solving Equations
7. Solving Inequalities
8. Linear Graphs
9. Quadratics: Multiplying, Factoring and Solving Polynomial Expressions and Equations
10. Linear Functions

Instructions:

- Start review packet about 2 weeks prior to the start of the school year.
- You are expected to use your notes from Algebra 1 and Geometry.
- Show all work (when appropriate) on a separate sheet of paper
- Simplification is implied for all problems.
- Leave answers in fractional form when appropriate (improper fractions are preferred to mixed numbers).
- Problems are to be returned on the first Friday of classes (after some class time for questions and answers has been provided).

Remember: This packet is for your benefit and is intended to help you succeed as you move through more advanced math classes.

Parentheses
Exponents
Multiplication
Division
Addition
Subtraction

NO CALCULATORS ALLOWED

Section A Evaluate

2. $\frac{2}{9} - \frac{3}{2}$

3. $\dfrac{\frac{1}{3} - \frac{4}{3}}{\frac{16}{3}}$

4. 1^{68}

5. $24 \div 3 \cdot 2 - 5 \cdot 7$

6. -1^{52}

7. $4\left[(3+2\times3)-5\right]+7$

8. $3(1-8)-6+7$

9. 3^4

10. $\dfrac{\frac{3}{2}+\frac{3}{4}+\frac{3}{8}}{21}$

11. $\left(\dfrac{6+(-9)}{-3-9}\right)\left(\dfrac{24+(-72)}{3-6}\right)$

NO CALCULATORS ALLOWED

Example of verbal expression:

Verbal Phrase	Expression
The sum of six and a number	$6 + x$

Section B

Write each as a verbal expression.

12) $d^2 = 37$

13) $n \cdot 6 = 44$

Simplify:

14. $\frac{12}{54}$

15. $1\frac{2}{3} + 4\frac{1}{5} - 3\frac{5}{6}$

16. $\frac{4}{5} \div \frac{2}{15}$

17. $3\frac{2}{3} - 2\frac{1}{2}$

18. $\frac{2xy^4}{5xy^2} \cdot \frac{-30xy}{2x^2y}$

19. $\left(\frac{5u^2}{2v^2}\right)^2$

Simplify:

20. $\frac{3x^2y^3}{9xy^5}$

21. $\frac{2x^{-2}y}{3y^{-3}x^2}\cdot\frac{3x^4}{8y^{-2}}$

22. $\left(3^{-1}+2^{-1}\right)^2$

23. $\sqrt{72}$

24. $(10z)\left(11^0\right)$

25. $\sqrt{17}+5\sqrt{17}$

26. $3\sqrt{8}-3\sqrt{32}$

27. $\sqrt{5}\cdot\sqrt{15}$

28. $\sqrt{2}\left(3\sqrt{2}+5\right)$

29. $\frac{2}{\sqrt{12}}$

30. $(7x-2y)-(3x+5y)$

31. $7(3x^2+10x)-4x$

32. $(8+x)(8-x)$

33. $(1+7y)^2$

34. $(5x+2y)^2$

Tip: If the question is asking for a definition, do not be afraid to seek help if you are unsure!

Section C

1. What number is 25% of 80?

2. 7 is 30% of what number?

3. Write the first 4 prime numbers.

4. Which property does the following statement illustrate?
$(a + b)c = (b + a)c$

5. What makes a number Prime?

6. What is the difference between an equation and an expression?

Example:

equation	**expression:**
2x = 1	3x+4

7. What is the differnce between a RATIONAL and IRRATIONAL number? Give an example.

8.

a. In your own words, what is the Domain of a function?

b. What is the Range of a function?

10. What is the difference between an improper fraction, fraction, and mixed number? give examples.

11. Explain in words how to add two fractions. Show symbolically below by combining the expression into a single fraction.

$$\frac{a}{b} + \frac{c}{d}$$

12. How do you multiply fractions? demonstrate below by combining the expression into a single fraction.

$$\frac{a}{b} \cdot \frac{c}{d}$$

Section D

1. Find the slope of the line

$y = 4x - 2$

2. Write the standard form of the equation of the line passing through the point (2,5) and perpendicular to the line $4x - y = 2$.

3. A line has a slope m = 2. Determine whether the line through (5,4) and (3, 5) is parallel or perpendicular to the first line.

4. Find the pair of parallel lines:
   a. $-y + 3x = 8$
   b. $3x + y = 8$
   c. $-y = 3x + 8$

5. The line through A (-4, 5) and B (2, y) is perpendicular to a line with slope 1. Find y.

6. Write the equation of the line in slope-intercept form of the line that contains the point $(8,-6)$ and has slope of $\frac{-3}{4}$

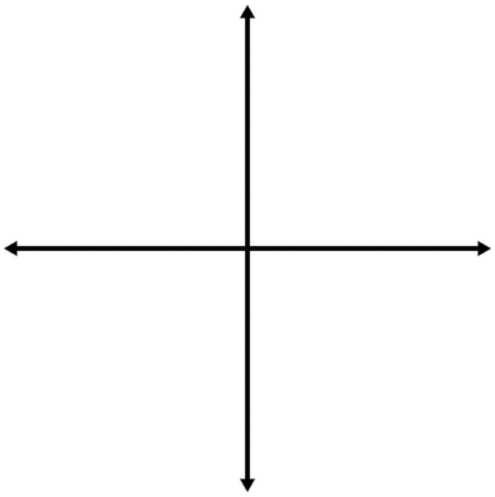
7. Find the slope of the line passing through the points $(-4,5)(-3,8)$

8. Find the slope and y-intercept of the line $y = \frac{5}{6}x - 1$

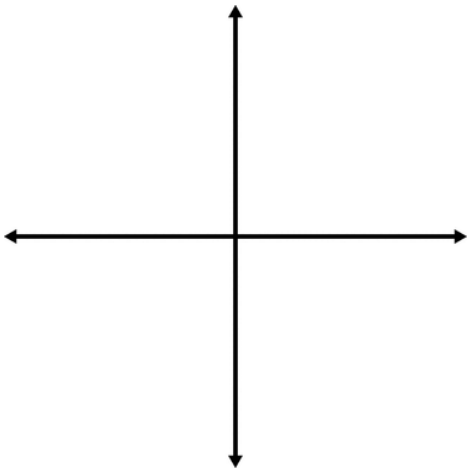
Section E

Graph

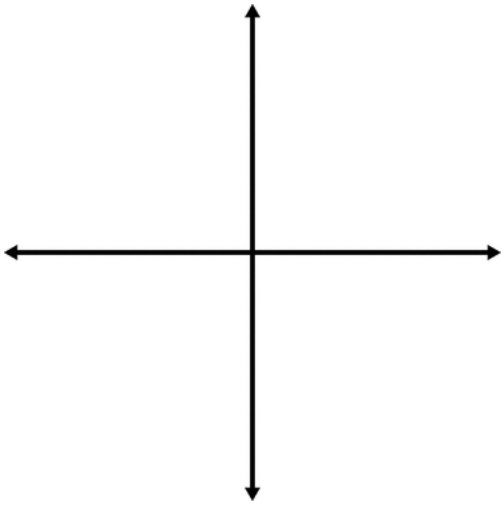
1. $y = -2x + 2$



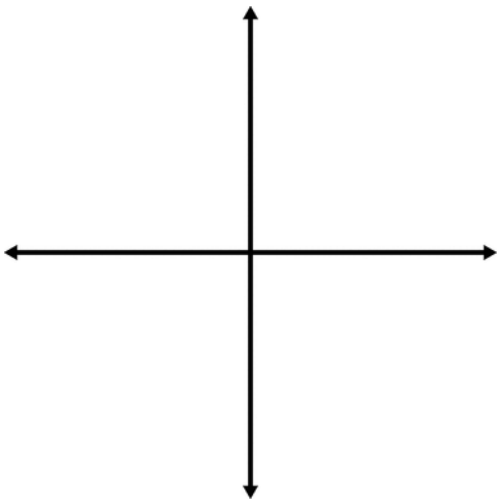
2. $y > x - 4$



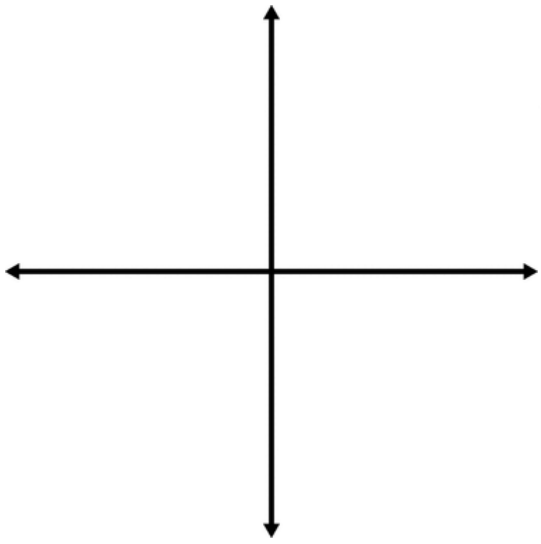
3. $y = x^2$



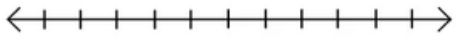
4. $2x + y = 4$



5. $\begin{cases} y > -3x - 2 \\ 2x - 3y < 6 \end{cases}$



6. $-3 \le x < 4$



Section F

Factor

$x^2 - 4x$

$a^2 - 16$

$x^2 - 4x + 4$

4. $s^2 + 5s + 4$

$x^2 - 9x - 10$

$x^2 - 10x - 24$

$x^2 - 10x + 24$

$x^2 - 10x - 25$

$2x^2 - 3x - 9$

10. $4x^2 + 12x + 9$

11. $8x^2 - 14x + 5$

12. $2y^2 + 10y - 12$

13. $x^2 + 64$

14. $x^2 - 81$

Section G

1. Which is larger, 2^5 or 5^2

2. Rewrite the expression using positive exponents. $(-2x)^{-3}$

3. Let $f(x)=2x+3$ and $g(x)=x^2$

3a. $g(-3)$

3b. $f(1)$

3c. $f(g(10))$

Section H

Solve

6. $3x+2=14$

7. $4-2(y+6)=11-3y$

8. $\frac{x}{2}+4=3x$

9. $x+4 \geq 6$

10. $8a=6\{4a-[4a+(2a-5)]\}$

11. $|x+1|=5$

Section H

Solve

12. $x^2 = 16$

13. $\frac{1}{3} + \frac{1}{x} = \frac{1}{2}$

14. $\begin{cases} x + y = 6 \\ 3x - y = 30 \end{cases}$

15. $\begin{cases} 4x + 3y = -14 \\ 8x - 2y = 12 \end{cases}$

16. $\begin{cases} 3x + 2y = -1 \\ y = 2x - 4 \end{cases}$

17. $(7^3)^5 = 7^x$

18. $\frac{5}{y+2} = \frac{6}{y-7}$

19. $\sqrt{x} + 5 = 3$

20. $2 = \sqrt{3x+1} - 3$

21. $(x+4)(9x-3) = 0$

22. $x^2 - 6x + 4 = 20$

23. $x^2 + 10x = 6$

Section I

FORMULAS TO MEMORIZE AND USE (No problems here to complete.)

1.	CommutativeProperty	• $a+b=b+a$ • $a\cdot b=b\cdot a$
2.	Associative Property	• $a+(b+c)=(a+b)+c$ • $a\cdot(b\cdot c)=(a\cdot b)\cdot c$
3.	Distributive property	$a(b+c)=ab+ac$
4.	Reflexive property	$a=a$
5.	Transitive Property	If $a=b$ and $b=c$, then $a=c$
6.	Slope, *m*	• $\frac{rise}{run}$ • $\frac{y_2-y_1}{x_2-x_1}$ • $\frac{\Delta y}{\Delta x}$
7.	Point-slope form of a line	$y-y_1=m(x-x_1)$ • *m*=slope • (x_1,y_1) is the point
8.	Slope-intercept form of a line	$y=mx+b$ • *m*=slope • b = y-intercept
9.	Standard form of a line	• $Ax+By=C$ • No decimals on fractions
10.	Horizontal lines	• $y=$ ____ • Slope m = 0
11.	Vertical lines	• Slope of undefined • $x=$ ____

12.	Parallel lines…	Have the same slope
13.	Perpendicular lines…	Have negative reciprocal slopes
14.	Meaning of percent	Divide by 100 (our portion of 100)
15.	Fractions need common denominators when…	Adding and subtracting
16.	Reciprocal of $\frac{a}{b}$	$\frac{b}{a}$
17.	Dividing by a fraction is the same as…	Multiplying by the reciprocal
18.	Cross multiply if $\frac{a}{b}=\frac{c}{d}$	$ad=bc$
19.	Inequalities "flip" when…	Multiply or divide by a negative value
20.	Area of a circle	$A=\pi r^2$
21.	Area of a square	s^2
22.	Area of a rectangle	bh
23.	Area of a triangle	$\frac{1}{2}bh$
24.	Volume of a Cube	s^3
25.	Perimeter	Distance around the outline of a shape
26.	Circumference	Perimeter of a circle $2\pi r$
27.	$x^a x^b =$	x^{a+b}
28.	$\frac{x^a}{x^b} =$	x^{a-b}
29.	$\left(x^a\right)^b =$	x^{ab}
30.	$x^{-m} =$	$\frac{1}{x^m}, x \neq 0$
31.	$\frac{a^x}{b^x} =$	$\left(\frac{a}{b}\right)^x$
32.	$a^x b^x =$	$(ab)^x$
33.	$\frac{a-b}{b-a} =$	-1
34.	FOIL	First, Outer, Inner, Last
35.	$(a+b)^2 =$	$a^2+2ab+b^2$
36.	$(a-b)^2 =$	$a^2-2ab+b^2$

37.	$(a+b)(a-b)=$	a^2-b^2
38.	$a^2-b^2=$	$(a+b)(a-b)$
39.	Zero Product Property	If $ab=0$, theneither $a=0$ or $b=0$
40.	Rules for reverse FOIL of ax^2+bx+c	• Front numbers multiply to *a* • Back numbers multiply to *c* • Outside plus the inside adds to *b* • *Product = ac • *Sum = *b*
41.	Process for completing the square	• $\frac{b}{2}$ • Square it
42.	Meaning of the square root of x, $\sqrt{x}$	Length of a side of a square whose area is *x*
43.	$\sqrt{ab}$	$\sqrt{a}\sqrt{b}$
44.	$\sqrt{\frac{a}{b}}$	$\frac{\sqrt{a}}{\sqrt{b}}$
45.	$\sqrt{a^2}$	$\lvert a\rvert$
46.	Midpoint formula	$\left(\frac{(x_1+x_2)}{2},\frac{(y_1+y_2)}{2}\right)$
47.	Right Triangle	A triangle with one angle that's $90°$
48.	Sum of angle measures in a triangle	$180°$
49.	Hypotenuse	The longest side in a right triangle (the side opposite the right angle)
50.	Pythagorean Theorem (for right triangles only)	$a^2+b^2=c^2$
51.	Distance formula	$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
52.	$\lvert x\rvert$ (graph)	