

Summer Packet
Rising Precalculus, and Functions and Trigonometry

Unless noted, calculators are permitted, but all work must be shown. Please record all answers on the answer sheet, and attach all work to the sheet (if the grids do not show up correctly on the answer sheet, please do all graphs on graph paper and attach). Underlined terms are important vocabulary that will be discussed when school begins. Please email me if you have questions: abeatty@sqjis.org.

Part I: Expressions and Types of Numbers

1. Evaluate each algebraic expression.

a. $x^2 - 6x + 3$ for $x = 7$

b. $6 + 5(x - 6)^3$ for $x = 8$

2. Write the algebraic expression for each English phrase. Then simplify the expression.

a. A number decreased by the sum of the number and four.

b. Ten times the product of negative four and a number.

3. Label each number in the set below as a) natural numbers, b) whole numbers, c) integers, d) rational numbers, e) irrational numbers, f) real numbers (may be more than one)/

$$\{-9, -\frac{4}{5}, 0, 0.25, \sqrt{3}, 9.2, \sqrt{100}\}$$

4. Give an example of a rational number that is not an integer.

Part II: Exponents and Scientific Notation: Topics include: exponential rules, and scientific notation.

5. Simplify each exponential expression and write each with no negative exponents.

a. x^2y

b. x^0y^5

c. $(3x^2y^5)^2$

d. $(3x^4)(2x^7)$

e. $\frac{25a^{13}b^4}{-5a^2b^3}$

f. $\left(\frac{3x^4}{y}\right)^{-3}$

g. $\left(\frac{4a^{-5}b^3}{12a^3b^{-5}}\right)^0$

6. Write each number in scientific notation.

a. -5716

b. 0.000083

c. 579,000,000,000

7. Simplify, then write answer in scientific notation.

a. $(2 \times 10^4) (4.1 \times 10^3)$

b. $\frac{8.4 \times 10^8}{4 \times 10^5}$

Part III: Radicals and Rational Exponents: Topics include: roots, simplifying radicals, radical operations, rationalizing denominators, and fractional exponents.

8. Simplify the expressions or indicate that the root is not a real number.

a. $\sqrt{36}$

b. $-\sqrt{36}$

c. $\sqrt{-36}$

d. $\sqrt{25-16}$

e. $\sqrt{10x} \cdot \sqrt{8x}$

f. $\sqrt{\frac{72x^3}{8x}}$

g. $7\sqrt{3} + 6\sqrt{3}$

h. $\sqrt{8} + 3\sqrt{2}$

i. $\sqrt[3]{-125}$

9. Rationalize the denominator.

a. $\frac{1}{\sqrt{7}}$

b. $\frac{\sqrt{7}}{\sqrt{3}}$

c. $\frac{3}{3+\sqrt{7}}$

10. Simplify the expression without a calculator.

a. $36^{\frac{1}{2}}$

b. $125^{\frac{2}{3}}$

c. $(7x^{\frac{1}{3}})(2x^{\frac{1}{4}})$

Part IV: Polynomials: Topics include: standard form, operations with polynomials.

11. Write the polynomial in standard form. Classify it by degree and by the number of terms:
 $x^2 - x^3 - 5$.

12. Simplify and write the answer in standard form.

a. $(-6x^3 + 5x^2 - 8x + 9) + (17x^3 + 2x^2 - 4x - 13)$

b. $(18x^4 - 2x^3 - 7x + 8) - (9x^4 - 6x^3 - 5x + 7)$

c. $(x + 8)(x - 1)$

d. $(x + 3)(x - 3)$

e. $(2x - 3)(5x + 3)$

f. $(8x^3 + 3)(x^2 - 5)$

g. $(x + 1)(x^2 - x + 1)$

h. $(x - 3)^2$

Part V: Factoring Polynomials: Topics include: factoring out the greatest common factor, and factoring into two binomials.

13. Factor out the greatest common factor.

a. $16x - 4$

b. $3x^2 + 6x$

c. $9x^4 - 18x^3 + 27x^2$

d. $x(x + 5) + 3(x + 5)$

14. Factor each polynomial.

a. $x^2 + 5x + 6$

b. $x^2 - 4x - 5$

c. $3x^2 - x - 2$

d. $36x^2 - 49$

e. $x^2 - 14x + 49$

Part VI: Rational Expressions: Topics include: domain, simplifying rational expressions, and operations with rational expressions.

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

a. $\frac{7}{x-3}$

b. $\frac{x+5}{x^2-25}$

16. Simplify each rational expression.

a. $\frac{3x-9}{x^2-6x+9}$

b. $\frac{x^2+12x+36}{x^2-36}$

17. Multiply or divide and simplify if possible.

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

b. $\frac{x^2-25}{2x-2} \div \frac{x^2+10x+25}{x^2+4x-5}$

18. Add or subtract and simplify if possible.

a. $\frac{3}{x+4} + \frac{6}{x+5}$

b. $\frac{4}{x} - \frac{3}{x+3}$

Part VII: Equations: Topics include: solving linear, quadratic, radical, and absolute value equations; solve for a variable; and find the discriminant.

19. Solve each linear equation.

a. $7x - 5 = 72$

b. $11x - (6x - 5) = 40$

c. $3(x - 2) + 7 = 2(x + 5)$

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

20. Solve each formula for the specified value.

a. $T = D + pm$ for p

b. $B = \frac{F}{S - V}$ for S

21. Solve each absolute value equation.

a. $|x - 2| = 7$

b. $2|3x - 2| = 14$

c. $|2x - 1| + 3 = 3$

22. Solve each quadratic equation. You may use any method, but the most appropriate is written next to the problem.

a. $x^2 - 13x + 36 = 0$ (factoring)

b. $x^2 = -11x - 10$ (factoring)

c. $3x^2 = 27$ (square root)

d. $3x^2 - 3x - 4 = 0$ (quadratic formula)

e. $x^2 - 6x + 10 = 0$ (quadratic formula)

23. Find the discriminant and tell what it indicates about the number and types of solutions.

a. $2x^2 - 11x + 3 = 0$

b. $4x^2 - 2x + 3 = 0$

24. Solve the radical expression $\sqrt{6x+1} = x-1$

Part VIII: Functions

Match each function to its appropriate equation.

25. Linear

A. $2x + 3y = 12 - 4x^2$

26. Quadratic

B. $g(x) = 0.5^x - 3.5$

27. Cubic

C. $f(x) = \frac{3x^2}{-5 + 2x^2}$

28. Rational

D. $2x + 3y = 12$

29. Exponential

E. $2x + 3y = 2x^3$

Part IX: Graphing

Please complete each on graph paper.

30. Create a scatterplot of the following data.

Number of students enrolled in Advanced Algebra

Year	2001	2002	2003	2004	2005	2006
# of students	33	29	45	43	43	61

31. Graph the linear function and give its slope and y -intercept: $y - 1 = -\frac{1}{3}x$.

32. Graph the absolute value equation: $f(x) = |x + 4|$.

33. Graph the inequality: $f(x) > 2x - 4$.

34. Graph the linear equations.

a. $x = 1.5$

b. $y = -2$

35. Graph the system of equations and give the solution:
$$\begin{cases} f(x) = -x - 1 \\ f(x) = 2x - 4 \end{cases}$$

36. Graph the quadratic function: $f(x) = (x + 1)^2 - 3$. Include the vertex and x -intercepts.

37. Graph the exponential function: $f(x) = 2^x - 3$.

38. Find the domain of the rational function. Identify all asymptotes and holes. Then graph: $f(x) = \frac{x + 1}{x^2 + 4x - 21}$.

Summer Packet-Answer Sheet
Rising Precalculus, and Functions and Trigonometry

Record the answers for your summer packet on this sheet with pencil.

1. a. _____

b. _____

2. a. _____

b. _____

3. -9 _____

$-\frac{4}{5}$ _____

0 _____

.25 _____

$\sqrt{3}$ _____

9.2 _____

$\sqrt{100}$ _____

4. _____

5. a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

6. a. _____

b. _____

c. _____

7. a. _____

b. _____

8. a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

9. a. _____

b. _____

c. _____

10. a. _____

b. _____

c. _____

11. _____

12. a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

13. a. _____

b. _____

c. _____

d. _____

14. a. _____

b. _____

c. _____

d. _____

e. _____

15. a. _____

b. _____

16. a. _____

b. _____

17. a. _____

b. _____

18. a. _____

b. _____

19. a. _____

b. _____

c. _____

d. _____

20. a. _____

b. _____

21. a. _____

b. _____

c. _____

22. a. _____

b. _____

c. _____

d. _____

e. _____

23. a. _____

b. _____

24. _____

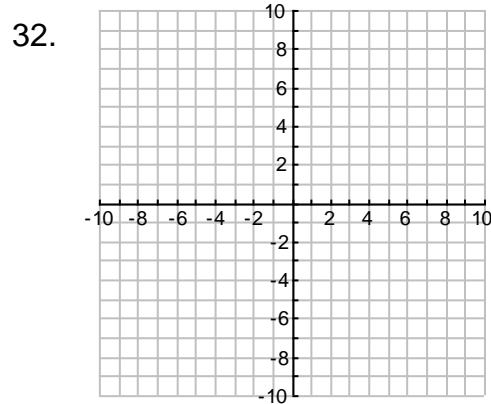
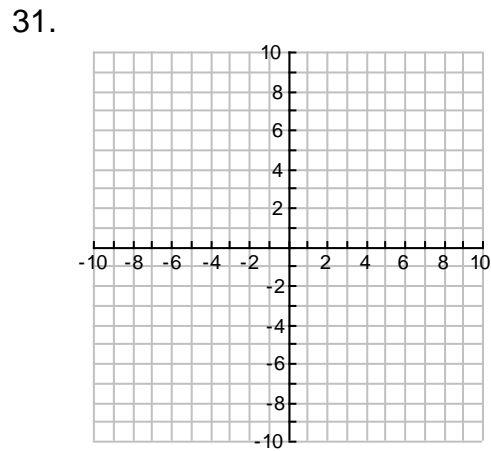
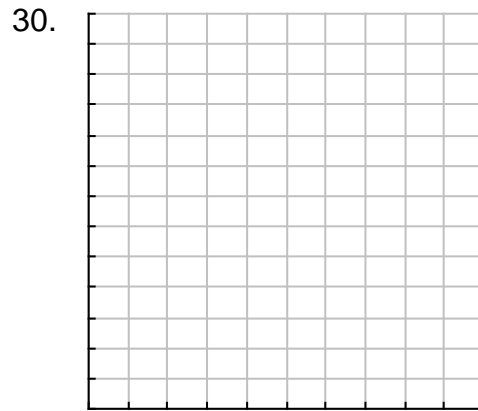
25. _____

26. _____

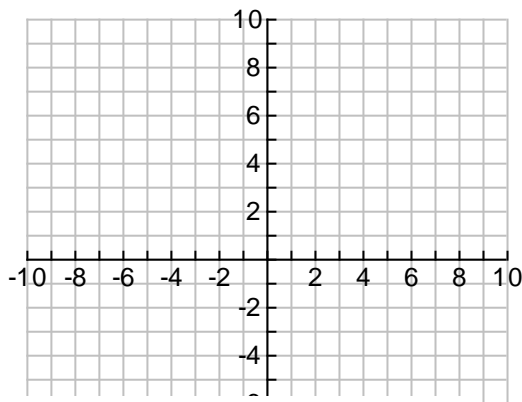
27. _____

28. _____

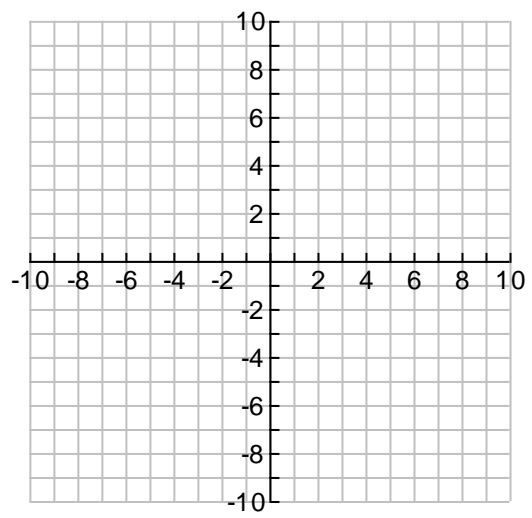
29. _____



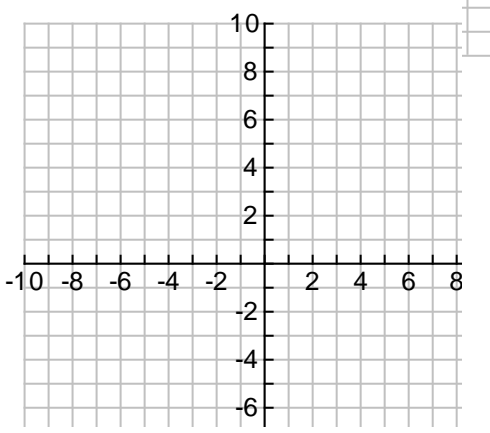
33.



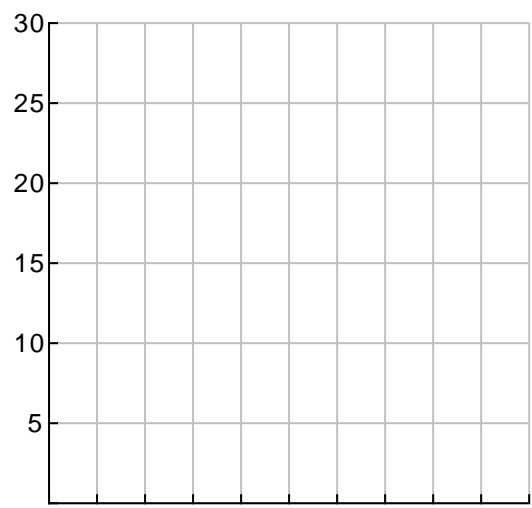
36.



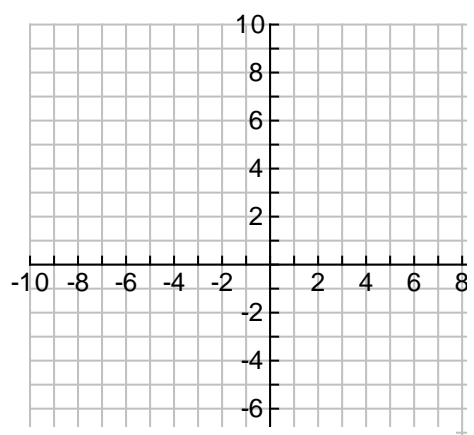
34. a.



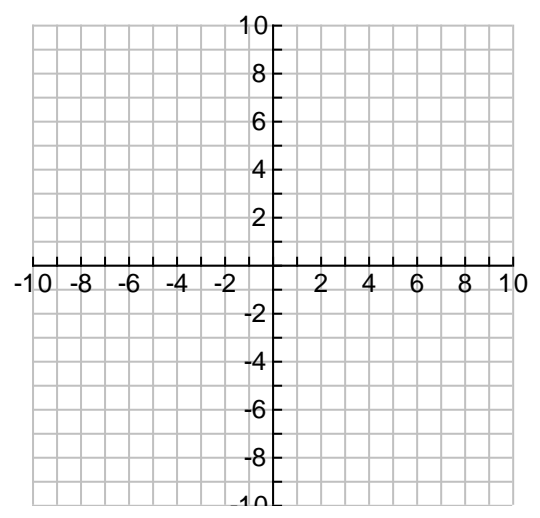
37.



b.



38.



35.

