Raising Grade 12 Summer packet

DUE ON THE FIRST DAY OF SCHOOL

The problems in this packet are designed to help you review topics from previous mathematics courses that are essential to your success in your next math class. You are expected to bring this completed packet to the class on the first day of school. In addition, this packet will count as part of your first quarter grade. Upon returning, you will be ASSESSED on the content of this packet. All contents outlined in this packet are General Math objectives. Neatly SHOW YOUR WORK on a separate sheet of paper.

Properties of Rational Exponents (HSN-RN.A.1, HSN-RN.A.2)

1. Simplify: $\sqrt[3]{x^6}$.
2. Rewrite $x^{1/2} \cdot x^{3/4}$ using properties of exponents.
3. Evaluate: $(27)^{2/3}$.
4. Simplify: $(x^{3/2})^2$.
5. Solve for x: $x^{3/2} = 8$.
6. Convert $\sqrt[4]{x^3}$ to exponential form.

7

Simplify:

$$\frac{x^{2/3}}{x^{1/6}}$$

8. Evaluate: $(81)^{3/4}$.

9. Simplify:

$$\left(\frac{a^2b^3}{c}\right)^{1/2}$$

10. Solve: $(x^{1/3}+2)^2=16$.

Properties of Complex Numbers (HSN-CN.A.1, HSN-CN.A.2, HSN-CN.A.3)

11. Simplify: $(3+2i)+(1-5i)$.

12. Simplify: $(4+3i)(2-i)$.

13. Find the modulus of $5-12i$.

14. Express

$$\frac{3+2i}{1-i}$$

in the form $a+bi$.

15. Solve: $x^2+4=0$.

16. Write the conjugate of $7+6i$.

17. Simplify: i^{15}.

18. Solve for x: $x^2+2x+5=0$.

19. Multiply: $(2-3i)^2$.

20. Determine the product: $(1+2i)(1-2i)$.

Solving Systems of Equations (HSA-REI.C.5, HSA-REI.C.6)

21. Solve using substitution: $y = 2x + 1$, $3x - y = 5$.

22. Solve using elimination: $2x + y = 7$, $x - y = 1$.

23. Solve the system: $x^2 + y^2 = 25$, $y = x + 1$.

24. Determine the point of intersection: $y = 3x - 2$, $y = -x + 6$.

25. Solve: $2x + 3y = 10$, $4x - y = 6$.

26. Graph and solve: $x + y = 5$, $x - y = 1$.

27. Solve the system involving fractions:

$$\frac{1}{x} + \frac{1}{y} = 1, \quad x - y = 1.$$

28. Find the solution to $y = x^2$, $y = 4x - 3$.

29. Find the solution of $x^2 + y^2 = 9$, $x + y = 3$.

30. Determine whether $(2, 3)$ satisfies $2x + y = 7$ and $x - y = -1$.

Polynomial Factorization

31. Factor: $x^2 - 5x + 6$.
32. Use the Remainder Theorem to find the remainder of $(x^3 + 2x^2 - x + 4) \div (x - 1)$.
33. Expand using Binomial Theorem: $(x + 2)^3$.
34. Factor completely: $x^3 - 27$.
35. Factor: $x^2 + 4x + 4$.
36. Use synthetic division: $(x^3 - 4x^2 + x - 6) \div (x - 2)$.
37. Factor using grouping: $x^3 + 3x^2 + 2x + 6$.
38. Expand: $(2x - 1)^4$.
39. Factor completely: $2x^2 - 8x + 6$.
40. Factor: $x^4 - 16$.

Circle Properties (HSG-GPE.A.1)

41. Write the equation of a circle with center (3, -2) and radius 5.
42. Identify the center and radius: $x^2 + y^2 - 4x + 6y = 12$.
43. Find the radius of a circle given the equation $x^2 + y^2 = 36$.
44. Complete the square: $x^2 + y^2 + 8x - 6y = 0$.
45. Determine if the point (4, 3) lies on the circle $x^2 + y^2 = 25$.

Parabolic Properties (HSG-GPE.A.2)

46. Find the equation of a parabola with vertex (0,0) and focus (0,3).
47. Write the equation of a parabola given focus (2, 0) and directrix $x = -2$.
48. Determine the focus and directrix of

$$y = \frac{1}{4}x^2.$$

49. Identify the vertex and axis of symmetry of $y = -3x^2 + 6x - 2$.
50. Find the vertex form of $y = x^2 + 4x + 1$.

Probability Models (HSS-CP.A.1)

51. Define the sample space for tossing two coins.
52. Identify the event: drawing a red card from a deck of cards.
53. What is the probability of rolling a 3 or a 5 on a fair 6-sided die?
54. List all possible outcomes of flipping three coins.
55. Define mutually exclusive events with an example.
56. Calculate the probability of selecting an even number from 1 to 10.
57. Define the event of selecting a prime number from 1 to 20.
58. Find the probability of getting heads 3 times in 3 coin tosses.
59. Define the complement of an event and give an example.
60. Find the probability of randomly choosing a vowel from the word "MATHEMATICS."

Expected Values (HSS-MD.A.1)

61. A game costs $5 to play and the player wins $20 with probability 0.1. What is the expected value?
62. A spinner has outcomes 1, 2, 3, 4 with equal probability. Find the expected value.
63. A raffle ticket costs $2. There is a 1 in 50 chance to win $100. What is the expected value?
64. A bag contains 3 red, 2 blue, and 5 green marbles. What is the expected number of green marbles in 10 draws?
65. A dice game pays $10 for a 6 and nothing otherwise. Find the expected value.
66. Compute the expected value: outcomes = [2, 5, 8] with probabilities [0.2, 0.3, 0.5].
67. A lottery offers $5000 with a 1 in 1000 chance. What is the expected value?
68. A quiz question has 4 options, one correct. You get +3 for correct, -1 for wrong. What is the expected value of guessing?
69. A spinner divided into 4 sections: win $0, $2, $4, or $6 with equal probability. Find the expected winnings.
70. Calculate the expected value of x from values: x=1,2,3 with probabilities 0.5, 0.3, and 0.2.

Open-Ended Questions

71. Explain how you can use properties of exponents to simplify $(x^{1/3}y^{2/3})^3$.
72. Describe how to find the modulus and argument of a complex number.
73. Create a system of equations that has no solution. Justify why.
74. Explain how you would use the Remainder Theorem to test if a binomial is a factor.
75. Derive the equation of a circle centered at (1, -4) passing through (4, 0).
76. Explain how to determine the focus of a parabola given its standard form.
77. Construct a probability model for a 3-sided spinner and calculate the expected value.
78. Describe a real-life scenario where expected value helps make decisions.
79. Analyze the difference between theoretical and experimental probability with an example.
80. Explain why the sum of all probabilities in a sample space must equal 1.