

IB Mathematics
Applications and Interpretation
Summer Work - 2025

The problems in this packet have been selected to refresh and reinforce the material covered during year one of the IB Mathematics: Applications and Interpretations course. They will focus on the Algebraic components primarily from Chapters 4, 5, and 9. The geometric topics in Chapters 1 and 2 will be reviewed later in the year. Year two itself will be broken into 4 main mathematical topics: Probability and Statistics, Algebraic Modeling, Introductory Calculus, and Periodic Functions. In addition to this material we will also be writing the Internal Assessment Paper and engaging in exam preparation. More information about the Internal Assessment will be covered in September however, it is a good idea to start thinking about areas of Mathematics you would like to explore and how those topics are present in the world.

For this packet you may use your Graphing Calculator for any problem however you must show all of your work to earn credit. All work is to be submitted through the Google classroom by August 28th. This assignment will be graded as a homework assignment worth a total of 20 points.

The first unit we will be working on is Voronoi Diagram - Section 4.5. Please watch the videos that are posted to the classroom as well as read and take notes on Section 4.5 before the first day of class. The list of video url's is also posted below

Voronoi Diagram Videos

https://www.youtube.com/watch?v=1iYkEv6AxzU&list=PLzU1cbDS8QvJF5ahZ1XY-Z-F_IT_h-uA8

https://www.youtube.com/watch?v=j2c3kumwoAk&list=PLzU1cbDS8QvJF5ahZ1XY-Z-F_IT_h-uA8&index=2

https://www.youtube.com/watch?v=uHdzwL7Obrs&list=PLzU1cbDS8QvJF5ahZ1XY-Z-F_IT_h-uA8&index=3

https://www.youtube.com/watch?v=RUUDKcOZ9Ow&list=PLzU1cbDS8QvJF5ahZ1XY-Z-F_IT_h-uA8&index=4

https://www.youtube.com/watch?v=dijZkOCNM0&list=PLzU1cbDS8QvJF5ahZ1XY-Z-F_IT_h-uA8&index=5

Chapter 4 Review Material

1. Calculate the distance between the points $(-3,6)$ and $(15,-2)$.
2. Calculate the distance between the points $(9,4,-3)$ and $(4,-6,1)$.
3. Find the midpoint of the line segment connecting the points in Problem 1.
4. Find the midpoint of the line segment connecting the points in Problem 2.
5. Points A, B, and C, are collinear such that point B is the midpoint of the line segment AC. The coordinates of point A is $(4,5)$ and of point B is $(17,-4)$. What are the coordinates of point C?
6. Calculate the gradient of the line segment connecting the points in Problem 1.
7. Calculate the gradient of the line segment AC in Problem 5.
8. Find the equation of the line that passes through the points in Problem 1. Write the equation in point-gradient form.
9. Find the equation of the line that passes through the points in Problem 5. Write the equation in point-gradient form.
10. Find the intercepts of the x and y axis of the line found in problem 8.
11. Find the intercepts of the x and y axis of the line found in problem 9.
12. Find the equation of the line that is perpendicular to line from problem 9 and passes through the point $(4,5)$
13. Find the equation of the line that is parallel to the line in problem 8 that passes through the origin.
14. Find the perpendicular bisector of the line segment connecting the points in problem 1.

Chapter 5 Review Material

1. Sketch the graph of $f(x) = 0.25x + 8$ and $g(x) = 2x - 4$
2. Find the intersection point of the two linear functions in problem 1.
3. Find the inverse of the function $f(x)$ from problem 1
4. Find the value of $g^{-1}(6)$ using the function defined in problem 1.
5. Summarize the differences between a function and a relation.
6. Define domain and range.
7. A company sells doughnuts. They incur a fixed cost of \$24,000 for rent, insurance, and other expenses. It costs \$0.28 to produce each doughnut.
 - a. Write a linear model to represent the cost C of the company as a function of x , the number of doughnuts produced.
 - b. Find and interpret the y intercept.
8. A city's population has been growing linearly. In 2008, the population was 28,200. By 2012, the population was 36,800. Assume this trend continues.
 - a. Predict the population in 2014.
 - b. Identify the year in which the population will reach 54,000.
9. Jamal is choosing between two truck-rental companies. The first, Keep on Trucking, Inc., charges an up-front fee of \$20, then 59 cents a mile. The second, Move It Your Way, charges an up-front fee of \$16, then 63 cents a mile. When will Keep on Trucking, Inc. be the better choice for Jamal?
10. Consider this scenario: The weight of a newborn is 7.5 pounds. The baby gained one-half pound a month for its first year.
 - a. Find the linear function that models the baby's weight w as a function of the age of the baby, in months, t .
 - b. Find a reasonable domain and range for the function W .
 - c. Find and interpret the x - and y -intercepts of the function W
 - d. For the function W , find and interpret the slope of the function.
 - e. When did the baby weigh 10.4 pounds?
 - f. What is the output when the input is 6.2?
11. A phone company has a monthly cellular data plan where a customer pays a flat monthly fee of \$10 and then a certain amount of money per megabyte (MB) of data used on the phone. If a customer uses 20 MB, the monthly cost will be \$11.20. If the customer uses 130 MB, the monthly cost will be \$17.80.
 - a. Find a linear equation for the monthly cost of the data plan as a function of x , the number of MB used.
 - b. Interpret the slope and y -intercept of the equation.
 - c. Use your equation to find the total monthly cost if 250 MB are used.
12. Suppose the world's oil reserves in 2014 are 1,820 billion barrels. If, on average, the total reserves are decreasing by 25 billion barrels of oil each year:
 - a. Give a linear equation for the remaining oil reserves, R in terms of t , the number of years since 2014.
 - b. Seven years from now, what will the oil reserves be?
 - c. If the rate at which the reserves are decreasing is constant, when will the world's oil reserves be depleted?

Chapter 9 Review Material - Please refer to problem 1 when any function is referenced

1. **Sketch** a graph of the following quadratic functions:
 - a. $f(x) = x^2 + 4x + 3$
 - b. $g(x) = -3(x + 2)^2 + 4$
 - c. $h(x) = 2x^2 - 6x + 7$
 - d. $j(x) = 2x^2 + 4x - 4$
2. Determine the axis of symmetry of $f(x)$ and $g(x)$.
3. Find the maximum or minimum value of the following functions
 - a. $k(x) = -4x^2 - 8x + 7$
 - b. $m(x) = 3(x - 3)^2 - 5$
4. A rock is thrown upward from the top of a 134-foot high cliff overlooking the ocean at a speed of 90 feet per second. The rock's height above ocean can be modeled by the equation $H(t) = -16t^2 + 90t + 134$.
 - a. When does the rock reach the maximum height?
 - b. What is the maximum height?
 - c. When does the rock hit the ocean?
5. Find the equations of a parabola given the vertex $(h,k) = (2,3)$ and it passes through the points $(x,y) = (5,12)$.