

Summer Assignment 2022-2023 (Part I is mandatory, Part 2 is optional read more below) Course Title: IB Applications and Interpretations Year 2

Teacher Name: Rakesh Modi

Teacher contact information: [Rakesh Modi@dekalbschoolsga.org](mailto:Rakesh_Modi@dekalbschoolsga.org)

Purpose of Assignment:

The following summer assignment is designed to prepare you for the forthcoming IB Math Applications and Interpretations Year 2. The IB Applications and Interpretations course is rigorous and fast paced and has a lot of content to cover before the exams in May 2023. This summer assignment contains content that has already been covered in previous Algebra classes but must be mastered before entering IB Math Applications and Interpretations. The assignment is designed to allow you to review the material previously covered in math courses so that you will be well prepared with several ideas that occur throughout the IB Math Applications and interpretations course.

Instructions for Assignment: There are two parts to this assignment.

PART I: IA (Internal Assessment Project) Readiness – This is Mandatory Choosing a topic (see attached below) and a FORM You should start thinking of a creative and serious idea for your Internal Assessment (IA) Project (refer to the materials and link attached for some ideas). This packet includes: IBO online sites for project ideas, materials to assist you in choosing a topic for your IA.

About the IA: The IA is a piece of written work which will be based on your personal research from a wide variety of topics including, but not limited to investigations, applications, statistical studies, and surveys. This IA will be done during the year. The project is an independent research and data gathering project for which you will collect, prepare, organize, analyze, and evaluate data. Fill out the “Initial Planning” Form A document. During the summer, you must come up with a project idea (topic/title) you wish to pursue or explore. Refer to the attached information to peruse through some ideas of IA topics. Write down your idea on Form A. Find a topic which interests you and which will be exciting to work with. Return the completed Form A with your homework. Turn in Form A (Part I) on the first Monday of school.

Part II: Four Algebra Review Worksheets (the last four pages of this pdf) – This is not required to be fully completed but read the instructions below. All work must be done neatly on your own paper. Make sure each page of your work is labeled with the corresponding Worksheet Number and Topic Name. Answers to problems must be circled to facilitate grading. Most importantly, the work should be neat! Even though you should be able to complete all the questions without the use of a graphing calculator it is suggested that you have your own graphing calculator (TI-83 or TI-84) for this course.

Due date and Method of assessment: Part 1: Form A (found on the next page) – Due the first Monday of school

Part 2: A quiz will be given over the material covered. The questions are optional, but if you would like to retake the summer assignment quiz, then all questions must be completed. The summer assignment quiz will occur the 2nd week of school.

Thank you. Have a restful and safe Summer! Looking forward to seeing you in August.

**SUMMER ASSIGNMENT PART I (See below for topics and ideas) IB Applications and Interpretations
Internal Assessment**

INITIAL PLANNING FORM A Complete this form and return it to me.

Name:
Prospective Title of IA:
Reason for choice:
Type of Data: Primary or Secondary If primary tell how, you will collect the data If secondary tell the sources will use to get the data:

Sample IA topic ideas which have been done and other areas of interest. Please read all the following and think about a project idea you want to explore. Fill out the form above after reading.

You will need to either use primary or secondary data sources:

Primary data is data collected by you. The main benefit is that you can personalize your investigation. It allows you to investigate something that perhaps no one else has ever done. It also allows you the ability to generate data that you might not be able to find online. The main drawback is that collecting good quality data in sufficient quantity can be time consuming. **You should aim for an absolute minimum of 50 data pieces, and ideally 60-100.**

Secondary data sources are data that was collected by others. The benefits are that you can gain access to good quality raw data on topics that you would not be able to collect data on personally – and it's usually much quicker to get the data. Potential drawbacks are not being able to find the raw data that fits what you want to investigate – or sometimes having too much data to wade through. SEE THE NEXT PAGES FOR SECONDARY SOURCES AND POSSIBLE IDEAS

Secondary data sources:

- 1) The Census at School website is a fantastic source of secondary data to use. If you go to the [random data generator](#) you can download up to 200 questionnaire results from school children around the world on several topics (each year's questionnaire has up to 20 different questions). Simply fill in your email address and the name of your school and then follow the instructions.
- 2) If you are interested in sports statistics then the [Olympic Database](#) is a great resource. It contains an enormous amount of data on winning times and distances in all events in all Olympics. Follow links at the top of the page to similar databases on basketball, golf, baseball and American football.
- 3) If you prefer football, the [Guardian stats centre](#) has information on all European leagues – you can see when a particular team scores most of their goals, how many goals they score a game, how many red cards they average etc. You can also find a lot of football stats on the [Who Scored](#) website. This gives you data on things like individual players' shots per game, pass completion rate etc.
- 4) The [Guardian Datablog](#) has over 800 data files to view or download – everything from the Premier League football accounts of clubs to a list of every Dr Who villain, US gun crime, UK unemployment figures, UK GCSE results by gender, average pocket money and most popular baby names. You will need to sign into Google to download the files.
- 5) The World Bank has a [huge data bank](#) – which you can search by country or by specific topic. You can compare life-expectancy rates, GDP, access to secondary education, spending on military, social inequality, how many cars per 1000 people and much much more.
- 6) [Gapminder](#) is another great resource for comparing development indicators – you can plot 2 variables on a graph (for example urbanization against unemployment, or murder rates against urbanisation) and then run them over a number of years. You can also download [Excel spreadsheets](#) of the associated data.
- 7) [Wolfram Alpha](#) is one of the most powerful maths and statistics tools available – it has a staggering amount of information that you can use. If you go to the examples link above, then you can choose from data on everything from astronomy, the human body, geography, food nutrition, sports, socioeconomics, education and shopping.
- 8) TSM – the Technology for Secondary Mathematics is something of an internet dinosaur – but has a great deal of downloadable data files on everything from belly-button ratios to lottery number analysis and baby weights.
- 9) Google Public Data – an enormous source for public data, which is displayed graphically and can be searched.
- 10) Nationmaster – another huge site with pretty much any statistic and data comparing countries. Currently they have 19 million data points – so you're likely to find something useful!
- 11) Google word usage analysis – a great tool which allows you to track the usage of words over the centuries.

Examples of IB Applications and Interpretations IA investigations.

To access sample graded IA's click on the following link.

<https://rmodituckerhighschool.weebly.com/resources.html>

PART 2 – Optional, but be ready for the summer quiz! If you want to retake the summer assignment quiz, then all problems must be completed on your own paper.

Worksheet # 1 – Exponent Rules

Directions 1-30: Simplify the expression to only have positive exponents. Assume that all variables are nonzero real numbers.

1. $x^2 \cdot x^3$

2. $(2k^3)(-4k^4)(3k^{-2})$

3. $(-2x^3)^2$

4. $-(2x^3)^2$

5. $(-2x^2)^3$

6. $-(2x^2)^3$

7. x^{-3}

8. $4x^{-3}$

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

10. $\frac{-5}{x^{-4}}$

11. $\frac{x^8}{x^2}$

12. $\frac{x^3}{x^6}$

13. $\frac{x^{-3}}{4x^5}$

14. $\frac{-10x^{15}}{5x^{-3}}$

15. $x^2 \cdot x^{-2}$

16. x^0 (see #13)

17. $\left(\frac{4x^2}{5y}\right)^3$

18. $(3y^2)(2y^{21})$

19. $(4x^3y^2)(-3xy)$

20. $(-2st^5)(-4st^{-3})$

21. $(5a^2b^3)(a^{-2}b)$

22. $\left(-\frac{a^{-3}}{3a^{-1}b}\right)^4$

23. $\frac{3}{4d} \cdot \frac{(2d)^4}{c^3}$

24. $y^0(8x^6y^{-3})^{-2}$

25. $(5r^5)^3 \cdot r^{-2}$

26. $\frac{(3x)^{-3}y^4}{-x^2y^{-6}}$

27. $\frac{12x^8y^{-7}}{(-4x^2y^{-6})^2}$

28. $\left(\frac{2f^2g^3}{3fg}\right)^4$

29. $\frac{1}{8x^{-2}y^4}$

30. $\frac{3}{8m^5} \cdot \left(\frac{m^4}{n^2}\right)^3$

Worksheet #2 – Factoring

Directions 1-10: Perform the multiplication.

- | | | | |
|----|-------------------------|-----|---------------------------|
| 1. | $3(5x + 1)$ | 2. | $-12(3w - 2)$ |
| 3. | $(y - 1)(y + 5)$ | 4. | $3(x - 3)^2$ |
| 5. | $(2x + 9)(3x - 4)$ | 6. | $(4x + 1)(4x - 1)$ |
| 7. | $2(x^2 + 3)(x - 2)$ | 8. | $(x - 1)(x + 1)(x - 6)$ |
| 9. | $(z - 3)(z^2 + 3z + 9)$ | 10. | $(2x + 3)(4x^2 - 6x + 9)$ |

Directions 11-34: Factor the expression completely

- | | | | |
|-----|---------------------------------|-----|--------------------------|
| 11. | $15x + 3$ (hint see #1) | 12. | $8x^5 + 4x^3$ |
| 13. | $y^2 + 4y - 5$ (hint: see #3) | 14. | $x^2 - 2x - 15$ |
| 15. | $n^2 + 10n + 25$ | 16. | $g^2 - 18g + 81$ |
| 17. | $2x^2 - 4x - 30$ (hint see #14) | 18. | $-3z^2 + 12z + 36$ |
| 19. | $6x^2 + 19x - 36$ (hint see #5) | 20. | $2w^2 - 5w - 3$ |
| 21. | $2x^2 + 7x - 30$ | 22. | $5x^2 - 32g + 12$ |
| 23. | $12w^2 + 51w + 12$ | 24. | $24y^2 + 64y + 42$ |
| 25. | $16x^2 - 1$ (hint see #6) | 26. | $54x^2 - 8$ |
| 27. | $x^4 - 16$ | 28. | $81y^4 - 1$ |
| 29. | $x^3 - 6x^2 - x + 6$ (see #8) | 30. | $2x^3 - 8x^2 + x - 4$ |
| 31. | $10x^3 + 5x^2 - 4x - 2$ | 32. | $z^3 - 27$ (hint see #9) |
| 33. | $125x^3 + 1$ | 34. | $64y^3 + 27$ |

Worksheet #3 – Rational Expressions

Simplify the expression, and list all excluded values from the domain of the expression.

1. $\frac{3}{5} + \frac{5}{6}$

2. $\frac{3}{x+2} + \frac{5}{x+4}$

3. $\frac{7}{12} - \frac{2}{5}$

4. $\frac{7}{x-6} - \frac{1}{x+3}$

5. $\frac{3}{2} + \frac{5}{4} - \frac{7}{5}$

6. $\frac{2}{x^2-4} - \frac{x}{x+2} + \frac{5x}{x-2}$

7. $\frac{3x}{x^2-1} + \frac{2}{x-1}$

8. $\frac{3}{x^2-3x-10} - \frac{2}{x^2+3x+2}$

9. $\frac{-18}{6x^2-x-1} + \frac{3x}{2x-1} - \frac{4x}{3x+1}$

10. $\frac{3}{x-1} + \frac{5}{x+3} - \frac{7}{x-6}$

11. $\frac{12}{36}$

12. $\frac{x^3-x^2-42x}{2x^2-20x+42}$

11. $\frac{3}{5} \cdot \frac{5}{6}$

12. $\frac{x+6}{x+5} \cdot \frac{5}{x+6}$

13. $\frac{4}{x^2-1} \cdot \frac{x+1}{x+6}$

14. $\frac{3x^2+18x}{x+6} \cdot \frac{6x^2}{3x}$

15. $\frac{8x^2-24x}{16x^3-48x^2} \cdot \frac{40x^3+56x^2}{5x^2-43x-70}$

16. $\frac{20x^2-100x}{x-1} \cdot \frac{1}{16x^3-80x^2}$

17. $\frac{3}{5} \div \frac{6}{5}$

18. $\frac{x-4}{x^2-2x-8} \div \frac{1}{x-5}$

Worksheet #4 – Solving

Questions 1-28: Solve the equation and give all solutions (real and complex). If no solutions are possible, then write no solutions. Some equations may require the quadratic formula. Give all solutions in simplest radical form.

1. $27 = 3c - 3(6 - 2c)$

2. $40 + 14j = 2(-4j - 13)$

3. $-3 = 12y - 5(2y - 7)$

4. $\frac{m}{5} = \frac{m-6}{4}$

5. $-\frac{2}{3} = \frac{4v+1}{2v+14}$

6. $\frac{c-8}{-2} = \frac{11-4c}{11}$

7. $|4c+5| = 7$

8. $|14-m| = 6$

9. $-3|5g+1| - 6 = -9$

10. $|9-4n| = 5$

11. $3x^2 - 27 = 0$

12. $7c^2 = 100$

13. $x^2 = 12x - 36$

14. $-10 = r^2 - 10r + 12$

19. $6z^2 = 2z^2 + 7z + 5$

20. $-4y^2 - 3y + 3 = 2y + 4$

21. $3g^2 - 6g - 14 = 3g$

22. $2x^2 - 7 = x$

23. $(x+13)^2 = 25$

24. $3(x+3)^2 = 27$

25. $4(x+5)^2 + 20 = 12$

26. $x^4 + 4x^2 - 5 = 0$

27. $x^4 - 5x^2 - 14 = 0$

28. $15x^4 + 7x^2 = 2$