Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**IB Mathematics: Applications and Interpretations SL**

**(Formally known as IB Math Studies SL)**

Ms. McKenzie

**SUMMER PACKET**

**Directions:**

1. **Packet is due on the first day of school, no exceptions. This packet includes everything that is listed here, the 17 questions attached to this document, and the 5 part packet that has been uploaded as well. Packet will be checked for completion and worth a homework grade. I will take questions from this packet on the first day of class as well.**
2. **This material covers prerequisite knowledge necessary for success in IB Mathematics: Applications and Interpretations SL.**
3. **Show all work to receive credit. If you only write down the answer, no credit will be given. All answers should be given in exact form unless otherwise specified.**
4. **You are to open the file labeled “IB MAI Assessment Guide Internal & External 2020-21” and read this. MAKE SURE YOU CHOOSE MAI AND NOT MAA!!!! There are a lot of changes in the curriculum for this year, so you will need to be familiar with it all. At about page 12, you will find all of the details for your internal assessment. THREE topic choices are due on the first day of school as well. These can be attached to your summer packet.**
5. **Students will need to purchase the book: Mathematics: Applications and Interpretation SL 2 by Haese Mathematics. It is an orange book with a globe on the front. I recommend purchasing the physical & digital copy.**
6. **Students will also need a good graphing calculator. We recommend the TI – Nspire.**
7. **Any questions, please feel free to email me at mmckenzie@mcpss.com.**

1. The cost *c*, in Australian dollars (AUD), of renting a bungalow for *n* weeks is given by the linear relationship *c* = *nr* + *s*, where *s* is the security deposit and *r* is the amount of rent per week.

Ana rented the bungalow for 12 weeks and paid a total of 2925 AUD.

Raquel rented the same bungalow for 20 weeks and paid a total of 4525 AUD.

Find the value of

(a) *r*, the rent per week;

(b) *s*, the security deposit.

2. The total weight of 256 identical pencils is 4.24 kg. Calculate the weight of one pencil, in kg.

(a) Give your answer exactly.

(b) Give your answer correct to three significant figures.

(c) Write your answer to part (b) in the form *a* × 10*k* where 1 ≤ *a* < 10 and *k* ∈ ℤ .

3. The fourth term of an arithmetic sequence is 12 and the tenth term is 42.

(a) Given that the first term is *u*1 and the common difference is *d*, write down two equations in *u*1 and *d* that satisfy this information.

(b) Solve the equations to find the values of *u*1 and *d*.

4. A geometric sequence has all its terms positive. The first term is 7 and the third term is 28.

(a) Find the common ratio.

(b) Find the sum of the first 14 terms.

5. Consider the numbers 5, 0.5,  and –5. Create a table showing which of the number sets,  and  these numbers belong to.

6. (a) Find the solution of the equation *x²*– 5*x* – 24 = 0.

(b) The equation *ax²* – 9*x* – 30 = 0 has solution *x* = 5 and *x* = –2. Find the value of *a*.

7. The universal set *U* is defined as the set of positive integers less than 10. The subsets *A* and *B* are defined as:

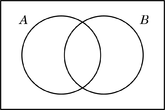
*A* = {integers that are multiples of 3} *B* = {integers that are factors of 30}

(a) List the elements of

(i) *A*;

(ii) *B*.

(b) Place the elements of *A* and *B* in the appropriate region in the Venn diagram below.

*U* 

8. Consider the statement *“If a figure is a square, then it is a rhombus”*.

(a) For this statement, write in words

(i) its converse;

(ii) its inverse;

(iii) its contrapositive.

(b) Only one of the statements in part(a) is true. Which one is it?

9. A bag contains 2 red, 3 yellow and 5 green sweets. Without looking, Mary takes one sweet out of the bag and eats it. She then takes out a second sweet.

(a) If the first sweet is green, what is the probability that the second sweet is also green?

(b) If the first sweet is not red, what is the probability that the second sweet is red?

10. A swimming pool is to be built in the shape of a letter L. The shape is formed from two squares

*x*

with side dimensions *x* and

as shown.

*x*

Diagram not to scale

*x x*

*x*

* 1. Write down an expression for the area of the swimming pool surface.
  2. The area *A* is to be 30 m2. Write a quadratic equation that expresses this information.
  3. Find both the solutions of your equation in part (b).

11. The gradients (slopes) of several lines are as follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Line | *a* | *b* | *c* | *d* | *e* | *f* | *g* | *h* |
| Gradient | -3 | -5/2 | 1/3 | 0.5 | 3/6 | -2/5 | 5/-2 | 0.4 |

1. Find two pairs of lines that are parallel to each other.
2. Find any two pairs of lines that are at right angles to each other.

12. (a) Represent the function where  by a mapping diagram.

*x* *y*

1. List the elements of the domain of this function.
2. List the elements of the range of this function.

13. In an experiment researchers found that a specific culture of bacteria increases in number according to the formula



Where *N* is the number of bacteria present and *t* is the number of hours since the experiment began.

Use the formula to calculate

1. The number of bacteria present at the start of the experiment;
2. The number of bacteria present after 3 hours;
3. The number of hours it would take for the number of bacteria to reach 19,200.
4. A swimming pool is to be built in the shape of a letter L. The shape is formed from two squares

*x*

with side dimensions *x* and

as shown.

*x*

Diagram not to scale

*x x*

*x*

1. Write down an expression for the area of the swimming pool surface.
2. The area *A* is to be 30 m2. Write a quadratic equation that expresses this information.
3. Find both the solutions of your equation in part (b).
4. Which of the solutions in part (c) is the correct value of *x* for the pool? State briefly why you made this choice.
5. The graphs of three trigonometric functions are drawn below. The *x* variable is measured in degrees, with –360° ≤ *x* ≤ 360°. The amplitude '*a*' is a positive constant with 0 < *a* ≤ 1.

Graph A

a Graph B

2

*y* 0

90 180

*x*

270

360

90 180

*x*

270

–a

360

Graph C

a

90

180

270

360

0

–a

Write the letter of the graph next to the function representing that graph in the box below.

|  |  |
| --- | --- |
| FUNCTION | GRAPH |
| *y* = *a*cos(*x*) |  |
| *y* = *a*sin(2*x*) |  |
| *y* = 2 + *a*sin(*x*) |  |

1. State the period of the function shown in graph B.
2. State the range of the function 2 + *a*sin(*x*) in terms of the constant *a*.

16. A farmer wants to construct a new fence across a field. The plan is shown below. The new fence is indicated by a dotted line.

75°

Diagram not to scale

40° 410 m

1. Calculate the length of the fence.
2. The fence creates two sections of land. Find the area of the smaller section of land ABC, given the additional information shown below.

A B

Diagram not to scale

245 m

24°

C

1. Find the volume of the following prism.

8 cm

Diagram not to scale

5.7 cm

42°