IB AI SL yr. 2 Summer Packet 2024 Name _____

This is due the first day of class!

This packet is to help you review topics that are a prerequisite (and knowledge just learned this year) upon entering IBAISL2. The **formula packet** is attached to your same google classroom from year 1 and is to be used on this packet.

To ensure that the good skills you developed in the past year(s) do not disappear this summer, working on this packet is a requirement to be completed over the summer. It is **NOT** recommended to complete immediately following school dismissal in June or the night before the packet is due. Student learning is most effective if the packet is completed over the months of July and August. IBAISL2 students will be tested on the materials covered in this packet within the first few weeks of school and throughout the year once the teacher has discussed the packet in the classroom.

Please **SHOW ALL THE WORK** in the space provided, if possible or on another sheet of paper. Be sure to circle your answers. The IBAISL exam allows you to use a TI-84 graphing calculator (GDC) on the entire exam so if you use a GDC to solve any part of this packet (unless direction specify otherwise), write down how you input it into your calculator so I can see how you solved the problem. By doing so you will become knowledgeable about how to gain the most points possible (even if the answer is wrong) on the exam come next May.

QUADRATICS REVIEW

Factor each quadratic **without** using your GDC. If the quadratic cannot be factored write "prime".

1. $x^2 - x - 2$
2. $x^2 + 3x - 4$
3. $8x^2 - 50y^2$

4. $-3x^2 - x + 2$
5. $14x^2 + 31x + 15$
6. $-x^3 + 3x^2 + 18x$

Solve each equation **without** using your GDC using any method except graphing or check and guess. Leave the answer in simplest radical form if necessary.

7. $-12n^2 - 11n = -15$

8. $14b^2 - 2 = -3b$

9. $x^2 + 2 = 9$

10. $x^2 - 5x = 0$

11. $36x^4 - 25 = 0$

12. $x + \frac{12}{x} = 7$

Use your GDC to solve the following:

16. $3x^2 - x - 5 = 0$

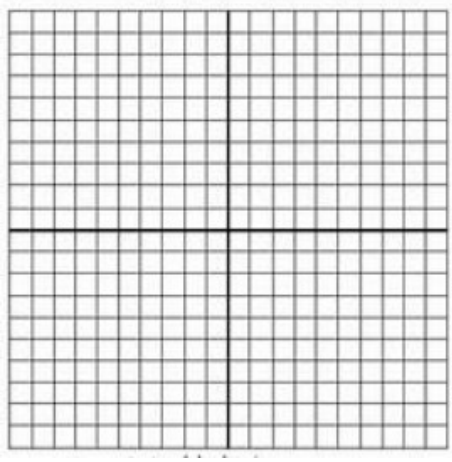
17. $f(x) = -x^2 - 5x + 3$

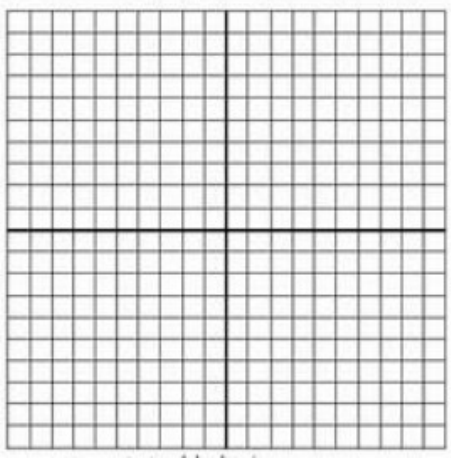
Without using your GDC - State the following for each of the given equations: axis of symmetry, vertex, direction of opening, x-intercepts, y-intercepts, maximum or minimum value, domain, and range. Then sketch the graph using that information. Make sure to label all pertinent information on your sketch.

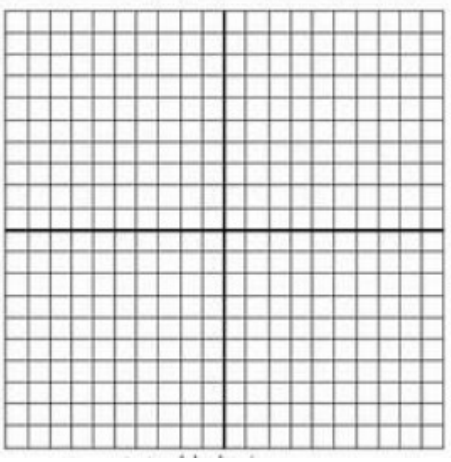
13. $y = -2(x + 2)(x - 1)$

14. $f(x) = 0.5(x - 2)^2 - 4$

15. $g(x) = 2x^2 + 6x - 3$





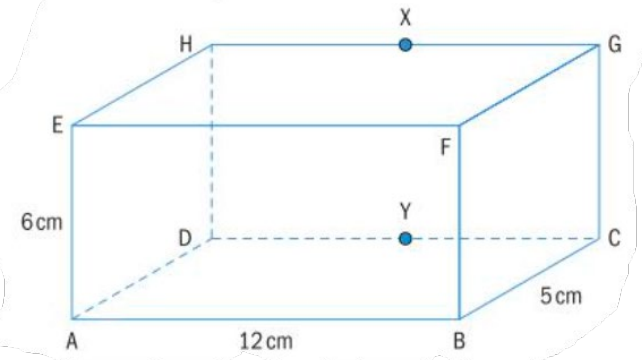


IBAISL1 REVIEW - Ch 1, 2, 4, 5, 9, & 10.1

You may use your GDC on this section. Make sure you show your work! That means if you use the calculator for say the finance editor you are listing the information that you inputted into the required fields.

1. **P1:** The diagram below shows a cuboid of dimensions 5 cm, 6 cm and 12 cm.

   X is the midpoint of side HG, and Y is the midpoint of side DC.



   a Find the length AY. (2 marks)

   b Find the size of angle $X\hat{A}Y$. (2 marks)

2. **P2:** Simplify the following algebraic expressions.

   a $\dfrac{10x^3 \times 3x^4}{2x^{-6}}$ (3 marks)

   b $\dfrac{x^2 \times 4x^{-3}}{x^{-1}}$ (3 marks)

   c $\sqrt{3x^3 \times 12x^0 \times 4x^5}$ (3 marks)

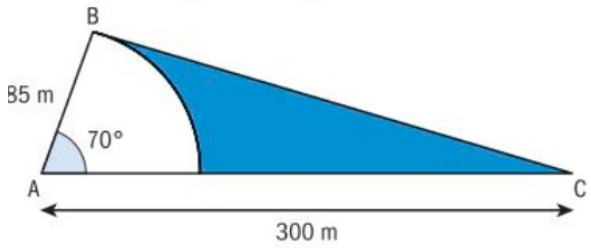
   d $\dfrac{\left(x^{-2}\right)^5}{\left(x^3\right)^{-4}}$ (3 marks)

3. **P1:** A straight ladder of length 7.1 m rests against a vertical wall.

   A person climbing the ladder should be "safe" as long as the foot of the ladder makes an angle of between 70° and 80° with the horizontal ground.

   Determine the minimum and maximum heights that the ladder can safely lie against the wall. (4 marks)

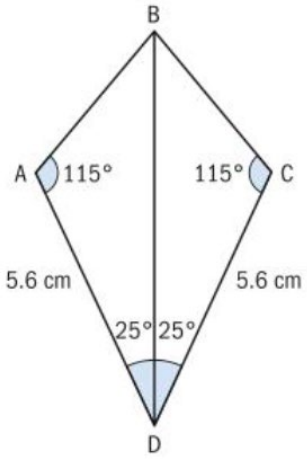
4. **P1:** The diagram shows a triangular field ABC. A farmer tethers his horse at point A with a rope of length 85 m.



Find, correct to 3 sf., the area of the field that the horse cannot reach.

(6 marks)

5. **P1:** A small pendant ABCD is made from five straight pieces of metal wire as shown in the diagram.



Calculate the total length of wire required to make the pendant.

(7 marks)

6. **P1:** Alan and Belinda stand on horizontal ground, 115 m apart.

Alan sees a bird in the sky at an angle of elevation of 27° from where he is standing.

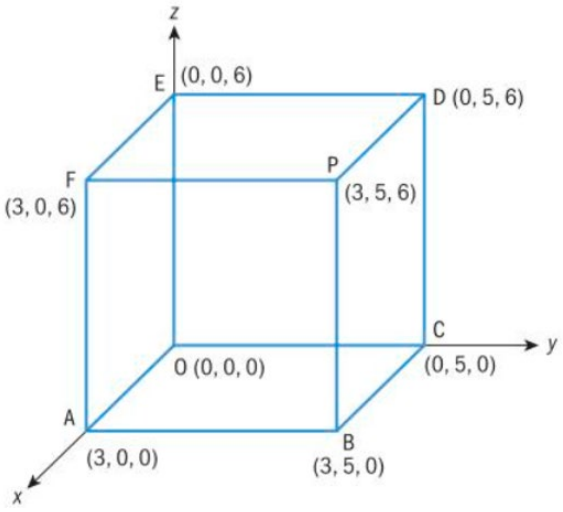
Belinda sees the same bird at an angle of elevation of 42°.

Alan and Belinda are standing on the same side of the bird, and they both lie in the same vertical plane as the bird.

a Determine the direct distance of Alan to the bird. (4 marks)

b Determine the altitude at which the bird is flying. (2 marks)

7. **P2:** The cuboid ABCOFPDE has vertices with coordinates shown in the diagram.



a Find the surface area of the cuboid. (2 marks)

b Find the length of the diagonal [BE]. (2 marks)

Diagonals [AD] and [BE] intersect at the point M.

c **i** Find the coordinates of M.

ii Find $A\hat{M}B$. (7 marks)

8. **P1:** The line L has equation $y = 3x - 5$. For the lines given below, state with reasons whether they are parallel to L, perpendicular to L, or neither. (6 marks)

i $y = \frac{1}{3}x - 7$ **ii** $-6x + 2y + 8 = 0$

iii $y - 5 = 2(x - 7)$ **iv** $y = \frac{-1}{3}x + 4$

v $x + 3y + 9 = 0$

9. **P1:** A Canadian bank charges its customers a fixed commission fee of \$ a Canadian dollars (CAD) if they wish to exchange CAD into euros (€).

The bank then uses the exchange rate \$1:€r to convert the remaining amount.

Michael converts 1200 CAD and receives €765 from the bank.

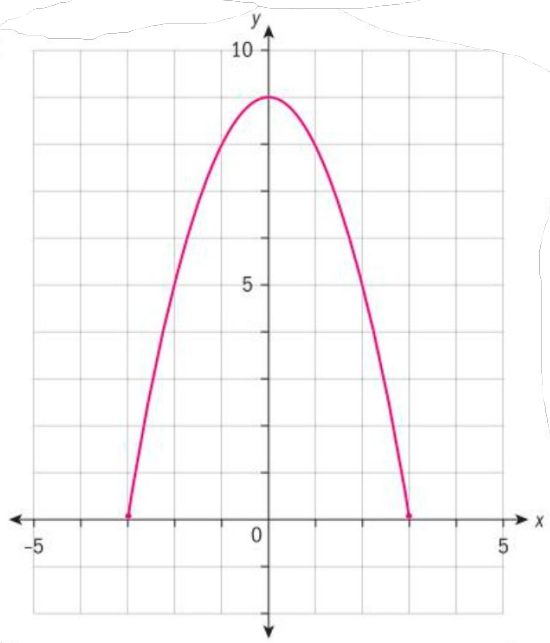
Janet exchanges 500 CAD and receives €315 from the same bank.

a Find the values of **i** a **ii** r. (6 marks)

b If Michael and Janet had put their Canadian dollars together first and then exchanged it all in one transaction, calculate the amount in euros, to the nearest cent, that they would have received. (2 marks)

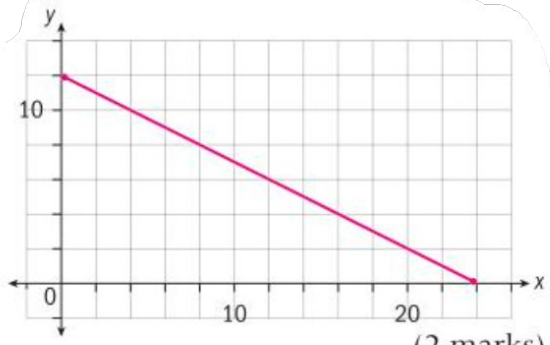
10. **P1:** State:
i the domain, and **ii** the range for each of the following functions.

a



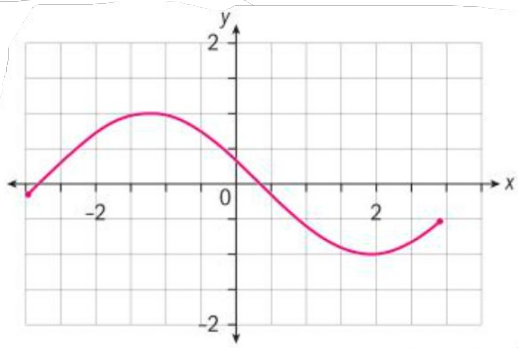
(2 marks)

b



(2 marks)

c



(2 marks)

11. **P1:** Find the range of each of the following functions.

a $f(x) = 5x + 1$, domain $\{x \in \mathbb{R} : -5 \leq x \leq 5\}$ (2 marks)

b $f(x) = 4 - 2x$, domain $\{x = -1, 0, 1, 2, 3, 4\}$ (2 marks)

c $f(x) = x^2$, domain $\{x \in \mathbb{R} : 0 \leq x \leq 10\}$ (2 marks)

d $f(x) = 250 - 12.5x$, domain $\{x \in \mathbb{R} : 0 \leq x \leq 10\}$ (2 marks)

12. **P1:** The nth term, u_n, of an arithmetic sequence is given by the formula $u_n = 23 + 7n$.

a State the first term of the sequence. (1 mark)

b Find the 50th term of the sequence. (2 marks)

c Explain why 1007 is not a term in this sequence. (3 marks)

13. **P1:** Boris plays a game of tennis. He serves from the base line to his opponent, Steffi.

The path of the ball may be modelled by the quadratic curve $H(x) = 2.103 + 0.1455x - 0.01932x^2$ for $0 \le x \le X$.

a Find the maximum height of the ball during its motion. (2 marks)

b The height of the net is 1.07 m. Boris is standing on the baseline of the court, at a horizontal distance of 11.98 m from the net. Show that the ball just passes over the net. (2 marks)

c Suggest a maximum value for X and explain why this would be a sensible value to take. (3 marks)

14. **P1:** The length (l) of a violin string varies inversely with the frequency (f) of its vibrations.

A violin string 13 cm long vibrates at a frequency of 400 Hz.

Find the frequency of a 10 cm violin string. (4 marks)

15. **P1:** The population P of ferrets in a ferret sanctuary after t months is given by $P(t) = 21 + 2.91t - 0.087t^2 + 0.0007t^3$.

a Sketch the graph of P against t for the first 80 months. (2 marks)

b Find the maximum ferret population during the first two years. (1 mark)

c Find the time(s) when the ferret population is under 40. (4 marks)

16. **P1:** k^2, $6 + k$, $12 - k$ are consecutive values of a sequence $\{a_n, n \ge 0\}$.

Find the value of k for which $\{a_n\}$ is a non-constant arithmetic sequence, stating its general term. (6 marks)