Reverse brainrot Exam

Time: speedrun it Total Marks: mark it yourself

Instructions

- Answer all questions.
- Show all your work. Partial credit will be given.
- **Calculators are NOT allowed.**
- Write your answers in the spaces provided.

Question 1: KSI's Geometric Journey (50 Marks)

KSI's journey can be described as moving "from the screen to the ring to the pen to the king." Along the way, he encounters various geometric shapes. Calculate the areas of these shapes, and then determine the total distance traveled.

(a) **From the Screen** (10 Marks)
KSI starts at the screen, which is a rectangle with a length of 12 cm and a width of 5 cm.

Calculate the area of the rectangular screen. (5 Marks)

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(b) **To the Ring** (10 Marks)
KSI moves to the ring, which is a circle with a radius of 3 meters.

Calculate the area of the circular ring. (Use $\pi = 3$) (5 Marks)

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(c) **To the Pen** (10 Marks)
KSI then moves to the pen, which is shaped like an equilateral triangle with a side length of 6 cm.

Calculate the area of the equilateral triangle. (5 Marks)

(d) **To the King** (10 Marks)
Finally, KSI reaches the king's throne, which is shaped like a square pyramid. The base of the pyramid has a side length of 4 meters, and the slant height is 5 meters.

Calculate the lateral surface area of the square pyramid. (5 Marks)

(e) **Total Distance Traveled** (10 Marks)
Now, calculate the total distance KSI traveled from the screen to the ring to the pen to the king. Use the coordinates provided: - Screen: $A(1, 2)$ - Ring: $B(4, 6)$ - Pen: $C(7, 2)$ - King: $D(10, 8)$

Calculate the distance from A to B. (3 Marks)

Calculate the distance from B to C. (3 Marks)

Calculate the distance from C to D. (3 Marks)

Calculate the total distance traveled. (1 Mark)

Question 2: The Sigma Boy's Challenge (50 Marks)

The Sigma Boy is known for his confidence and independence. He loves solving problems that involve **sequences, series, and geometry**. Help him complete his journey by solving the following problems.

(a) **The Sigma Notation** (20 Marks)

The Sigma Boy is analyzing a sequence defined by the following sigma notation:

$$\sum_{k=1}^{5}(3k-2)$$

Write out the terms of the sequence. (5 Marks)

Calculate the sum of the sequence. (5 Marks)

The Sigma Boy notices that the sequence is arithmetic. What is the common difference? (5 Marks)

Using the formula for the sum of an arithmetic series, verify your answer to part (b). (5 Marks)

(b) **The Sigma Grindset** (10 Marks)

The Sigma Boy invests his time in self-improvement. He decides to save money in a pattern that follows a geometric sequence. On day 1, he saves \$2. On day 2, he saves \$4. On day 3, he saves \$8, and so on.

Write the general formula for the amount saved on day n. (5 Marks)

How much will he save on day 10? (5 Marks)

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Question 3: The Skibidi Toilet Chaos (50 Marks)

The Skibidi Toilet is causing chaos in the city! To restore order, you must solve the following problems involving **probability and statistics**.

(a) **Probability of Toilet Incidents** (20 Marks)
The Skibidi Toilet causes incidents in the city with the following probabilities: - **Low chaos**: 40% chance, 2 incidents per hour. - **Medium chaos**: 30% chance, 5 incidents per hour. - **High chaos**: 20% chance, 10 incidents per hour. - **Extreme chaos**: 10% chance, 20 incidents per hour.

What is the expected number of incidents per hour? (10 Marks)

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If the Skibidi Toilet is active for 5 hours, what is the expected total number of incidents? (5 Marks)

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What is the probability that the Skibidi Toilet causes **at least 5 incidents** in a single hour? (5 Marks)

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(b) **Statistical Analysis of Chaos** (20 Marks)
A researcher records the number of Skibidi Toilet incidents over 10 days:

$$4, 7, 5, 8, 6, 9, 5, 7, 6, 8$$

Calculate the mean number of incidents per day. (5 Marks)

Calculate the median number of incidents per day. (5 Marks)

Calculate the range of the data. (5 Marks)

Calculate the standard deviation of the data. (5 Marks)

(c) **Probability of Skibidi Toilet Appearances** (10 Marks)
The Skibidi Toilet appears in random locations throughout the city. The probability of it appearing in a specific location is 0.2. If the city has 5 locations:

What is the probability that the Skibidi Toilet appears in **exactly 2 locations**? (5 Marks)

What is the probability that the Skibidi Toilet appears in **at least 1 location**?

(5 Marks)

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