HOMEOSTASIS SCENARIO-TEST SAMPLE ITEMS

ITEM ONE

During a geography field trip in Karamoja, students camped in semi-desert grasslands. **Temperatures reached 39°**C at noon and dropped to **15°C at night.** One group forgot their shade tent and drinking water. By the second day, two students showed:

- Increased **breathing and dry lips**
- Dizziness and **low urine output**
- **Hot skin but** reduced sweating

Another student, who had been taking energy **drinks with caffeine**, remained alert but later developed muscle cramps.

The school nurse measured the following:

Student	Body Temp (°C)	Urine Volume (mL/hr)	Pulse (beats/min)	Plasma ADH Level (pg/mL)
A (no shade, no water)	39.8	8	120	20
B (same as A)	39.2	10	118	22
C (with caffeine)	37.5	40	85	6
D (in shade, hydrated)	36.8	60	75	5

Task:

(a) Analyse how the physiological responses observed in the students demonstrate temperature regulation and water balance mechanisms in humans.

(b) Suggest scientifically sound strategies to prevent dehydration and overheating during future field trips, using evidence from the scenario.

ITEM TWO

A marathon is taking place on an extremely hot day. Two runners, Alice and David, are of similar fitness. Alice drinks water at every station, while David drinks a popular sports drink that is high in electrolytes. By the final leg, David is experiencing muscle cramps and confusion, while Alice finishes strong. Medical staff suspect an electrolyte imbalance.

Parameter (Post-Race)	Alice	David
Core Temperature (°C)	38.5	39.0
Reported Symptoms	Thirsty, tired	Cramps, headache, disoriented
Blood Sodium (mEq/L)	138	125
Urine Output	Moderate	Very Low

Task:

(a) Based on the data, diagnose David's likely condition and explain its connection to osmoregulation.

(b) Explain how the hormone ADH would normally help Alice's body retain water during the race.

(c) Advise David on what type of fluid he should consume during future races and why.

TAP THE LINK BELOW FOR SOLUTIONS

https://www.youtube.com/watch?v=cG7dX5u0M_o