

Test Scenario 1

RUNNING IN HOT WEATHER

During long-distance running, body temperature rises, and sweating occurs.

If runners do not drink enough to replace the water they lose through sweating, they can experience dehydration. Water loss of 2% of body mass and above is considered to be a state of dehydration. This percentage is labelled on the water loss meter shown below.

If the body temperature rises to 40°C and above, runners can experience a life-threatening condition called heat stroke. Notice that a water loss of 2% and above causes dehydration, and that a body temperature of 40°C and above causes heat stroke.

Table 1.

Air Temperature (°C)	Air Humidity (%)	Drinking Water	Sweat Volume (Litres)	Water Loss (%)	Body Temperature (°C)
20	40	No	0.8	1.1	38.8

Situation 1

A runner runs for one hour on a hot, dry day (air temperature 40°C, air humidity of 20%). The runner does not drink any water (see Table 2).

Table 2.

Air Temperature (°C)	Air Humidity (%)	Drinking Water	Sweat Volume (Litres)	Water Loss (%)	Body Temperature (°C)
40	20	No	1.6	2.3	39.8

1. What health danger does the runner encounter by running under these conditions? The health danger that the runner encounters is:
 - a. dehydration
 - b. heat stroke

2. This is shown by the:
 - a. Sweat volume
 - b. Water loss
 - c. Body temperature

of the runner after a one-hour run.

Situation 2

A runner runs for an hour on a hot and humid day (air temperature 35°C, air humidity of 60%) without drinking any water. This runner is at risk of both dehydration and heat stroke (see Table 3).

Table 3.

Air Temperature (°C)	Air Humidity (%)	Drinking Water	Sweat Volume (Litres)	Water Loss (%)	Body Temperature (°C)
35	60	No	1.8	2.5	40.5
35	60	Yes	1.8	0.0	40.5

3. What would be the effect of drinking water during the run on the runner's risk of dehydration and heat stroke?
 - a. Drinking water would reduce the risk of heat stroke but not dehydration.
 - b. Drinking water would reduce the risk of dehydration but not heat stroke.
 - c. Drinking water would reduce the risk of both heat stroke and dehydration.
 - d. Drinking water would not reduce the risk of either heat stroke or dehydration.

Situation 3

4. When the air humidity is 60%, what is the effect of an increase in air temperature on sweat volume after a one-hour run (see Table 4)?
 - a. Sweat volume increases
 - b. Sweat volume decreases

Table 4.

Air Temperature (°C)	Air Humidity (%)	Drinking Water	Sweat Volume (Litres)	Water Loss (%)	Body Temperature (°C)
20	60	Yes	0.8	0.0	38.9
30	60	Yes	1.4	0.0	39.6
40	60	Yes	2.5	0.0	41.2
20	60	No	0.8	1.2	38.9
30	60	No	1.4	1.9	39.6
40	60	No	2.5	3.5	41.2

Situation 4

5. Based on the simulation, when the air humidity is 40%, what is the highest air temperature at which a person can run for one hour without getting heat stroke?
- 20°C
 - 25°C
 - 30°C
 - 35°C
 - 40°C

Table 5.

Air Temperature (°C)	Air Humidity (%)	Drinking Water	Sweat Volume (Litres)	Water Loss (%)	Body Temperature (°C)
20	40	Yes	0.8	0.0	38.8
25	40	Yes	1.0	0.0	39.0
30	40	Yes	1.2	0.0	39.3
35	40	Yes	1.5	0.0	39.8
40	40	Yes	1.9	0.0	40.7
40	40	No	1.9	2.7	40.7