1. **At what altitude would the temperature be 10°C, given that the temperature at sea level is 25°C and the lapse rate is 6.5°C per 1 km?**

Altitude = (Temperature at sea level − Target Temperature) / Lapse Rate
= (25°C - 10°C) / 6.5°C/km
= 2.31 km **(Ans:)**

2. A geologist wants to find out the height of a mountain in feet. He knows that the temperature at the base of the mountain is 77°F and the temperature at the top is 24.8°F. What is the total height of the mountain?

a) 14,500 km
b) 14,500 feet
c) 18,792 km
d) 18, 792 feet

Ans: - b) 14,500 feet

Lapse Rate in feet = Change of 3.6°F for every 1,000 feet.

°
°
°

3. Calculate the rise in temperature as a hiker descends from the top of a mountain of height 2 km above the ground, to its base which is 0.5 km above the ground.

Ans: 9.75°C

Lapse Rate in km = Change of 6.5°C for every 1 km.

°
°

4. The temperature at sea level is 30°C, and the lapse rate varies with altitude. The lapse rate is 6.5°C change per 1 km for the first 2 km, then changes to 4.5°C per 1 km for the next 3 km. What is the temperature at an altitude of 5 km?

Here,
For the first 2 km: Temperature decrease = 2km × (-6.5°C/km) = -13°C
For the next 3 km: Temperature decrease = 3 km × (-4.5°C/km) = -13.5°C
Total temperature decrease = (-13°C) + (-13.5°C) = -26.5°C
So, temperature at 5 km = 30°C - 26.5°C = 3.5°C **(Ans:)**

5. If the temperature at an altitude of 1 mile is 50°F, what would be the temperature at an altitude of 3 miles, considering the standard lapse rate of 3.6°F per 1000 ft?

Given, Temperature at 1 mile = 50°F

Changes of altitude = 3 miles - 1 miles = 2 miles
We know, 1 mile = 5280 feet
So, at 2 miles: Altitude = 2 × 5280 = 10560 feet
Given, the standard lapse rate, 3.6°F temperature decrease per 1000 ft altitude
At 10560 ft altitude, the decrease of temperature is = (3.6°F/1000 ft * 10560) = 38.016 °F
So, temperature at 3 miles = 50°F − 38.016 °F = 11.98°F **(Ans:)**

6. **A balloon is blown up and released from ground level. The Balloon will instantly pop when at a height of 18,000 feet. If the ground temperature is 102°F, at what temperature will the balloon pop?**

Ans: 37.2°F

Lapse Rate in feet = Change of 3.6°F for every 1,000 feet.

°
°

°
So, the balloon will pop at 37.2 °

7. A hiker wants to find out the change in temperature when ascending a mountain. He knows that the base of the mountain is at a height of 1,000 feet and the top of the mountain is at a height of 14,500 feet. What is the total temperature change as one climbs the mountain? Mention whether it is positive or negative.

Ans: - 48.6°F

Lapse Rate in feet = Change of 3.6°F for every 1,000 feet.

°
°

As the hiker is going up the mountain, the temperature is decreasing, and thus the temperature change is - 48.6°F, and is negative.

8. In a mountainous region, the lapse rate is affected by the presence of waterbodies. At an altitude of 1.5 km, the temperature is 16.8°C. If the temperature changes by 2°C for every kilometer above 1.5 km, what would be the temperature at an altitude of 3.8 km?

Here,
At 1.5 km temperature is = 16.8°C
Changes of distance(altitude) = 3.8 km - 1.5 km = 2.3 km
Now, Temperature change (decrease) from 1.5 km to 3.8 km = (2°C/km) × 2.3 km = 4.6°C
So, Temperature at 3.8 km = 16.8°C - 4.6°C =12.2°C **(Ans:)**

9. A drone is used to capture images from high altitudes. It can fly up to an elevation where the temperature is -2.5°C. If the temperature at ground level is 30°C, then what is the maximum elevation the drone can fly up to?

Ans: 5 km

Lapse Rate in km = Change of 6.5°C for every 1 km.

To calculate the maximum elevation, we must first calculate the change in temperature when going from the ground to the max height.

°

Using the temperature change, we can apply the lapse rate rule to calculate the maximum elevation.

°
°

10. A hawk flies from a tree 100 feet in height, to an elevation of 11,350 feet. Calculate the drop in temperature, in F, as it flies from 100 feet to 11,350 feet.

Ans: 40.5°F

Lapse Rate in feet = Change of 3.6°F for every 1,000 feet.

°
°