AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

7.3 Thermal Inversion

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS thermal inversion 逆温

Objective

Build the skills to answer exam questions on **thermal inversion**.

You must be able to:

- describe a **thermal inversion** 逆温
- explain how it traps pollutants
- link inversions to smog events

1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

Normal conditions

Usually air is **warmest near the ground** and cools with height, so warm polluted air **rises** and disperses.

A thermal inversion

In a **thermal inversion**, a layer of **warm air sits above cooler air** near the ground. The cool surface air cannot rise through the warm layer, so it — and the pollutants in it — are **trapped** near the ground.

Effect on pollution

Pollutants accumulate under the inversion, causing severe **smog** and health hazards until the inversion breaks (e.g. wind or heating).

Where it happens

Inversions are common in **valleys** (cool air pools) and cities surrounded by mountains, especially on calm, clear nights.

2 Practice

Now apply the methods above.

2.1 In normal air, how does temperature change with height near the ground? [1]

2.2 What is the arrangement of air in a thermal inversion? [1]

2.3 Why does an inversion worsen pollution? [1]

3 Exam-style questions

3.1 A thermal inversion traps pollutants because warm air [1]

A B
C D

A below cool air lets pollution rise
B above cool air stops the surface air from rising
C removes all pollution
D cools the ground

3.2 A city in a valley experiences a thermal inversion.

(a) Explain why pollution builds up near the ground. [2]

(b) State one condition that could break the inversion. [1]

3.3 Explain why thermal inversions are common in valleys. [2]