

Exercise walk-through

Introduction to Maps ■ 1.1

eXercise

You must be able to

- distinguish a **reference map** 参考地图 from a **thematic map** 专题地图
- explain why every **projection** 投影 distorts shape, area, distance, or direction
- match a projection (Mercator, Gall-Peters, Robinson) to its main distortion
- read **map scale** 比例尺 and say what a large- vs small-scale map shows

Method — Reference vs thematic maps

A **reference map** shows locations — borders, cities, roads. A **thematic map** shows the spatial pattern of one variable, such as population density or climate.

Method — Why projections distort

The Earth is a sphere; a map is flat. Flattening it always distorts at least one of **shape, area, distance, or direction**. No projection preserves all four.

Method — Matching projection to distortion

Mercator keeps direction/shape but greatly exaggerates area near the poles.

Gall-Peters keeps area true but distorts shape. **Robinson** is a compromise, distorting each a little.

Practice 2.1 ■ 2 marks

State one difference between a reference map and a thematic map.

Solution 2.1

Method: Reference vs thematic maps

Worked steps

a reference map shows locations/features **B1**; a thematic map shows the pattern of one variable **B1**.

Practice 2.2 ■ 2 marks

Explain why a flat map of the whole world must distort the Earth.

Solution 2.2

Method: Why projections distort

Worked steps

the Earth is a sphere and a map is flat **B1**; flattening a curved surface must distort shape, area, distance, or direction **B1**.

Practice 2.3 ■ 1 mark

The Mercator projection is common in classrooms and online maps.

- (a) State the property the Mercator projection preserves.
- (b) State the main distortion it introduces.

Solution 2.3

Method: Matching projection to distortion

Worked steps

(a) direction / true shape locally **B1**. (b) it exaggerates area toward the poles (e.g. Greenland looks huge) **B1**.

Exam-style 3.1 ■ 1 mark

A map showing the percentage of each country's population that is urban is best described as a

- A** reference map
- B** thematic map
- C** political map
- D** topographic map

Solution 3.1

A reference map

B thematic map 

C political map

D topographic map

Worked steps

B. it maps the spatial pattern of one variable, so it is a thematic map.

Exam-style 3.2 ■ 1 mark

A geographer needs true compass bearings for ocean navigation. The best projection is

- A** Gall-Peters (equal-area)
- B** Mercator (conformal)
- C** an equal-area interrupted map
- D** a cartogram

Solution 3.2

Method: Matching projection to distortion

A Gall-Peters (equal-area)

B Mercator (conformal) 

C an equal-area interrupted map

D a cartogram

Worked steps

B. Mercator preserves direction, which is why it was designed for navigation.

Exam-style 3.3 ■ 1 mark

A city planner uses a street map of one neighbourhood; a student uses a map of the whole world.

- (a) Which map is larger scale?
- (b) State one thing the larger-scale map shows that the smaller-scale map cannot.

Solution 3.3

Worked steps

(a) the neighbourhood street map **B1**. (b) fine local detail — individual streets/buildings **B1**.