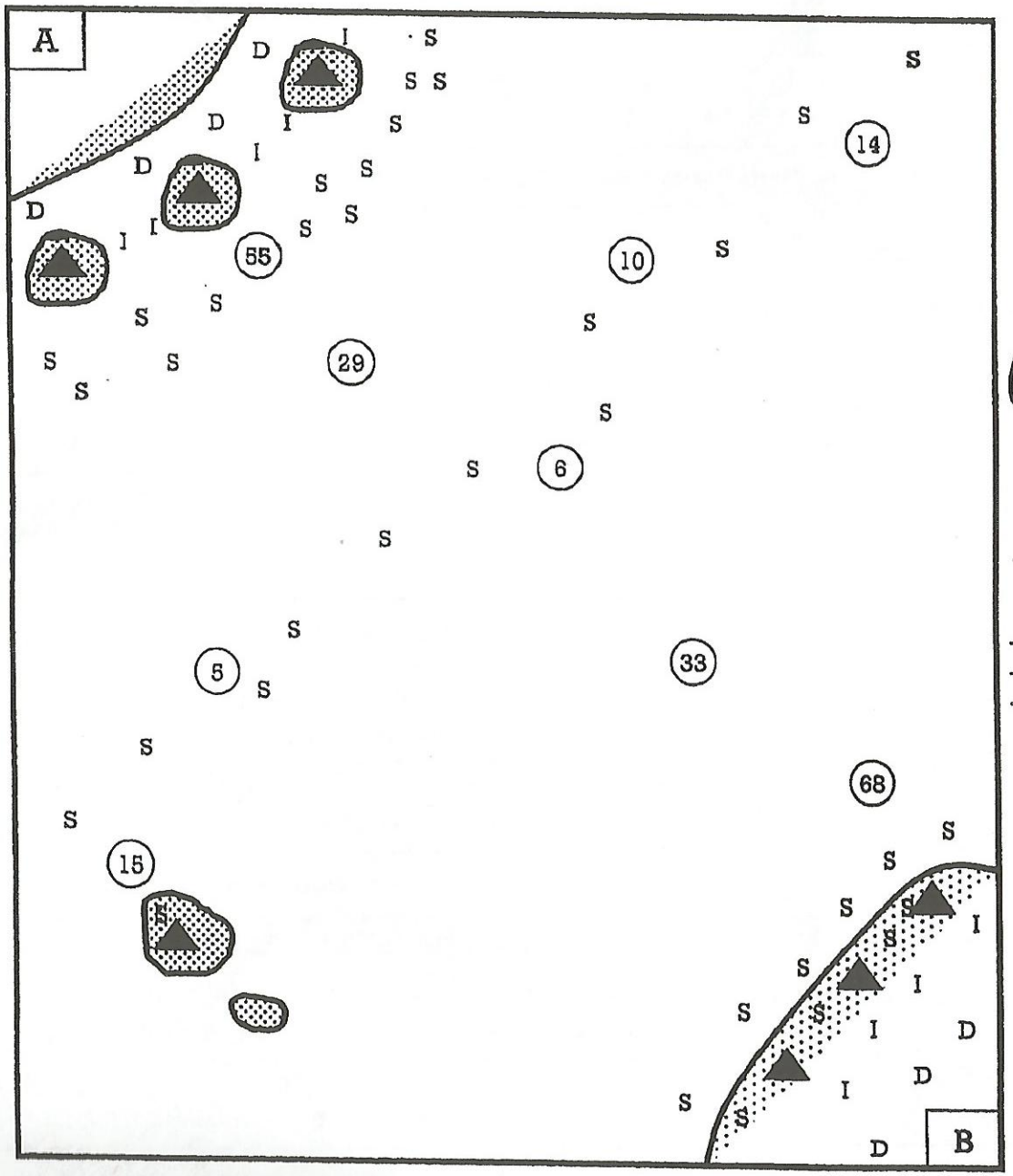
PHYSICAL GEOGRAPHY - EXERCISE 10

PLATE TECTONIC MAP OF AN OCEAN BASIN Name _____



Quake depth

S = shallow focus [0 to 45 miles deep]

I = intermediate focus [45 to125 miles deep]

D = deep focus [125 to 310 miles deep]

Active Volcano

Continent A or B or an Island

(6) **Age of the ocean floor, in millions of years**

Label neatly in the correct location:

Movement #1, divergence = sea-floor spreading = mid-ocean ridge

Movement #2, convergence = subduction

2 **Mid-ocean ridge [Mid-Atlantic Ridge]**

3 **Major mountain range within the continent like South America**

4 **Volcanic Island Arc**

5 **Deep Ocean Trench**

6 **Hot Spot = Mantle Plume**

1a.	How many different lithospheric *plates* are clearly shown on the map?	1a.	. Name _____
b.	How many of the plates on the map consist entirely of ocean floor [or ocean floor with islands]?	b.	
2a.	With a number "2", indicate the most likely location on the map of a mid-ocean ridge like the Mid-Atlantic Ridge.		
b.	What type of boundary is this?	2b.	
c.	What is the evidence shown on the map that suggests that this boundary is present?	i. _____ ii. _____	
3a.	With a number "3", indicate the most likely location on the map of a major mountain range found within a continent like the Andes in South America.		
b.	What type of boundary is this?	3b.	
c.	What is the evidence shown on the map that suggests that this boundary is present?	i. _____ ii. _____ iii. _____	
4a.	With a number "4", indicate the most likely location on the map of a volcanic island arc.		
b.	What type of boundary is this?	4b.	
c.	What is the evidence shown on the map that suggests that this boundary is present?	i. _____ ii. _____ iii. _____	
5.	With a number "5", label all plate boundaries where deep ocean trenches are found.		
6a.	Assume that only one of the volcanoes on the map has been produced not by movements 1 or 2, but by a mantle plume known as a hot spot. Label with a number "6".		
b.	Draw a one-inch [2 cm.] arrow extending from the hot spot indicating the direction in which you would expect to find increasingly older extinct volcanoes left by the mantle plume.		
7.	Why is the ocean floor older near continent B than near continent A?	7.	

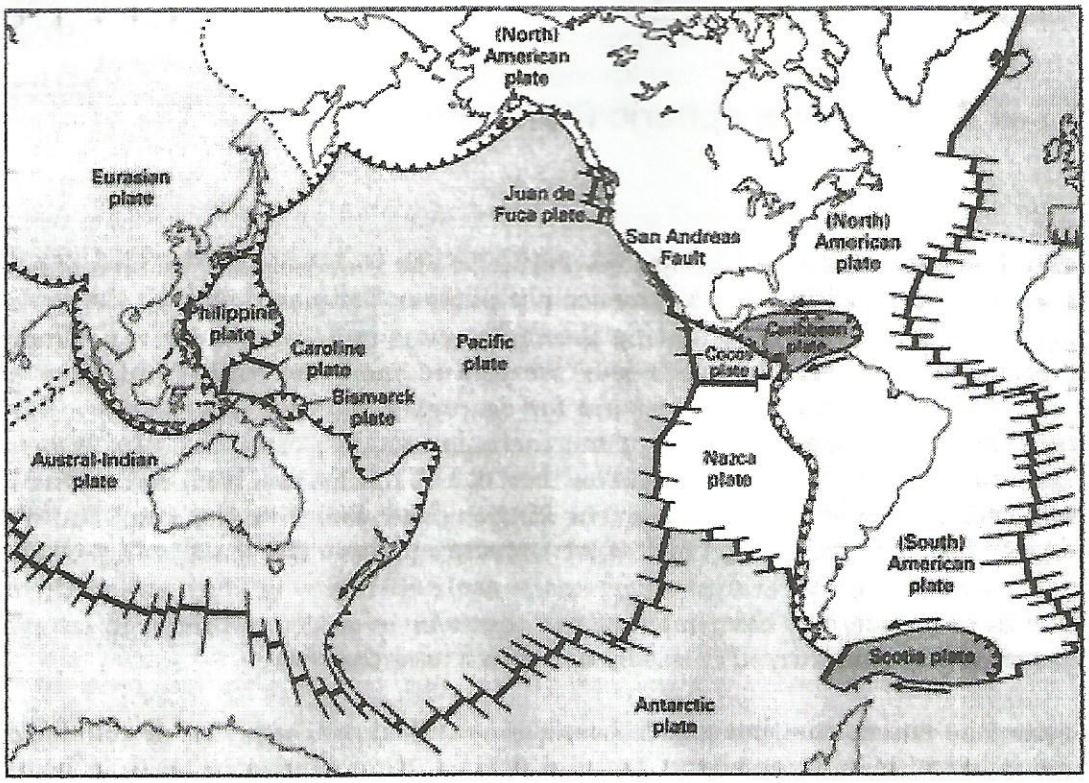
NAME _____ DATE _____

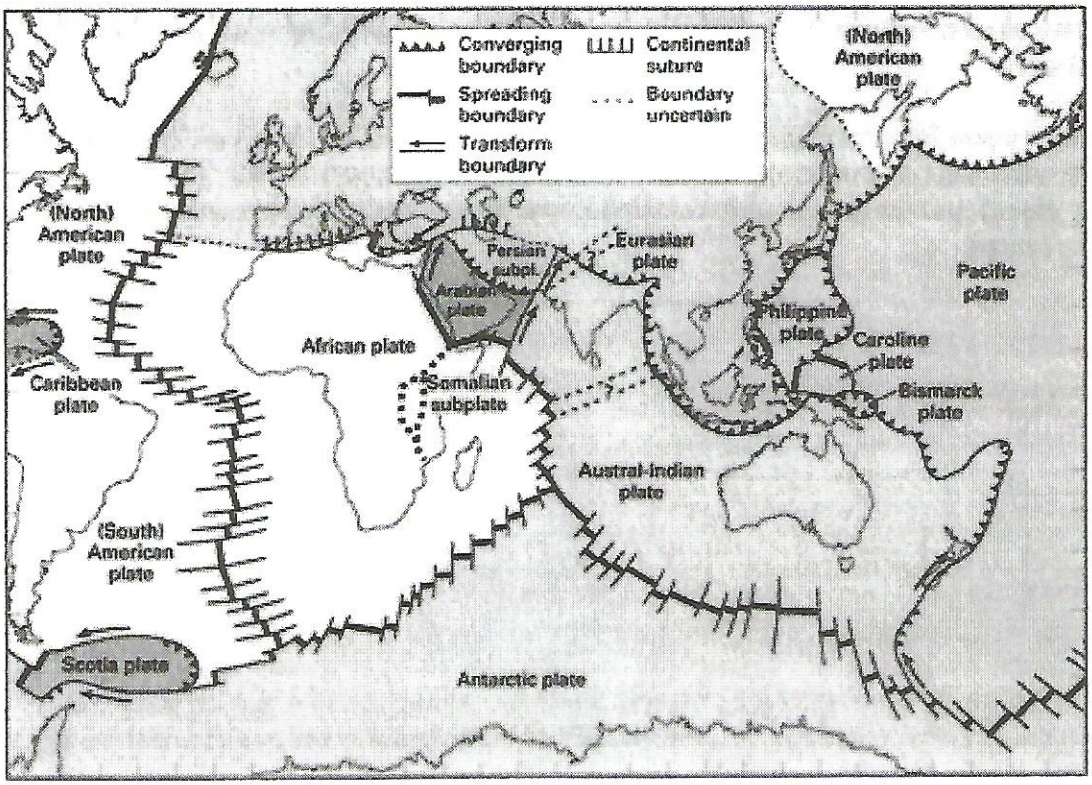
Exercise 9 The Lithospheric Plates

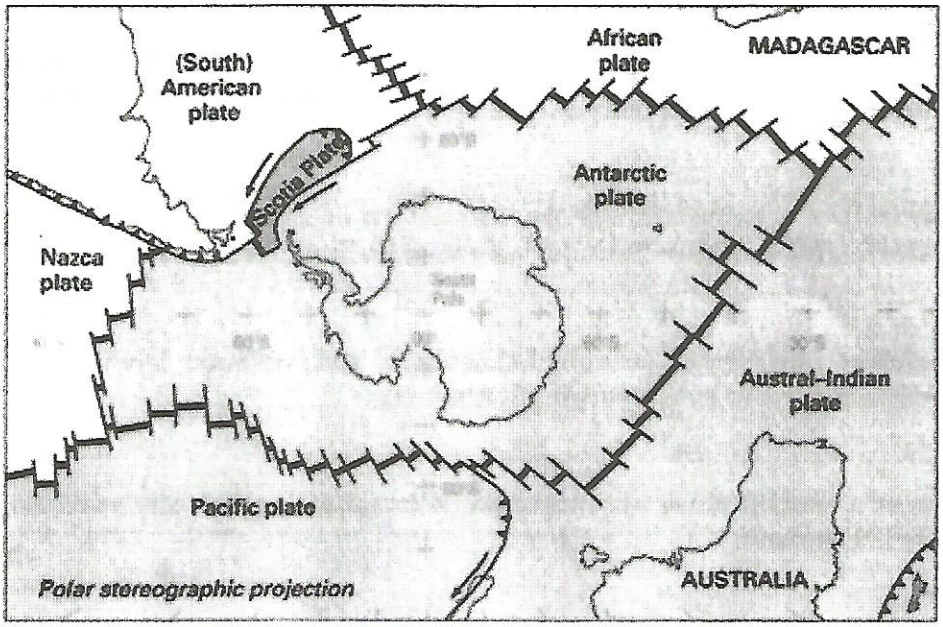
Plate tectonics has been hailed as a major revolution in the geosciences. The idea of scientific revolutions was put forward in 1962 by science philosopher Thomas S. Kuhn. He applied the term *paradigm* to whatever major scientific theory happens to dominate a given science field at a given period of history. The word was strange to most scientists, but they quickly adopted it as a buzz-word and looked around for examples. Kuhn thought that a paradigm gradually became unsatisfactory because it increasingly failed to cope with new information. Its loyal followers held fast to it as long as they could, but finally revolted, discarding the old paradigm and replacing it with a new one. The king is dead, long live the king! Kuhn's ideas soon came under fire, and today they look a bit simplistic, to say the least, and perhaps even unrealistic. A more moderate and perhaps more accurate view is that major theories of science evolve in sequence, but that much of the scientific evidence gathered in support of a discarded theory remains valid and is incorporated to newer theories.

Plate tectonics—the notion that gigantic lithospheric plates move, separate or collide, grow or disappear—was indeed a new paradigm, but did it bring the executioner's axe to bear on an earlier paradigm? Not really. Geology, though long-established as a science, never had even a good working hypothesis of how continents grow and ocean basins come into existence, or how mountain ranges rise. Now geologists have their very own first-born paradigm to love and cherish. True, it arrived a century later than the biologists' paradigm of evolution, but better late then never.

All of our exercises for this chapter relate to plate tectonics, so that you can become better acquainted with this strange newcomer to the world of science. As geographers looking always for global patterns and relationships, we begin with a geographical survey of the lithospheric plates.


(North) American plate
Eurasian plate
Juan de Fuca plate
San Andreas Fault
(North) American plate
Philippine plate
Caroline plate
Pacific plate
Bismarck plate
Cocos plate
Nazca plate
Australi-Indian plate
(South) American plate
Scotia plate
Antarctic plate


Converging boundary
Spreading boundary
Transform boundary
Continental suture
Boundary uncertain
(North) American plate
(North) American plate
Persian subpl.
Eurasian plate
Arabian plate
Pacific plate
Philippine plate
African plate
Caroline plate
Caribbean plate
Somalian subplate
Bismarck plate
Austral-Indian plate
(South) American plate
Scotia plate
Antarctic plate



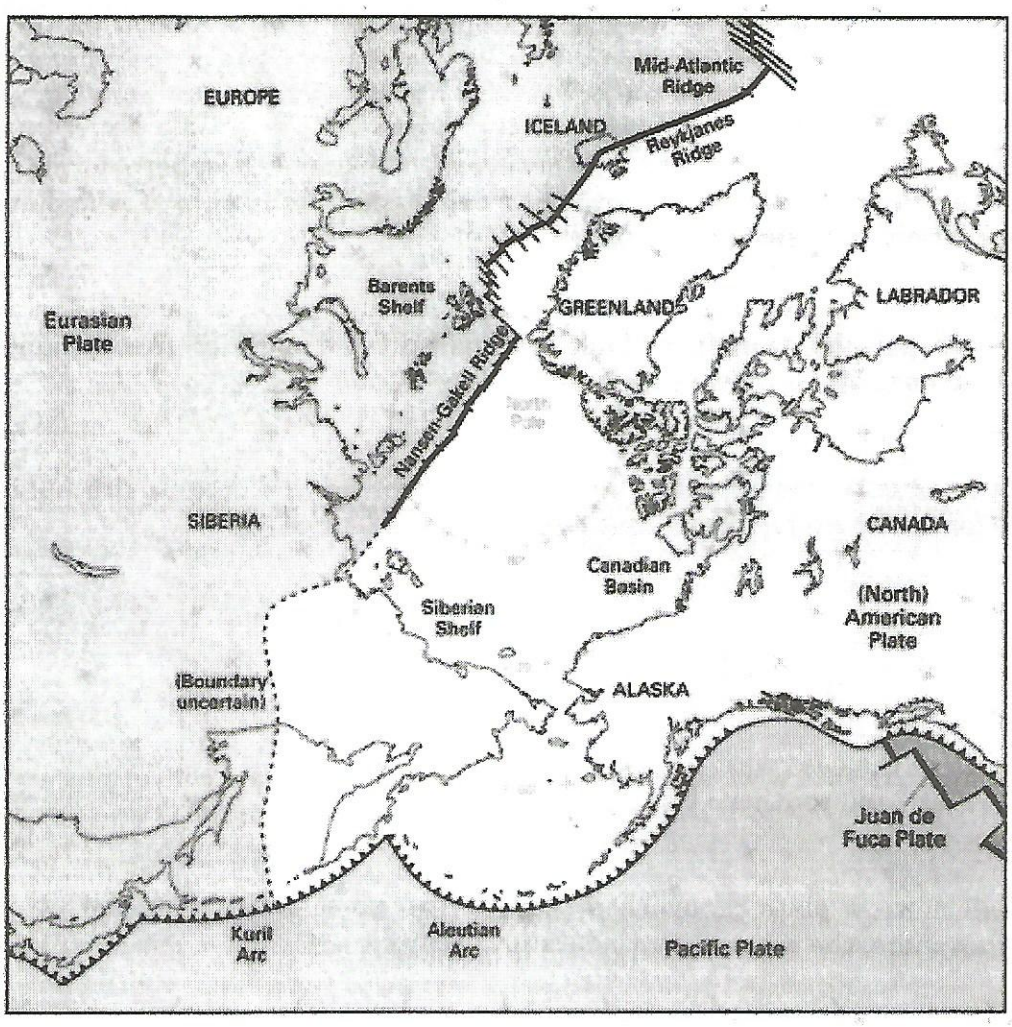


Figure A

Using the maps of Figure A as your information source, enter the name of the plate or subplate that satisfies each of the following descriptions.

(1) It consists almost entirely of oceanic lithosphere. Its eastern boundary is largely a spreading boundary; its western boundary is largely a converging boundary.

_____

(2) Formed entirely of oceanic lithosphere, its eastern boundary is a converging boundary; its northern, western, and southern boundaries are spreading boundaries.

_____

(3) Formed almost entirely of oceanic lithosphere and volcanic island arcs, this plate is bounded almost exclusively by converging boundaries.

_____

(4) It consists of a central mass of continental lithosphere completely surrounded by a broad zone of oceanic lithosphere.

_____

(5) It consists of two widely separated masses of continental lithosphere, one of which is almost completely surrounded by oceanic lithosphere; the other bounded on the north by a converging boundary.

_____

(6) It consists largely of continental lithosphere. Oceanic lithosphere forms its western western and northern border zone. Converging boundaries in the form of island arcs comprise much of its eastern and southern boundary.

_____

(7) It has two parallel transform fault boundaries, and each of these connects with a spreading boundary and a converging boundary.

_____

(8) It is about equally divided into continental lithosphere and oceanic lithosphere. Oceanic lithosphere forms the eastern part; continental, the western part.

_____

(9) Composed entirely of oceanic lithosphere, its western and southern boundaries are spreading boundaries; its northern boundary is a converging boundary.

_____

(10) Elongate in the east-west direction, its eastern boundary is a converging boundary, and both its northern and southern boundaries are transform boundaries. (Two answers)

_____ _____

(11) A small, narrow plate sandwiched between two great plates, one of which is formed of oceanic lithosphere, the other of continental lithosphere.

_____

(12) It consists of a large central core of continental lithosphere, surrounded on the west, south, and southeast by oceanic lithosphere. Its northern boundary is partly a converging boundary. Its northeastern boundary is a spreading boundary.

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