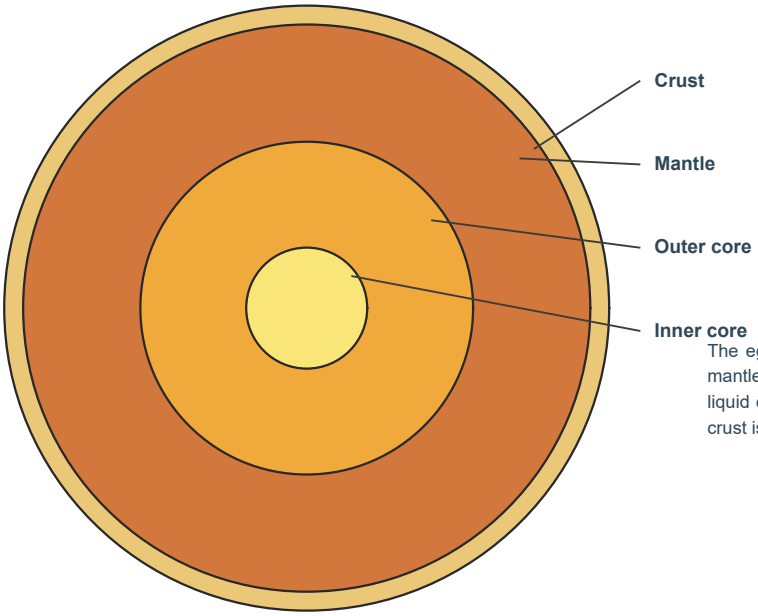
Layers of the Earth: the labelled cross-section

Figures from the US Geological Survey (This Dynamic Earth, 'Inside the Earth'). Diameter about 12,750 km. Three main layers by material, the core in two parts.



The egg comparison (USGS): the crust is the shell, brittle and thin; the mantle the white; the core the yolk, except that the core is two parts, liquid outside and solid inside. The diagram is not to scale: to scale, the crust is a line.

Layer	Thickness (USGS)	State	Made of
Crust	about 5 km (oceans), about 30 km (continents), up to 100 km (mountains)	solid, brittle	rock: basalt (oceanic), granite-type (continental)
Mantle	about 2,900 km	hot, semi-solid	silicate rock, iron, magnesium, calcium
Outer core	2,200 km	liquid	iron-nickel alloy
Inner core	1,250 km	solid	iron-nickel alloy

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Mechanical layers, the evidence and practice

By behaviour, not material

Layer	What it is	USGS note
Lithosphere	the crust plus the cool, rigid top of the mantle, acting as one stiff slab; broken into the plates	at least 80 km thick on average; thinnest under the oceans and under volcanically active regions such as the western US
Asthenosphere	a narrow, mobile zone of hot, semi-solid mantle below the lithosphere that can slowly flow	the rigid plates 'float' and move about on it

Crust is a kind of rock; lithosphere is crust plus mantle behaving as one. Do not mix the two label sets on one diagram.

How we know

[ ] Earthquake waves: P waves travel through solids and liquids, S waves only through solids.
[ ] S waves never reach the far side of the Earth: the outer core is liquid.
[ ] Waves bend and speed up entering denser rock; the depths where their speed jumps are the boundaries.
[ ] The deepest hole ever drilled is about 12 km, inside the crust.

Practice

[ ] 1. Which layer is thickest?
[ ] 2. Which layer is liquid?
[ ] 3. Why is the inner core solid?
[ ] 4. Where does the magnetic field come from?
[ ] 5. Thicker: oceanic or continental crust? By roughly how much?
[ ] 6. A diagram says mantle, outer core, inner core and 'lithosphere'. Fix it.
[ ] 7. Which waves cannot pass through the outer core, and what does that show?
[ ] 8. Order from the outside in.

Answers

1) mantle, about 2,900 km. 2) the outer core. 3) pressure. 4) the spinning liquid outer core. 5) continental, about 30 km against about 5 km. 6) the top label should be crust. 7) S waves; the outer core is liquid. 8) crust, mantle, outer core, inner core.

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