

SOLUTION

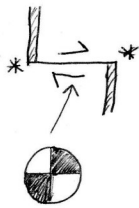
- (a) Rayleigh + Love waves; see notes for particle motion
- (b) Distortion $g_{\text{pole}} > g_{\text{eq}}$
 mass distribution $g_{\text{pole}} < g_{\text{eq}}$
 Centrifugal $g_{\text{pole}} > g_{\text{eq}}$
- (c) Olivine - spinel (410 km)
 Spinel - perovskite (660 km)
- (d) Earth acts as fluid, so surface depressed by weight of ice. After ice melts, surface rises.
 ① Hudson's Bay (Canada) ② Baltic (Scandinavia)
- (e) Wobble of rotation axis of Earth, because not a perfect sphere and coupling of atmosphere and ocean currents.
- (f) Curie depth is depth at which Curie temp. is reached. This is temp. at which remnant magnetization ceases.
- (g) ~800,000 years since last reversal
- (h) Strength of Earth's dipole field is currently decreasing with time. This was observed before previous reversals.

2(a) $M_0 = \mu DLW = 100 \times 10^9 \times 200 \times 1000 \times 30 \times 1000 \times 2$
 $= 1.2 \times 10^{21} \text{ Nm}$ (equations on formula sheet)
 $M_w = 8.05$

2(b) A: Low angle thrust fault
 Convergent margin in a subduction zone

B: Normal fault, 45° dip
 Extension at a mid-ocean ridge

2(c)



sea-floor spreading
 shows plates moved apart
 - were never connected;

3(a) see lecture notes

(b) see figure

(c) $v_m = 8 \text{ km/s}$

(d) radius of core = 2000 km

(e) see figure

(f) $1300 = \frac{\text{distance in mantle}}{v_m} + \frac{\text{distance in core}}{v_c}$
 $= \frac{4000}{8} + \frac{4000}{v_c} \Rightarrow v_c = 5 \text{ km/s}$

(g) see figure

(h) time for PP ($\Delta = 180^\circ$) = $2 \times$ time of P ($\Delta = 90^\circ$)
$$= \frac{2 \times 2 \times 4000 (\sin 45^\circ)}{8}$$
$$= 1414 \text{ seconds}$$

(i) See figure

4(a) see notes

(b) internal field (geodynamo)	98%
crustal magnetization	1%
external (magnetosphere)	1%

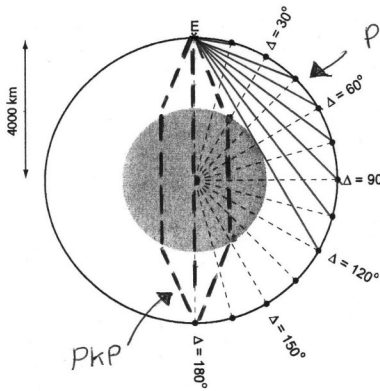
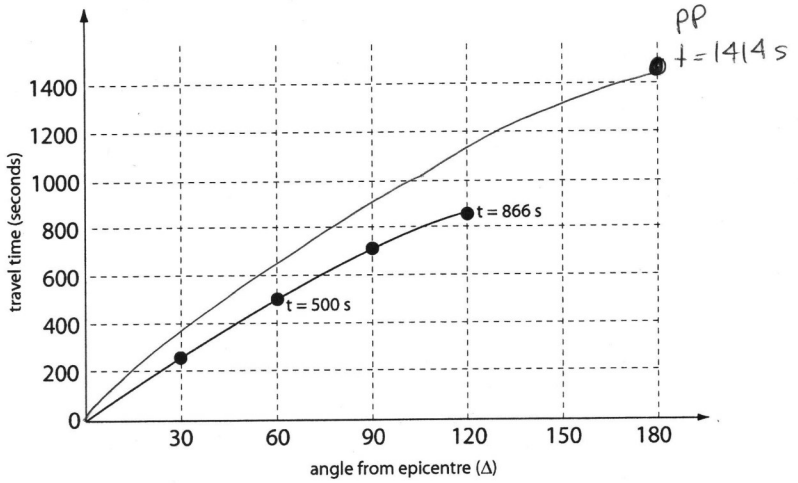
(c) Thermo-remnant magnetization (atoms align when molten; freeze)
Detrital remnant magnetization; (atoms align in suspension)
Chemical remnant magnetization; (diagenesis)

(d) Assume \Rightarrow geomagnetic field has always been dipolar
 \Rightarrow dipole axis has always been close to rotation axis
(i.e. geomagnetic & geographic poles coincide)

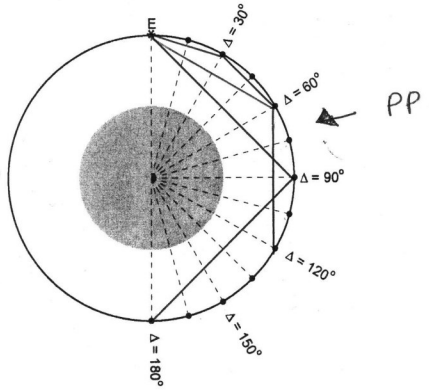
(e) $\tan I = 2 \tan \Theta$

$I = 40^\circ \Rightarrow \Theta = 22.8^\circ$

\Rightarrow rock has moved from latitude $22.8^\circ \text{N} \rightarrow 54^\circ \text{N}$



Direct P-wave
PKP



PP