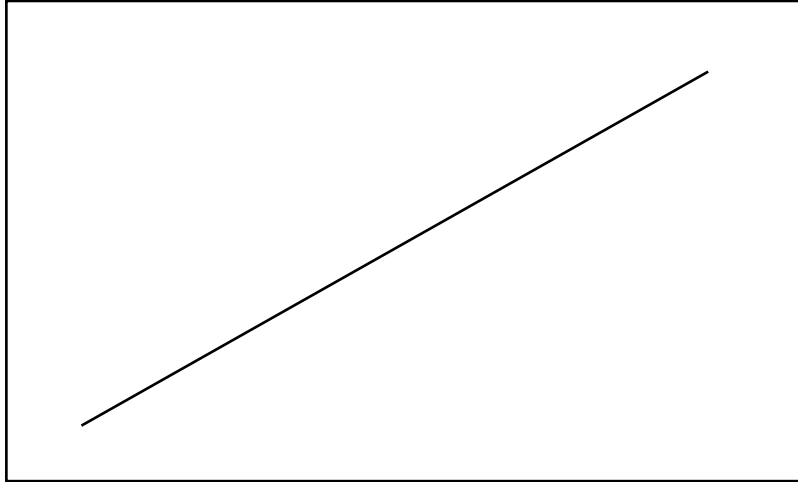


SECTION A: (90 MARKS)

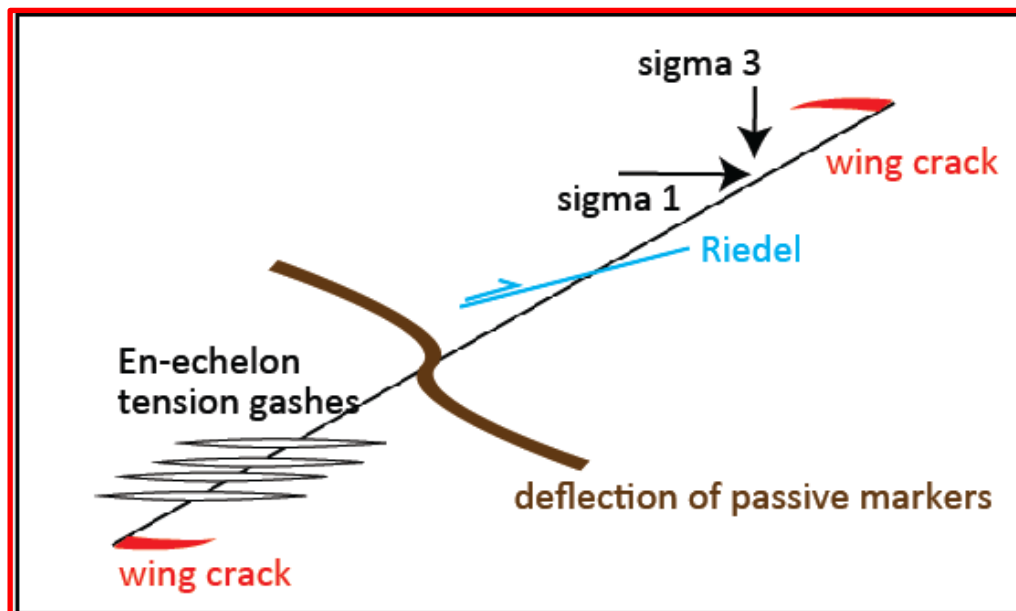
Question 1: Brittle deformation. (12 marks).

Consider a right-lateral strike-slip fault as drawn in map view below in the box.



Draw in the box above the geometries of the following features consistent with a right lateral strike-slip fault:

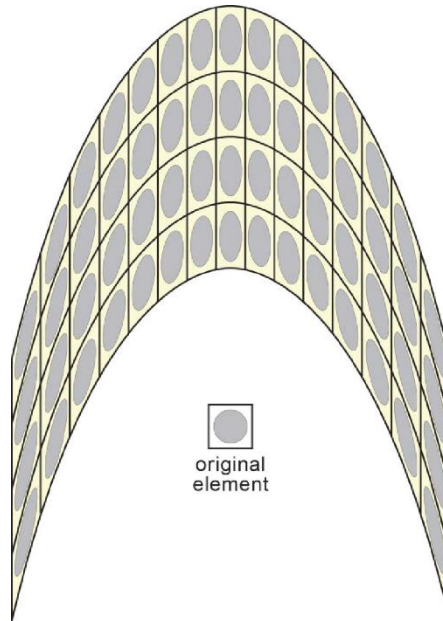
- 1.1 En-echelon tension gashes (2 marks)
- 1.2 Riedel shear (2 marks)
- 1.3 wing cracks (2 marks)
- 1.4 deflection of passive markers (such as bedding planes) (2 marks)
- 1.5 arrows representing the orientation of sigma 1 and sigma 3. (4 marks)



Question 2: Strain and folding. (15 marks).

- 2.1. Comment on the strain and strain distribution in the fold below. (7 marks)
- 2.2. Which type of fold is it and how does this type of fold form? (8 marks)

The fold is a shear or passive fold. See lecture on fold and folding, chapter 4.1.



Question 3: Stress and strain. (12 marks).

- 3.1. Body and applied forces are distinct forces that are both important for the deformation of rocks. Explain how these two forces differ and give at least one geological example of each. (6 marks)

See lecture 3 on forces and stress, chapter 1.

- 3.2. What are the differences between flattening and constriction states of strain? Give at least one geological example of each. (6 marks).

See lecture 2 on strain, chapter 12.

Question 4: Rheology. (12 marks).

- 4.1. Explain the role of strain rate in deformation of rocks. Give one geological example where strain rate plays a role. (6 marks)

See lecture 5 on rheology, chapter 9

- 4.2. Consider two rocks of highly different viscosities such as salt rock and quartzite. Explain how these two rocks are expected to deform in the middle crust if they were set in the same stress field. (6 marks)

See lecture 5 on rheology, chapter 11

Question 5: Ductile deformation. (15 marks).

- 5.1. Which kind of structure is shown in the photo below? (3 marks)

It is a sheath fold.

- 5.2. Explain how this structure formed (use sketches). (12 marks)

See lecture on fold and folding, chapter 4.1



Question 6: Fabrics and shear zones. (12 marks)

6.1. What is(are) the difference(s) between an L-S-tectonite and an S-tectonite? Use annotated sketches to illustrate your answer. (6 marks)

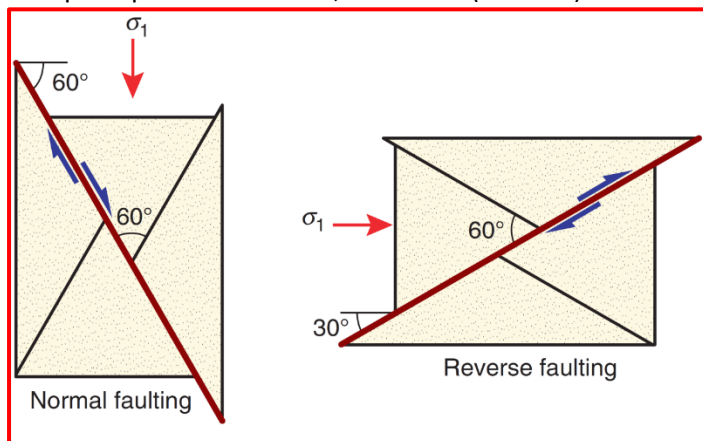
See lecture on fabrics, foliations and lineations, chapter 1.

6.2. Do shear zones form by homogeneous strain? Motivate your answer. (6 marks)

See lecture on shear zones, chapter 2.

Question 7: Brittle deformation. (12 marks)

7.1. Define what conjugate faults are and report on the angular relations between them and the principal stress axes σ_1 , σ_2 and σ_3 . (6 marks)



See lecture on faults and faulting.

7.2. Explain why Mohr diagrams are useful (use sketches). (6 marks)

See lecture on Mohr circle