Geology · Biology and Earth Sciences

Geological Structures of the Earth's Crust Rocks

thanawiya-archive.com

150	3	70
questions	sets	pages

Contents

Multiple choice questions (89 questions) — Questions · p. 2 — Answers · p. 54

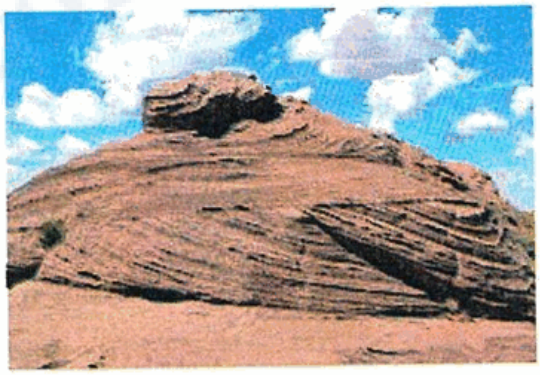
Essay questions (13 questions) — Questions · p. 31 — Answers · p. 62

Past exam questions (48 questions) — Questions · p. 37 — Answers · p. 64

Click a question number to jump to its answer, and an answer number to go back to the question.

Multiple choice questions — 89 questions

1 The following geological structures (H) and (J) were found in sedimentary rocks. What do the structures (H) and (J) represent, respectively?



H



J

(A) (H) ripple marks / (J) graded bedding

(B) (H) cross bedding / (J) graded bedding

(C) (H) cross bedding / (J) mud cracks

(D) (H) mud cracks / (J) ripple marks

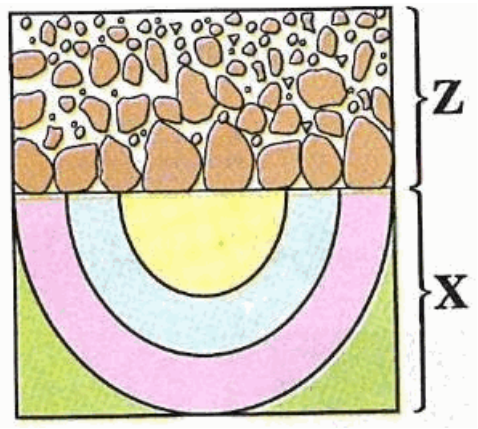
---

2 All of the following are geological structures that form after the sediments become rocks except .....

(A) ripple marks (B) folds (C) faults (D) joints

---

3 From the opposite figure, which of the following causes the formation of the two structures (Z) and (X)?



(A) (X) environmental factors, (Z) water currents

(B) (X) environmental factors, (Z) internal forces

(C) (X) water currents, (Z) tectonic forces

(D) (X) internal forces, (Z) environmental factors

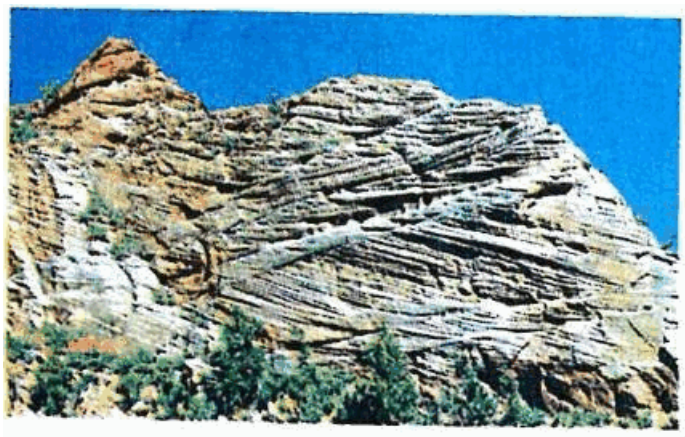
---

4 A sedimentary bed consists of grains of unequal size. The average grain size of its upper part is 0.02 mm, of its middle part 1 mm and of its lower part 3 mm. The geological structure that this bed represents is .....

(A) graded bedding (B) cross bedding (C) ripple marks (D) mud cracks

---

5 The opposite picture shows a rock mass formed by water currents. This rock mass belongs to the ..... structures.



(A) tectonic (B) secondary (C) primary (D) igneous

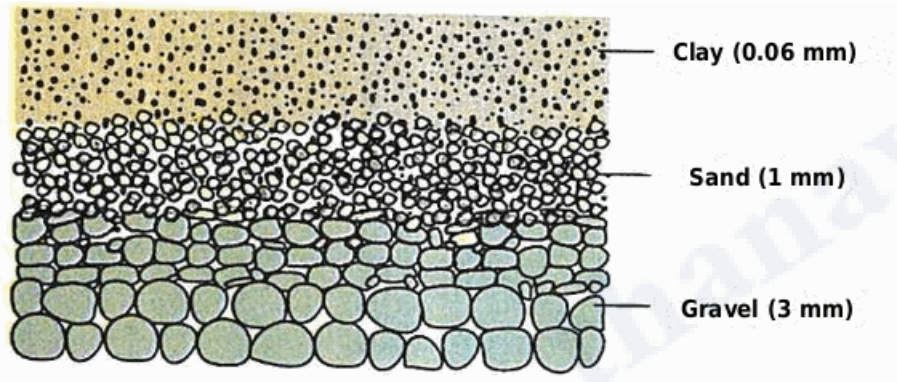
---

6 The opposite figure represents deposits in the form of sand dunes formed by ..... factors.



(A) internal (B) climatic (C) tectonic (D) secondary

7 The opposite figure represents .....



(A) graded bedding (B) cross bedding (C) mud cracks (D) ripple marks

8 Cross bedding is a geological structure that may result from .....

(A) earthquakes (B) water currents (C) volcanoes (D) tectonic pressure

9 The geological structure shown in the opposite picture forms by the action of .....



(A) heat and dryness
(B) compression forces
(C) internal forces
(D) tectonic forces

10 By studying the following geological structures, we find that the sedimentary rocks that formed at the beginning of deposition in both sections were in the form of .....



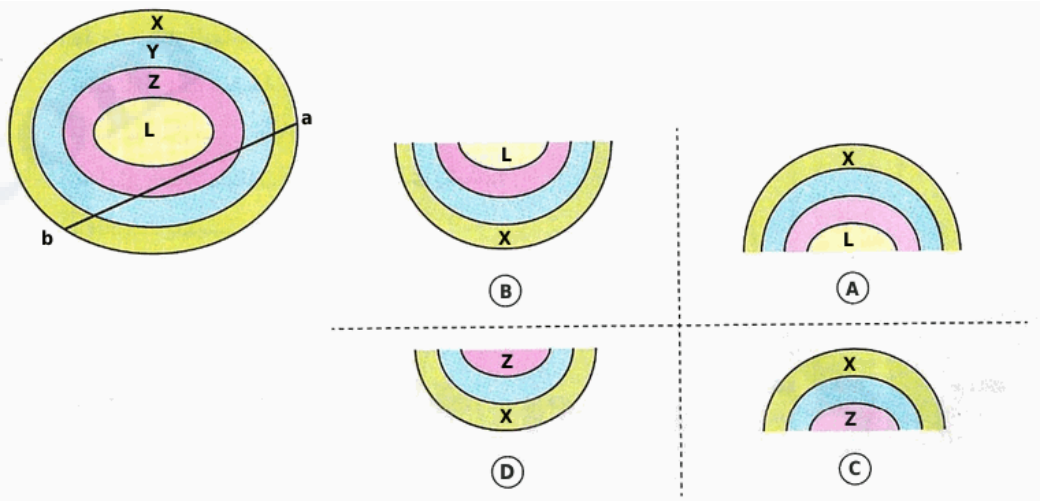


(A) horizontal layers
(B) igneous rocks
(C) faulted rocks
(D) folded layers

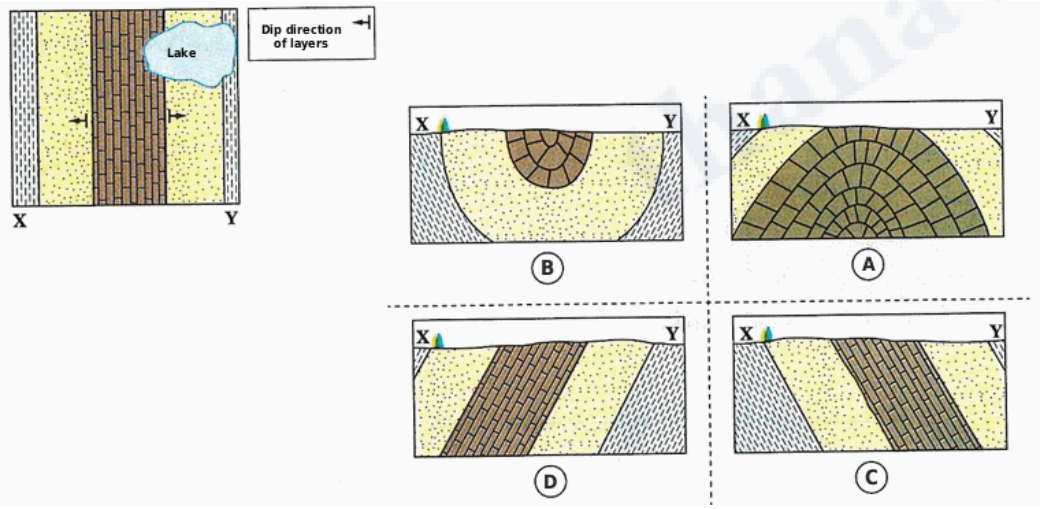
11 Which of the following choices is correct for distinguishing between an anticline and a syncline?

(A) Anticline: the limbs diverge downwards, syncline: the youngest layers are on the outside
(B) Anticline: the youngest layers are on the outside, syncline: the limbs diverge upwards
(C) Anticline: the limbs converge downwards, syncline: the oldest layers are in the centre
(D) Anticline: the oldest layers are in the centre, syncline: the limbs converge upwards

12 In the opposite horizontal section, if layer (X) is the oldest layer and (L) is the youngest layer, what is the shape resulting from taking the vertical section (a – b)?



13 In front of you is a horizontal section of sedimentary layers. Which of the following vertical sections matches the section along (X – Y)?



14 If the ratio between the structural elements of a fold is $(1 : 2 : 2)$ and its limbs converge upwards, this indicates the presence of .....

(A) a syncline made of two layers

(B) an anticline made of two layers

(C) a fold whose youngest layers are in the centre

(D) a fold whose oldest layers are on the sides

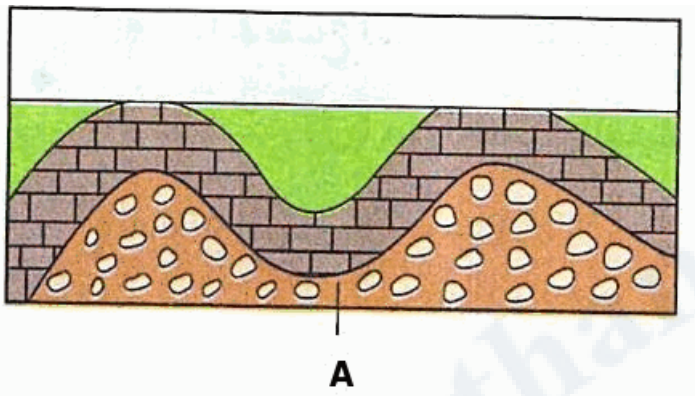
15 An anticline has two layers (X) and (Y). If the age of (X) is 5 million years and the age of (Y) is 2 million years, then layer .....

(A) (X) surrounds layer (Y)
(B) (Y) surrounds layer (X)
(C) (X) is farther from the centre than (Y)
(D) (Y) is found in the centre of the fold

16 A fold consists of 4 layers, so the number of its limbs is .....

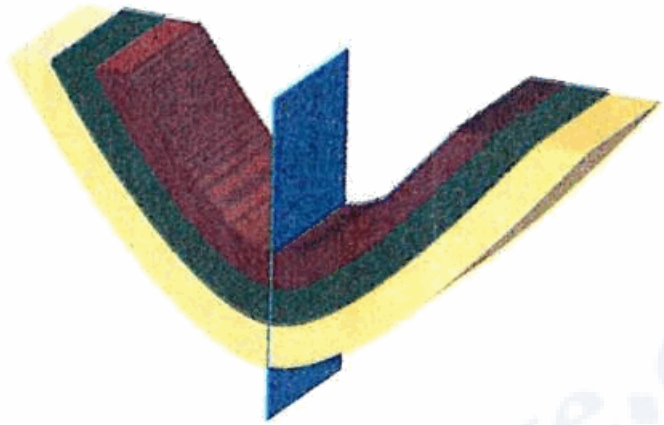
(A) 1 (B) 2 (C) 4 (D) 8

17 The opposite vertical section contains some geological structures. The layer marked by the letter (A) .....



(A) represents the youngest layer in the structure that contains it
(B) was deposited in the form of folds
(C) represents the oldest layer in the structure that contains it
(D) formed because it was exposed to tension forces

18 How many axes does the opposite fold have?

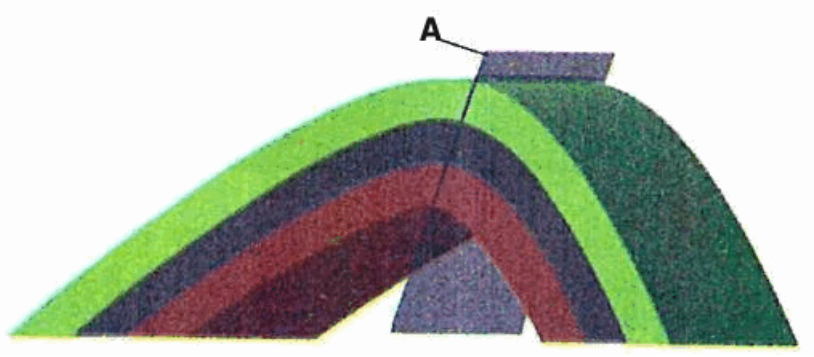


(A) 1 (B) 3 (C) 5 (D) 6

19 The structural element of folds whose number depends on the number of layers cut by another structural element is .....

(A) the axis
(B) the axial plane
(C) the limb
(D) the centre of the fold

20 In the opposite block diagram, the letter (A) refers to .....



(A) the axial plane of the fold
(B) one of the limbs of the fold
(C) one of the axes of the fold
(D) the centre of the anticline

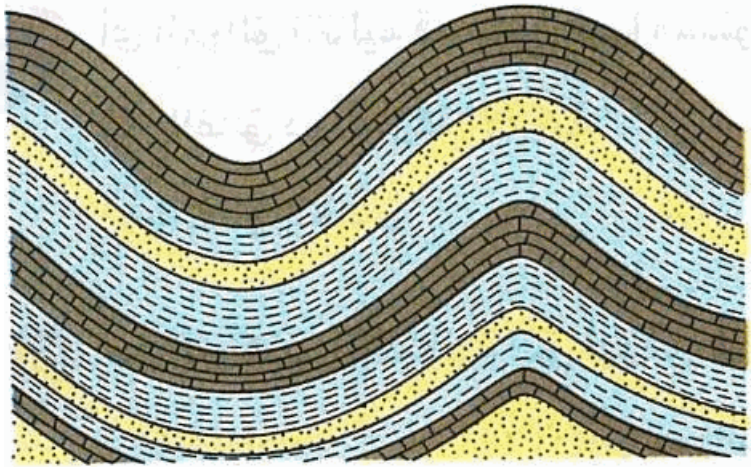
21 A fold consists of 10 complete layers, so the numerical relation between the limbs and the axes, respectively, is .....

(A) 10:1
(B) 1:5
(C) 5:1
(D) 1:10

22 In folds in which the youngest layers are at the centre .....

(A) the limbs converge downwards
(B) the limbs converge upwards
(C) the limbs diverge downwards
(D) the oldest rocks are surrounded by younger ones

23 The vertical section in front of you represents geological structures that we may benefit from in all of the following except .....



(A) obtaining hot springs
(B) determining the age relation of rocks
(C) obtaining groundwater
(D) obtaining petroleum

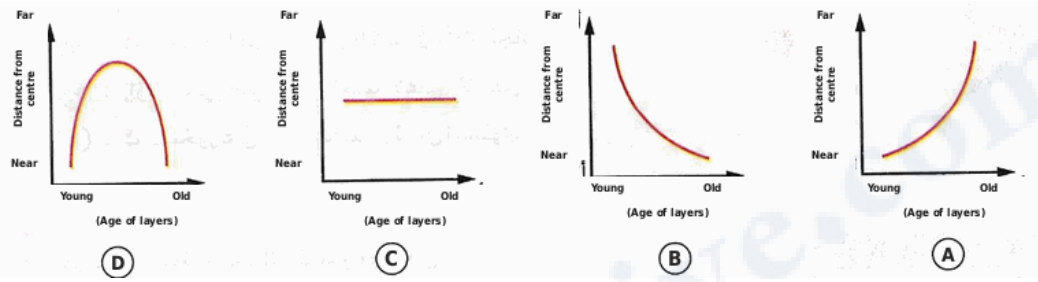
24 The study of folds shows the relation between their layers because they are .....

(A) deposited only on land
(B) clearer in igneous rocks
(C) arranged in time from the centre outwards
(D) clearer in metamorphic rocks

25 The structural element of a fold that may cut all the layers that have not been eroded is .....

(A) the axis
(B) the axial plane
(C) the two limbs
(D) the crest of the fold

26 The graph that represents the relation between the age of the layers and the distance from the centre of an anticline is .....



27 The geological structure resulting from the breaking and movement of the rocks above the fracture plane towards the older layers is a .....

(A) normal fault (B) thrust fault (C) reverse fault (D) strike-slip fault

28 Two normal faults that join in the rocks of the hanging wall indicate .....

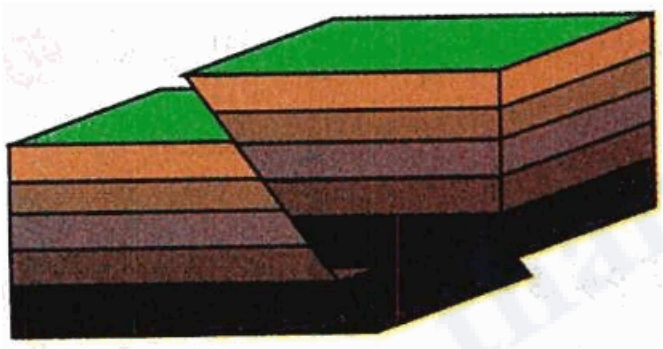
(A) the presence of old layers surrounded by younger layers

(B) the presence of young layers surrounded by older layers

(C) that the area was exposed to a compression force

(D) that the layers between the two faults stand out upwards

29 The opposite block diagram shows a ..... fault.



(A) reverse (B) normal (C) horst (D) graben

30 In which of the following faults may the fault plane be perpendicular to the direction of movement of the rock mass?

(A) The strike-slip fault (B) The reverse fault

(C) The normal fault (D) The horst fault

31 One of the tectonic structures that has a role in encouraging therapeutic tourism is .....

(A) joints (B) faults (C) anticlines (D) synclines

32 Which of these structures appears in sedimentary rocks only?

(A) Faults (B) Cross bedding (C) Joints (D) Folds

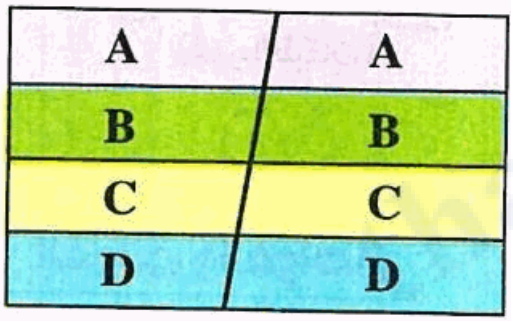
33 All of the following are among the importance of faults except that they are .....

(A) petroleum traps
(B) places of hot springs
(C) places where natural gas forms
(D) places where manganese is deposited

34 A normal fault happens when .....

(A) the rocks on both sides of the fracture are pushed towards each other
(B) the rocks above the fracture plane move in the direction of gravity
(C) the rocks on both sides of the fracture shake up and down
(D) the rocks on both sides of the fracture move in the same plane

35 The figure in front of you represents a vertical section of a geological structure resulting from tectonic forces that led to fracturing. It is a ..... fault.



(A) normal
(B) reverse
(C) thrust
(D) strike-slip

36 The opposite vertical section represents geological structures, which are .....



(A) normal faults
(B) joints
(C) horsts
(D) reverse faults

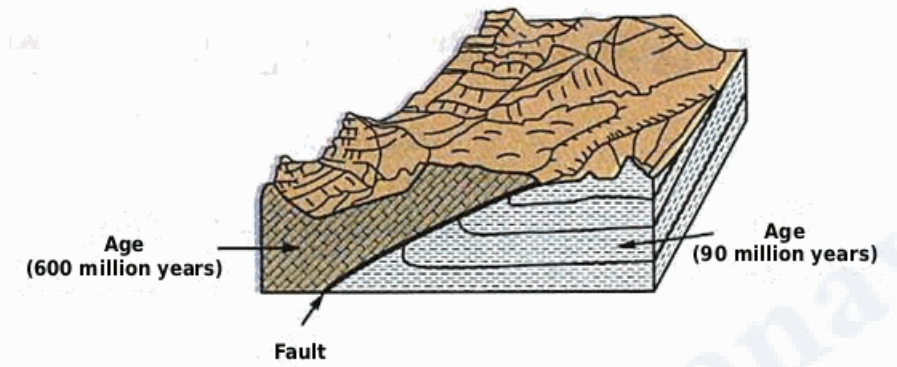
37 The fault in which no vertical displacement of the rocks on both sides is expected is the ..... fault.

(A) reverse (B) normal (C) horst (D) strike-slip

38 Which of the following faults differs in the type of tectonic forces that cause its formation?

(A) The normal fault (B) The thrust fault (C) The horst fault (D) The graben fault

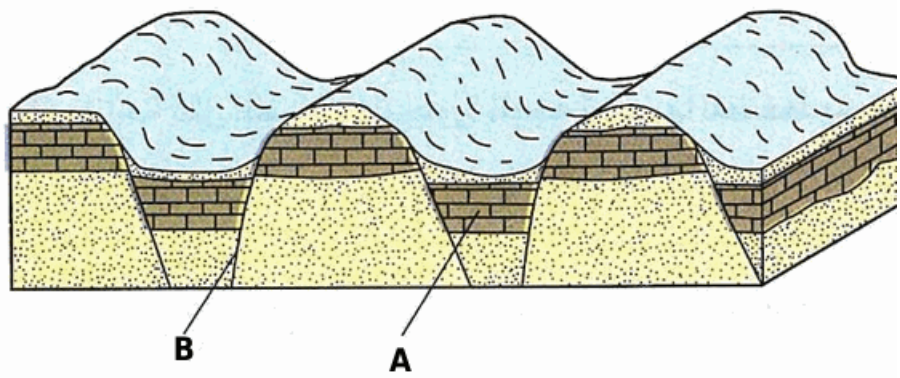
39 The opposite block diagram shows a fault in the American state of Montana. What is the type of the fault?



(A) Normal fault (B) Reverse fault (C) Horst fault (D) Graben fault

40 The opposite block diagram represents an area containing many faults. Study it well, then answer:

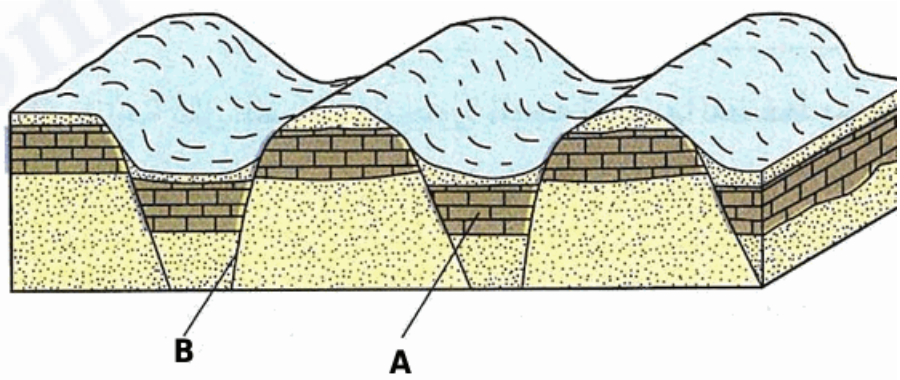
What is the type of fault (A)?



(A) Graben (B) Reverse (C) Thrust (D) Strike-slip

41 The opposite block diagram represents an area containing many faults. Study it well, then answer:

What is the type of forces acting on fault (B)?



(A) Tension forces

(B) Compression forces

(C) Tension and compression forces together

(D) External forces

---

42 The formation of Pharaoh's Bath (Hammam Faraoun) on the eastern coast of the Gulf of Suez is due to the occurrence of .....

(A) cross bedding in sedimentary rocks

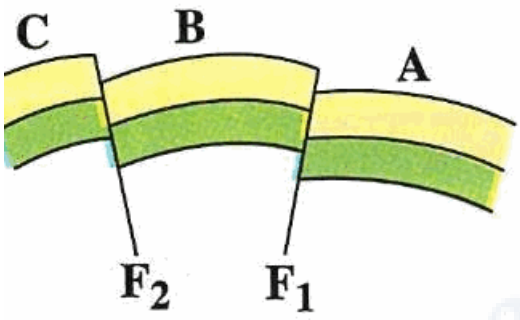
(B) bending in a group of sedimentary rocks

(C) a fracture in a group of rocks without displacement

(D) a fracture in a group of rocks with displacement

---

43 The opposite figure represents a vertical section of an area that was folded, then successive earth movements affected it and formed the faults (F1) and (F2). The letters that indicate the rocks of the hanging wall are .....



(A) B, C (B) A, C (C) B (D) A

---

44 By studying the following two vertical sections, what is the similarity between the two tectonic structures in sections (1) and (2)?



(A) The presence of the older layers surrounded by younger layers

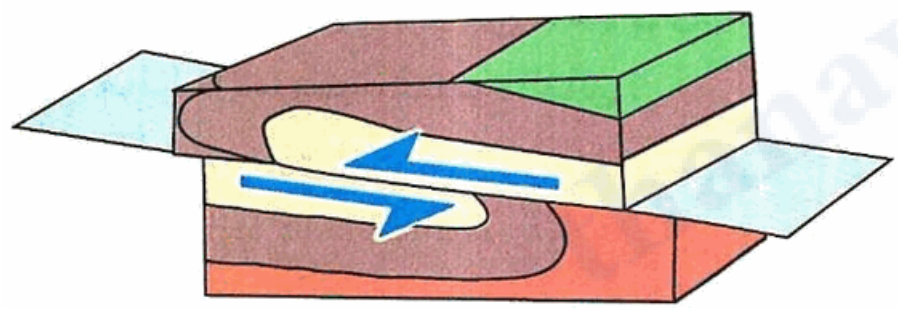
(B) Both tectonic structures result from compression forces

(C) Both happen as a result of the breaking and displacement of rocks

(D) They are found only in sedimentary rocks

---

45 Which of the following does not describe the opposite structure?



(A) It results from tension forces

(B) It results from compression forces

(C) The rocks of the hanging wall move almost horizontally

(D) It is one of the types of reverse faults

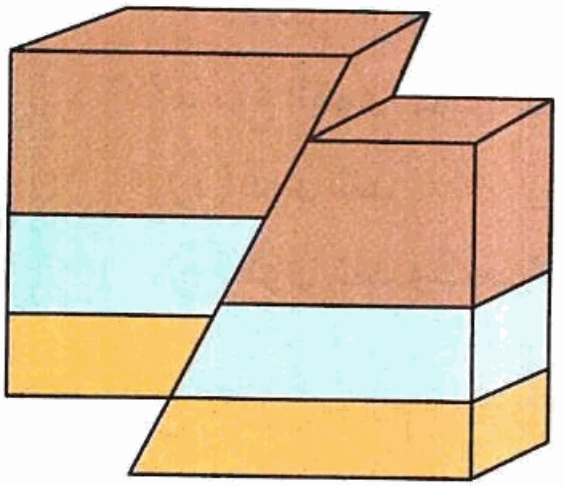
---

46 The displacement of neighbouring rock blocks as a result of being exposed to compression causes .....

(A) joints (B) normal faults (C) thrust faults (D) folds

---

47 The opposite fault resulted from the movement of the rocks of the hanging wall .....



(A) downwards relative to the rocks of the footwall

(B) upwards relative to the rocks of the footwall

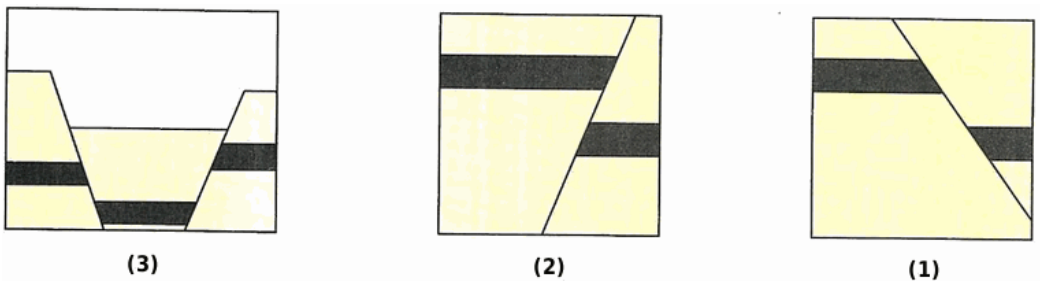
(C) horizontally without vertical displacement

(D) almost horizontally with a slightly inclined vertical displacement

48 The downward movement of the rocks between two normal faults is known as the ..... fault.

(A) graben (B) horst (C) thrust (D) strike-slip

49 The following vertical sections are of layers that were broken and displaced as a result of tectonic forces. What are the types of tectonic structures represented in sections (1), (2) and (3), respectively?



(A) (1) normal fault / (2) reverse fault / (3) graben fault

(B) (1) reverse fault / (2) normal fault / (3) graben fault

(C) (1) reverse fault / (2) normal fault / (3) horst fault

(D) (1) normal fault / (2) reverse fault / (3) horst fault

50 Joints are distinguished from faults by .....

(A) being tectonic structures

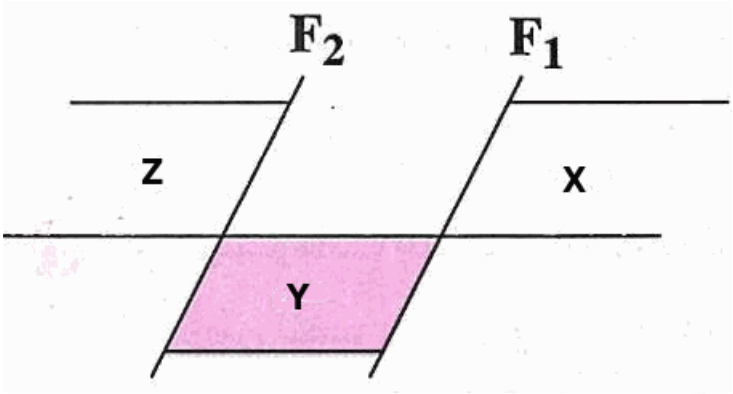
(B) the absence of displacement of the rocks on both sides of the fracture

(C) being a fracture in rock masses

(D) being found in sedimentary rocks only

---

51 The rock block (Y) in the opposite figure represents .....



(A) a hanging wall for both faults (F1) and (F2)

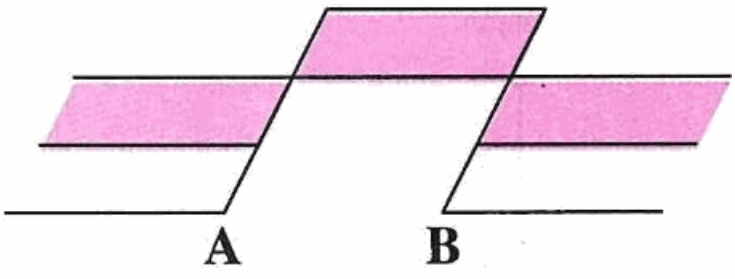
(B) a footwall for both faults (F1) and (F2)

(C) a hanging wall for fault (F1) and a footwall for fault (F2)

(D) a footwall for fault (F1) and a hanging wall for fault (F2)

---

52 The structures (A) and (B) in the opposite vertical section happen because of .....



(A) (A) tension forces - (B) compression forces

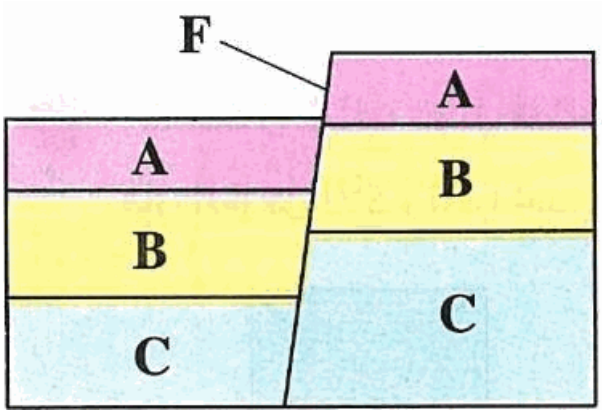
(B) (A) compression forces - (B) tension forces

(C) (A) tension forces - (B) tension forces

(D) (A) compression forces - (B) compression forces

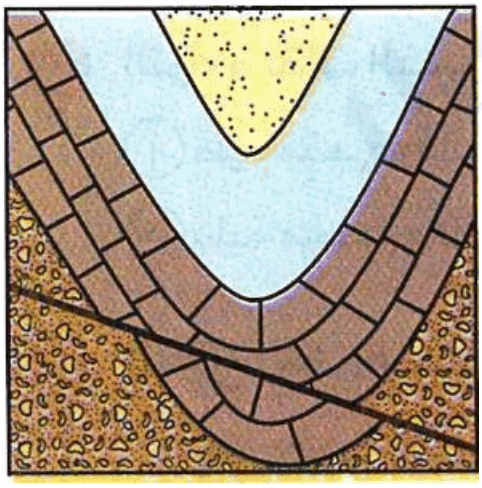
---

53 The opposite vertical section shows the rock layers (A), (B) and (C), and the letter (F) represents a fault. The correct order of events from oldest to youngest is .....



(A) C then B then A then F
(B) A then B then C then F
(C) F then C then B then A
(D) F then A then B then C

54 The tectonic structures in the opposite vertical section formed as a result of the rocks being exposed to .....



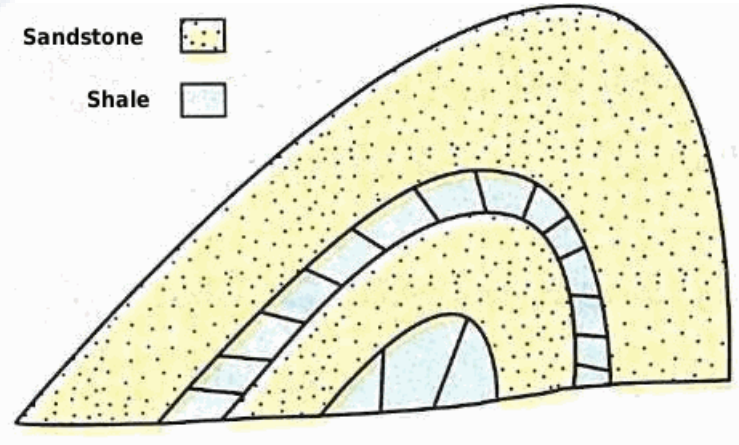
(A) tension, then the tension force increased
(B) compression, then the compression force increased
(C) compression, then tension and fracturing
(D) tension, then compression and fracturing

55 The geological structure that is considered a possible place for petroleum oil to collect is .....

(A) graded bedding (B) cross bedding (C) the joint (D) the horst

56 The opposite figure shows a vertical section of an anticline showing joints in the shale layers. Study it well, then answer:

The number of joints in the older shale layer is less than in the younger shale layer, although the force acting on each of them is the same. This may be because .....



(A) the old shale layer is thicker than the young layer

(B) the young shale layer is thicker than the old layer

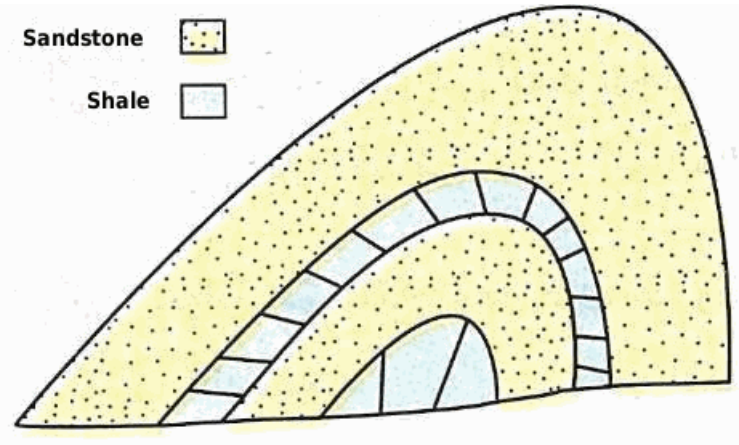
(C) the old shale layer is less cohesive than the young layer

(D) the young shale layer is more cohesive than the old layer

---

57 The opposite figure shows a vertical section of an anticline showing joints in the shale layers. Study it well, then answer:

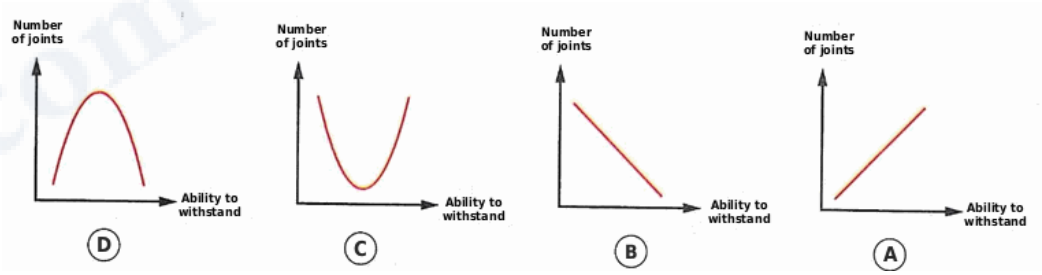
The ratio between the number of axes and the number of limbs of the fold, respectively, is .....



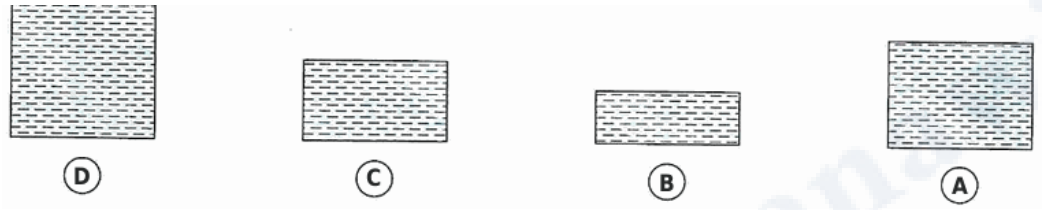
(A) 1:2 (B) 3:2 (C) 2:1 (D) 1:4

---

58 Which of the following graphs represents the relation between the ability of a rock to withstand tectonic forces and the number of its joints, when exposed to the same magnitude, direction and type of tectonic forces?



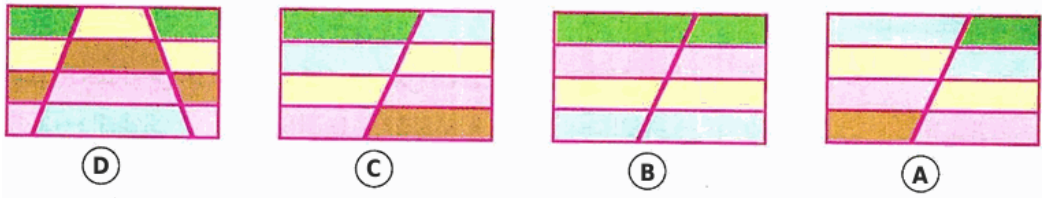
59 The following figures represent vertical sections of the same rock exposed to the same magnitude, direction and type of tectonic forces. The figure most affected by the formation of joints is .....



60 The bending of the layers of the Earth's crust downwards as a result of being exposed to compression, and with the increase of compression, may produce .....

(A) a syncline and a reverse fault
(B) an anticline and a normal fault
(C) an anticline and a reverse fault
(D) a syncline and a normal fault

61 The section that represents a fault formed as a result of compression acting on the layers is .....



62 The geological structure in which the oldest layer is found surrounded by younger layers, among the following, is .....

(A) the graben fault
(B) the horst fault
(C) the thrust fault
(D) the syncline

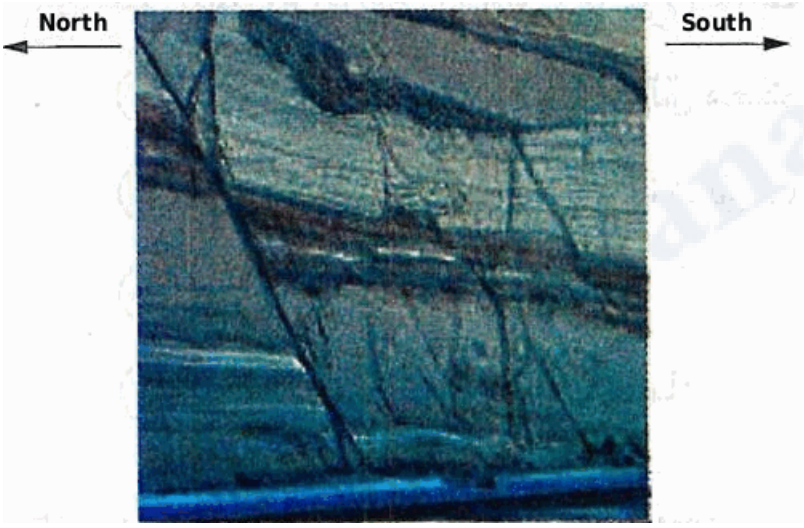
63 The faults that result from tension forces and share the rocks found below the fault plane are the ..... faults.

(A) thrust (B) reverse (C) graben (D) horst

64 Which of the following is one of the benefits of a rock fracture that results from tectonic forces and is not accompanied by movement?

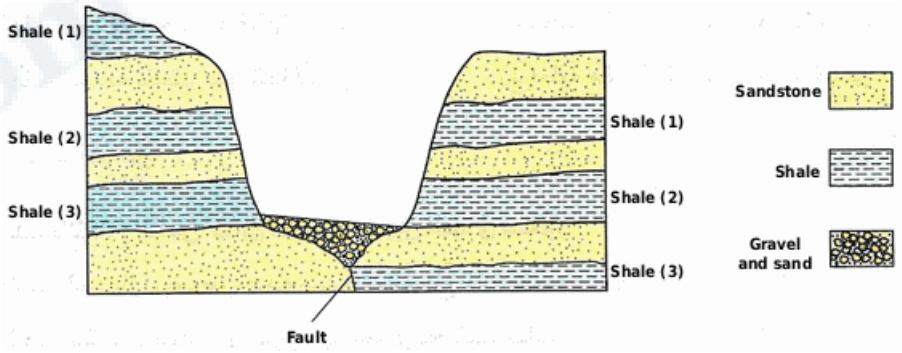
(A) Petroleum oil collects in it
(B) It is used in therapeutic tourism
(C) Estimating the age of rocks
(D) It is used in making obelisks

65 The opposite vertical section shows a fault in sedimentary rock layers, with the north and south directions shown by arrows. In the light of your study of faults, we find that the fault most probably formed .....



(A) after the deposition of the rock layers, as the northern side of the rocks moved down
(B) after the deposition of the rock layers, as the southern side of the rocks moved down
(C) before the deposition of the rock layers, as the southern side of the rocks moved down
(D) before the deposition of the rock layers, as the southern side of the rocks moved up

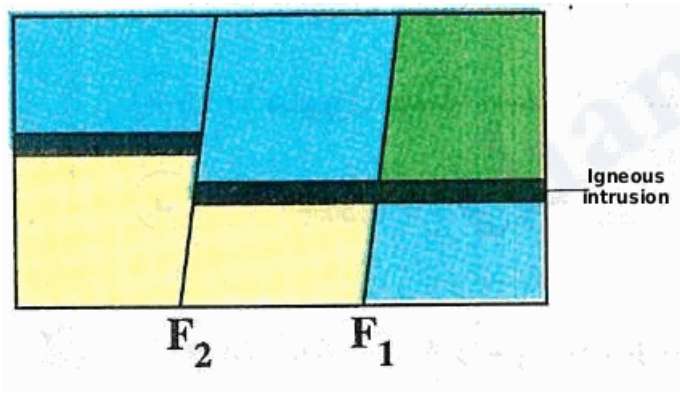
66 The following vertical section is of a river channel in the middle of a layered sequence of sandstone and shale, with a fault below the river channel. Which of the following types of faults is found below the river channel in the previous section?



(A) Normal fault (B) Reverse fault (C) Graben fault (D) Strike-slip fault

---

67 In front of you is a vertical section with an igneous intrusion whose age is 5 million years. The two faults may be .....



(A) (F1) 4 million years old and (F2) 4 million years old

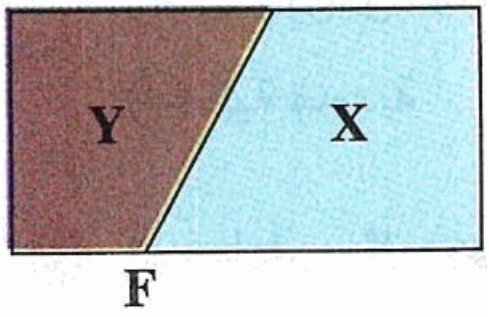
(B) (F1) 6 million years old and (F2) 4 million years old

(C) (F1) 4 million years old and (F2) 6 million years old

(D) (F1) 6 million years old and (F2) 6 million years old

---

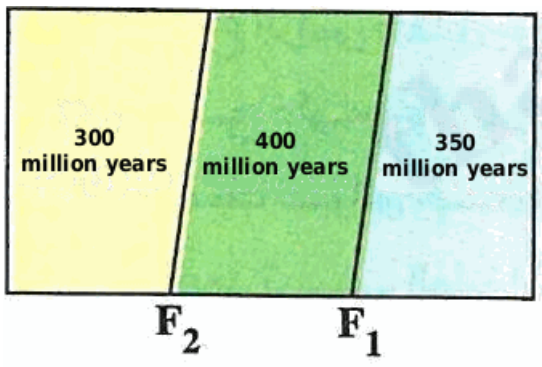
68 In front of you is part of a vertical section of a tectonic structure (F) resulting from tension forces. The ages of the rock blocks (X) and (Y), respectively, are probably .....



(A) (X) 300 million years / (Y) 400 million years
(B) (X) 250 million years / (Y) 300 million years
(C) (X) 300 million years / (Y) 200 million years
(D) (X) 250 million years / (Y) 400 million years

---

69 From the opposite vertical section, what are the types of the faults (F1) and (F2)?



(A) (F1) normal fault - (F2) reverse fault
(B) (F1) reverse fault - (F2) normal fault
(C) (F1) and (F2) are both normal faults
(D) (F1) and (F2) are both reverse faults

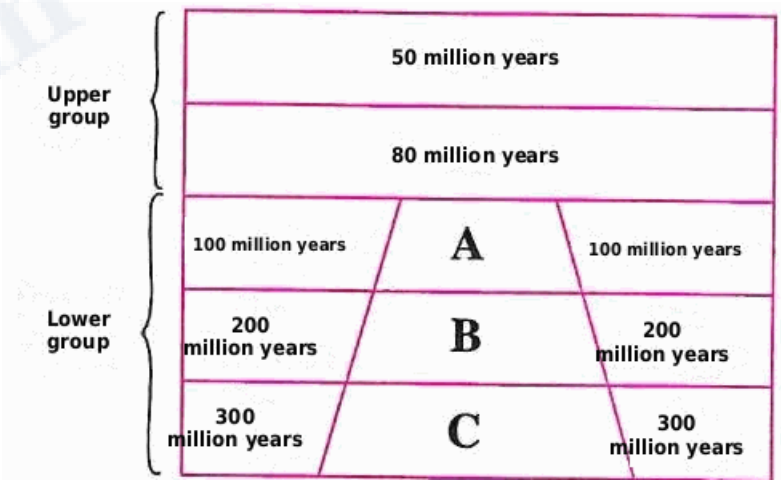
---

70 The following figure represents a horizontal section of a sedimentary sequence containing a geological structure, in which the limestone layer is the youngest. The geological structure in the section may be .....



(A) an anticline whose layers bend downwards
(B) a syncline whose layers bend downwards
(C) an anticline whose layers bend upwards
(D) a syncline whose layers bend upwards

71 In front of you, in the opposite vertical section, are two normal faults that join in the rocks of the footwall. Assuming no break in deposition in the lower group, the correct order of the layers (A → B → C) in terms of age is .....



(A) 200 million years → 300 million years → 400 million years
(B) 200 million years → 400 million years → 300 million years
(C) 100 million years → 200 million years → 300 million years
(D) 300 million years → 200 million years → 100 million years

---

72 If you find, in a vertical sequence, two parallel groups of sedimentary rocks separated by an erosion surface, the resulting structure is called .....

(A) a disconformity
(B) a nonconformity
(C) an anticline
(D) an angular unconformity

---

73 Which of the following represents a similarity between the angular unconformity and the nonconformity?

(A) The older layers are igneous or metamorphic
(B) The younger layers are igneous or metamorphic
(C) The younger layers are sedimentary
(D) The older layers are sedimentary

---

74 The presence of inclined layers of sedimentary sandstone and shale above igneous granite rocks indicates .....

(A) a disconformity
(B) an angular unconformity
(C) a nonconformity
(D) the presence of a normal fault

75 Which of the following indicates the presence of an angular unconformity surface?

(A) The presence of a layer of sedimentary sandstone above a layer of metamorphic marble

(B) The presence of a fold with horizontal sedimentary layers above it

(C) The presence of horizontal sedimentary layers with a joint, above them a horizontal sedimentary layer

(D) The presence of a horizontal layer of sedimentary sandstone with a horizontal layer of sedimentary shale above it

---

76 Which of the following cannot be seen in geological structures?

(A) The limb of a fold

(B) The fault plane

(C) The axis of a fold

(D) The unconformity surface

---

77 The presence of a disconformity surface indicates the occurrence of the following geological events except .....

(A) stopping of deposition

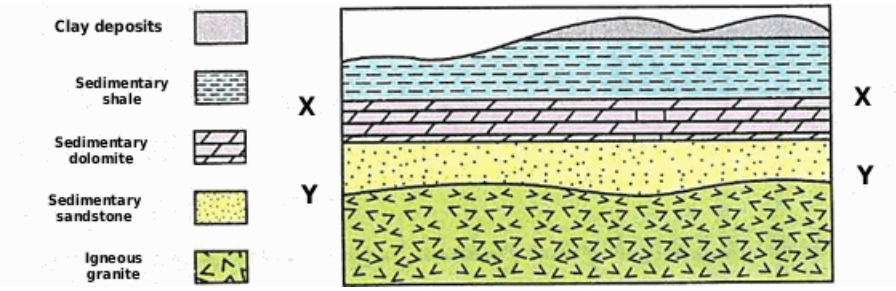
(B) erosion

(C) absence of fossils

(D) a difference in the dip of the layers

---

78 From the following vertical section, which of the following choices most accurately shows the types of the two unconformity surfaces?



(A) (X – X) disconformity surface - (Y – Y) nonconformity surface

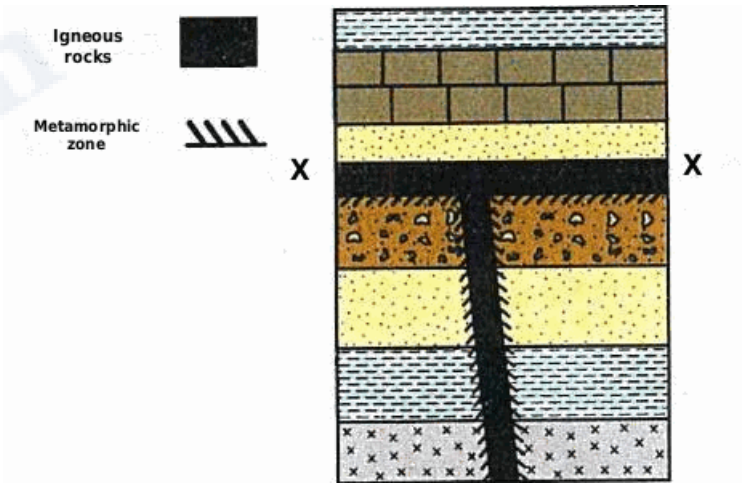
(B) (X – X) disconformity surface - (Y – Y) angular unconformity surface

(C) (X – X) angular unconformity surface - (Y – Y) angular unconformity surface

(D) (X – X) angular unconformity surface - (Y – Y) nonconformity surface

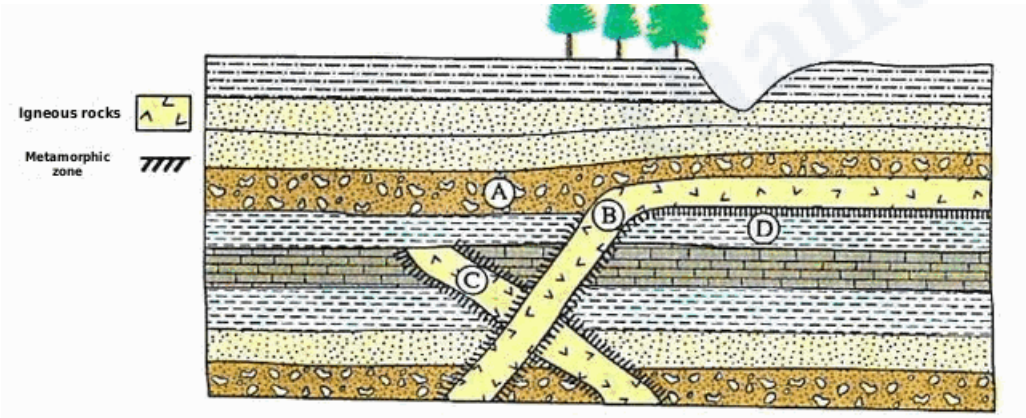
---

79 From the opposite vertical sedimentary section, the type of the unconformity surface (X – X) is .....



(A) angular (B) disconformity (C) nonconformity (D) secondary

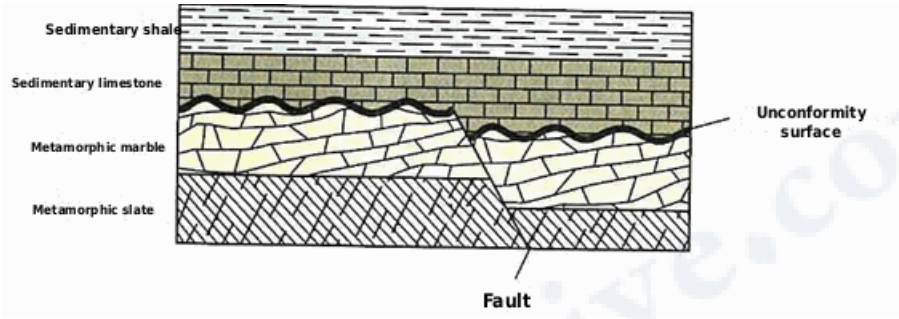
80 In the opposite vertical section, (A), (B), (C) and (D) represent rock units. Which of the following choices represents the correct order of the rock units from oldest to youngest?



(A) B then C then A then D (B) C then D then B then A

(C) C then B then D then A (D) B then A then D then C

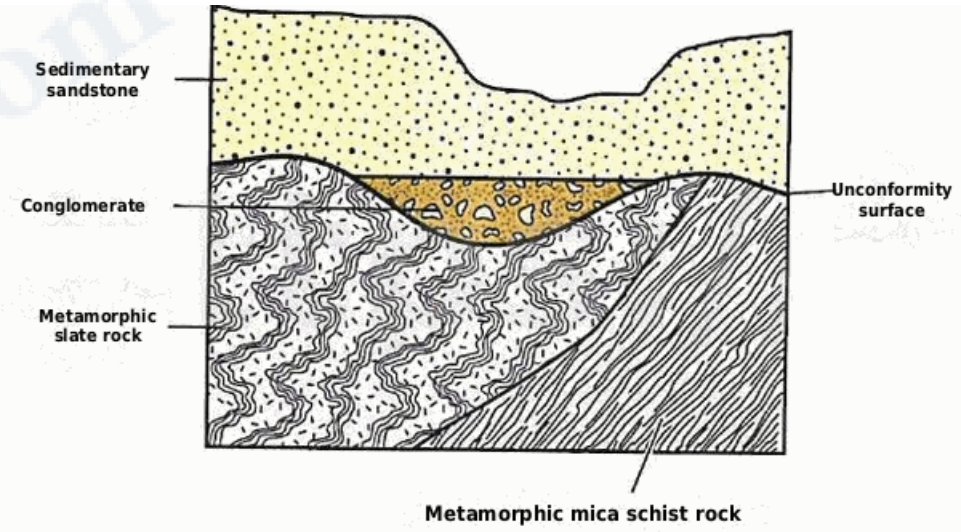
81 The unconformity surface in the opposite vertical section is .....



(A) a nonconformity (B) angular (C) a disconformity (D) secondary

82 The opposite vertical section shows an unconformity surface between rocks formed in different periods of time. Study it well, then answer:

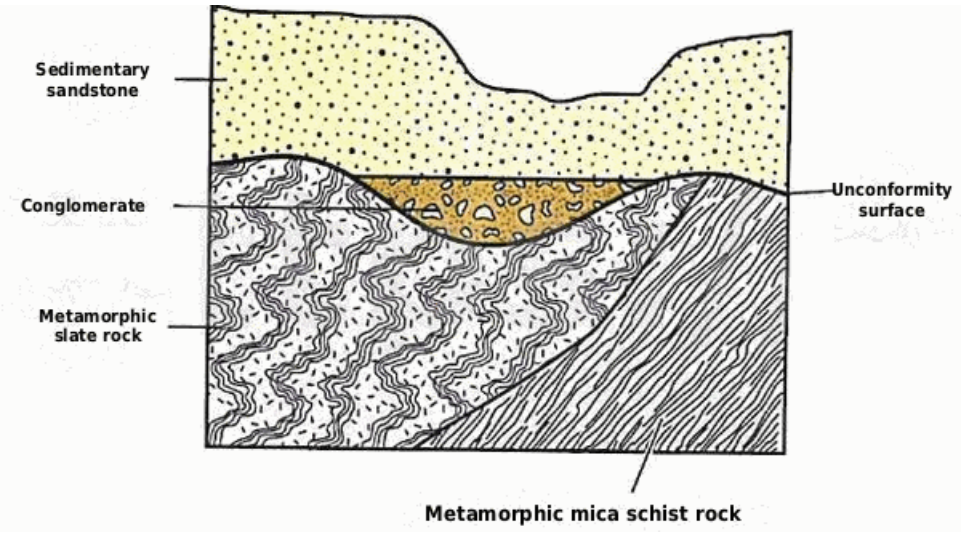
The type of the unconformity surface in the section is .....



(A) nonconformity (B) angular (C) disconformity (D) secondary

83 The opposite vertical section shows an unconformity surface between rocks formed in different periods of time. Study it well, then answer:

The most accurate choice that is evidence of the formation of the unconformity surface in the section is .....



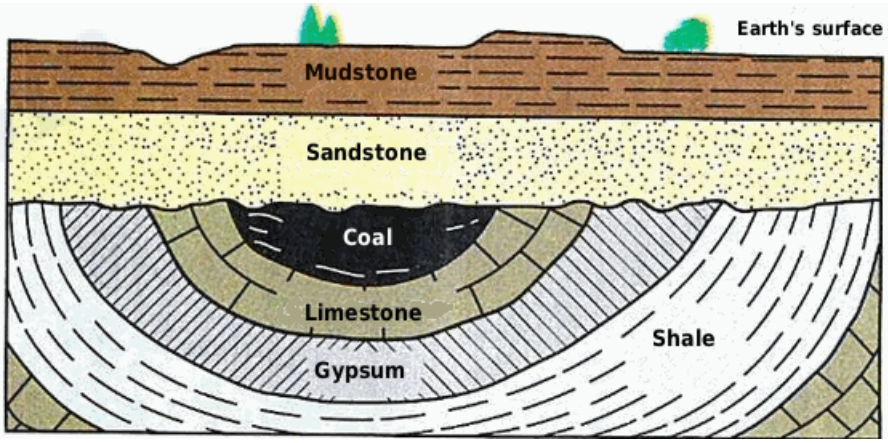
(A) the difference in the dip of the layers on both sides of the unconformity surface

(B) the presence of conglomerate above the unconformity surface

(C) the folding of the metamorphic slate rock

(D) the presence of sandstone layers above the conglomerate

84 The opposite figure represents a vertical sedimentary sequence in the Earth's crust. By studying it, we find that folding and erosion happened after the formation of the .....



(A) mudstone layer but before the formation of the shale layer

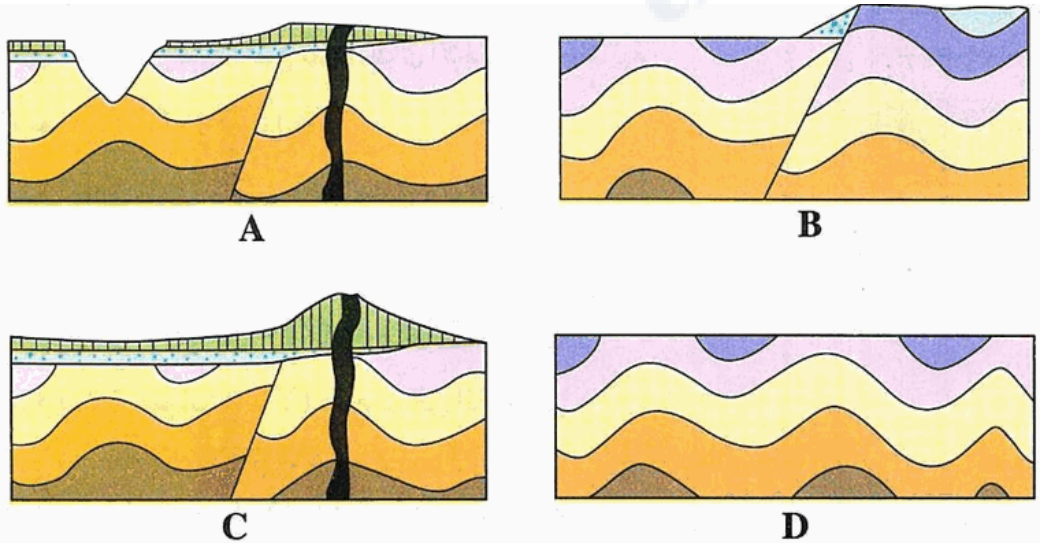
(B) sandstone layer and after the formation of the gypsum layer

(C) coal layer but before the formation of the sandstone layer

(D) limestone layer but before the formation of the coal layer

---

85 The following vertical sections show the sequence of events in an area. What is the correct order of the events in the previous sections from oldest to youngest?



(A) A then B then C then D

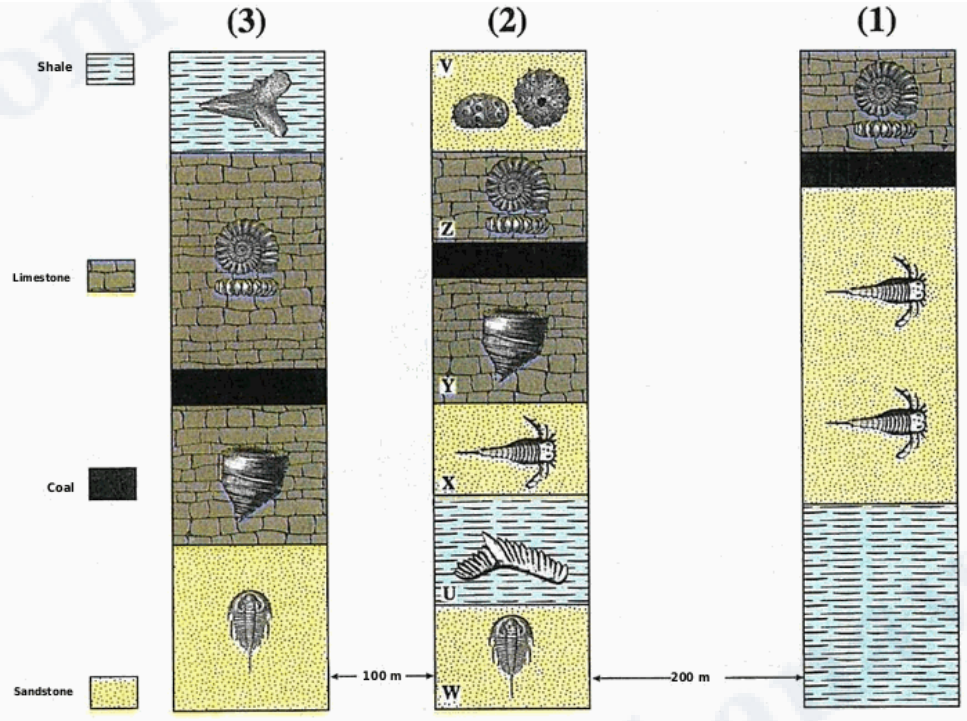
(B) D then B then C then A

(C) A then D then C then B

(D) D then B then A then C

---

86 The following figures represent three vertical sections (3), (2) and (1), where the shale layer in section (3) is the youngest layer in the three sections. Which of the following does not represent an unconformity surface?



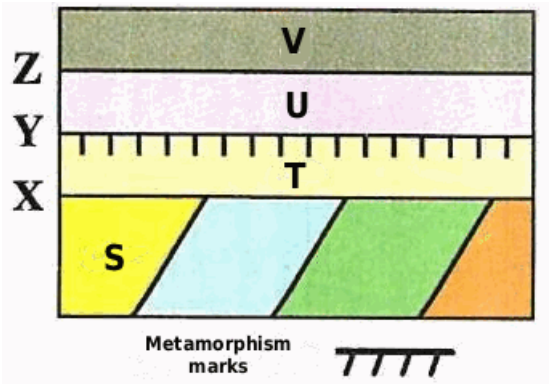
(A) The boundary between the sandstone and coal layers in section (1)

(B) The boundary between the sandstone and limestone layers in section (3)

(C) The boundary between the limestone and shale layers in section (3)

(D) The boundary between the limestone (Z) and sandstone (V) layers in section (2)

87 In the opposite vertical sequence, if the rocks (S), (T) and (V) are sedimentary rocks and (U) represents an igneous lava flow, which of the following choices describes the surfaces (X), (Y) and (Z)?



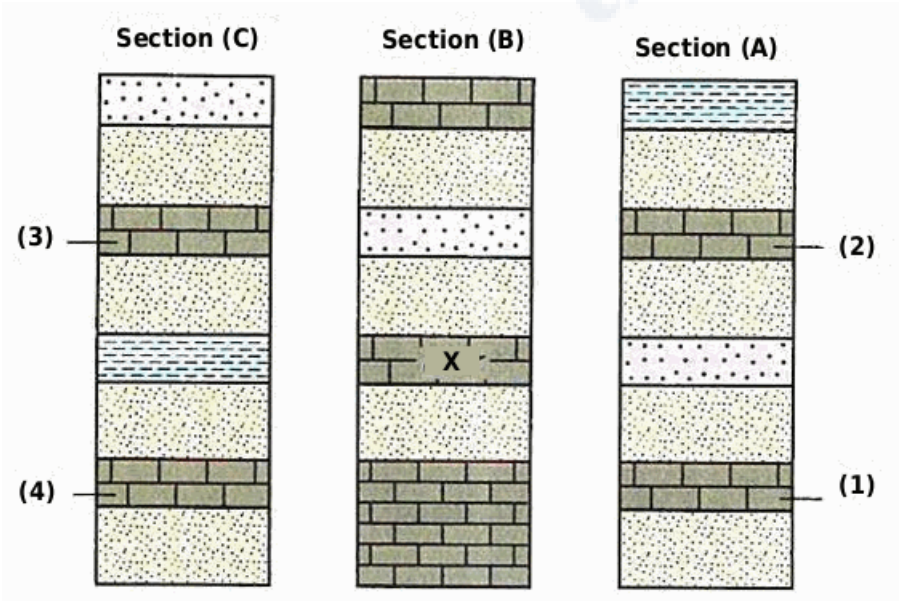
(A) (X) angular unconformity - (Z) nonconformity

(B) (X) angular unconformity - (Z) disconformity

(C) (Y) disconformity - (Z) nonconformity

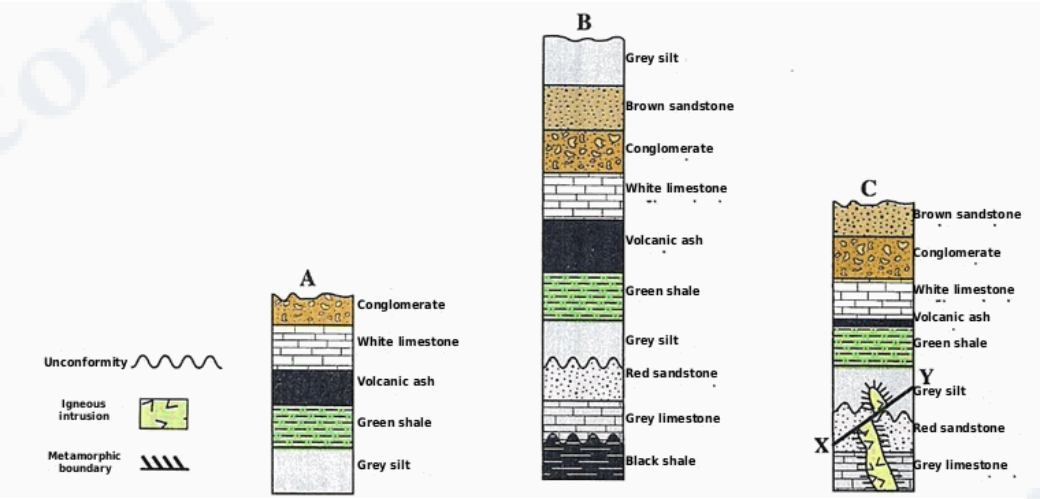
(D) (X) nonconformity - (Y) disconformity

88 By studying the vertical sections (A), (B) and (C), which belong to the same area and contain no unconformity surfaces, we find that layer (X) has the same age as layer .....



(A) (1) (B) (2) (C) (3) (D) (4)

89 The three vertical sections (A), (B) and (C) represent rock outcrops in the same area, and the line (X – Y) represents a fault. The youngest sedimentary rock layer among the following is .....



(A) black shale (B) grey limestone (C) brown sandstone (D) conglomerate

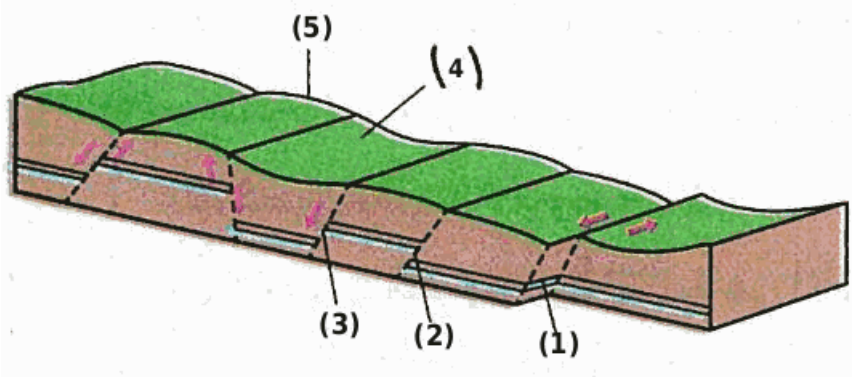
Essay questions — 13 questions

1 Study the opposite figure well, then answer the following questions:

(1) What are the types of the geological structures (1) and (2)?

(2) Show one difference between structure (4) and structure (5).

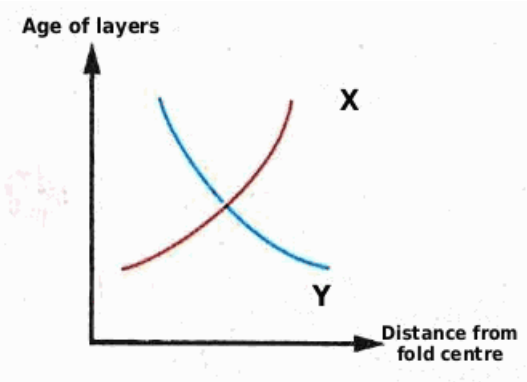
(3) Deduce the cause of the formation of structure (3).



2 The opposite graph shows the relation between the distance from the centre of the fold and the age of the layers for two different types of folds. Study it well, then answer:

(1) What is the type of folds (X) and (Y)?

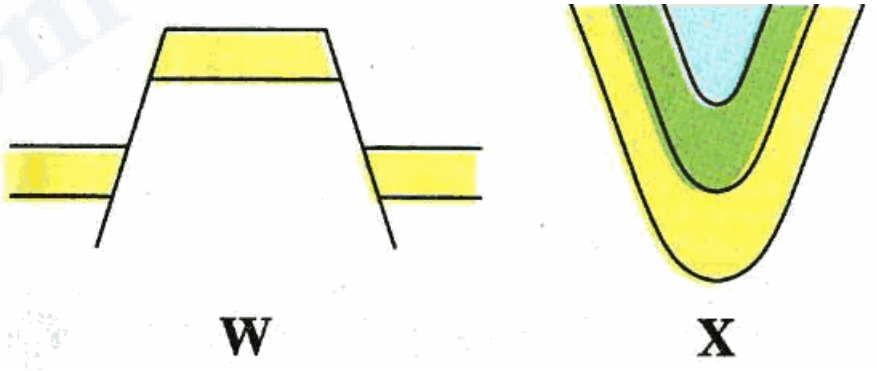
(2) What structural elements are always equal in number in the two structures?



3 Study the two structures (X) and (W), then answer:

(1) Compare the two structures (X) and (W) in terms of the time relation between the layers.

(2) What is the type of tectonic forces that cause the two structures (X) and (W)?

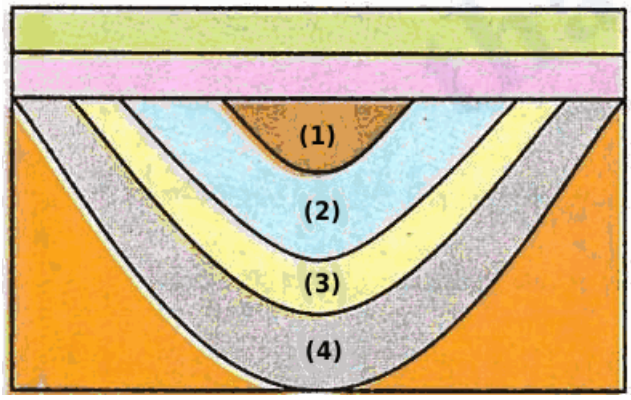


4 Study the vertical section shown in front of you, which represents one of the types of folds, then answer:

(1) What is the type of the fold shown? And what is the type of tectonic forces that formed it?

(2) Which of the layers (1), (2), (3) and (4) is the oldest?

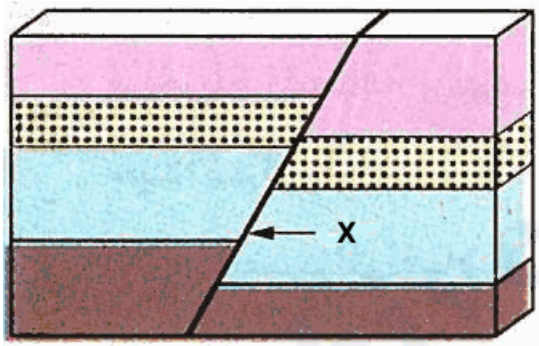
(3) How many axial planes are there in the fold?



5 The opposite block diagram shows one of the faults. Study it well, then answer:

(1) What is the type of the fault shown in the section? And why?

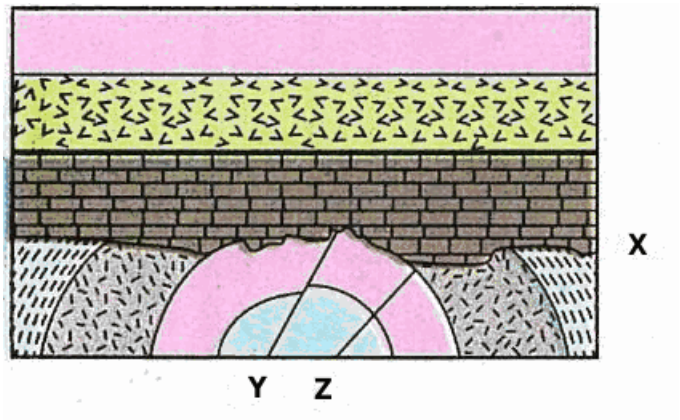
(2) What is the economic importance of what the letter (X) indicates?



6 Study the opposite vertical section, which shows sedimentary sequences containing several different geological structures, then answer:

(1) Deduce the type of the structures (X) and (Y).

(2) How did structure (Z) form?

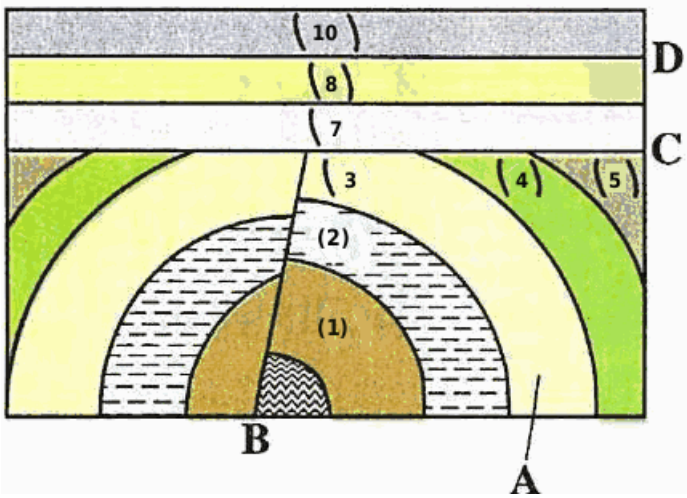


7 In the opposite vertical sedimentary section, the numbers (1) to (10) indicate successive sedimentary layers. Study it well, then answer:

(1) Compare structure (C) and structure (D).

(2) There is a similarity in economic importance between the two structures (A) and (B). Explain this.

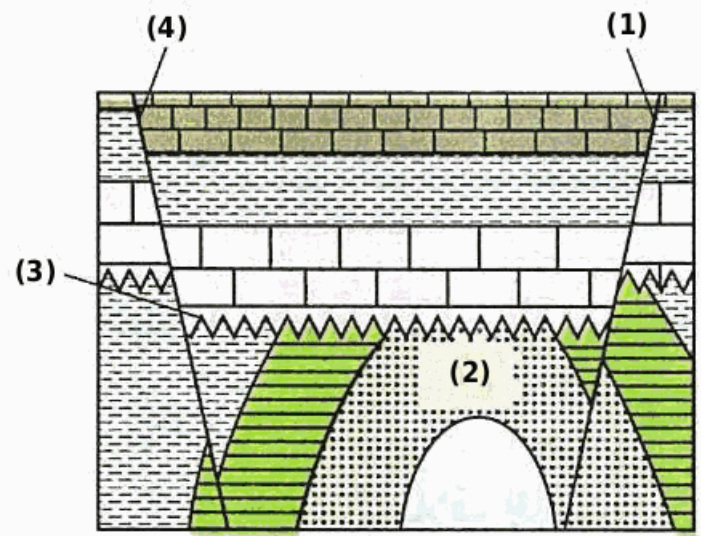
(3) Which of the following geological events is the oldest? (deposition of layers (7) and (8) / the group (1) to (5) being affected by compression forces / deposition of layer (10) / the group (1) to (5) being affected by tension forces).



8 Study the vertical sedimentary section in front of you, then answer:

(1) What does each of the structures (1) and (4) represent? And why? And structure (3)? State its type.

(2) What is structure (2)? And why?



9 When studying a vertical geological section, the events in the section were arranged as follows:

(1) Crystallisation of igneous granite rocks.

(2) Deposition and lithification of two layers of sand and then clay above the granite.

(3) Tension forces that broke all the rocks, and the fracture was accompanied by movement.

(4) Erosion, then deposition and lithification of two layers of lime and then shale.

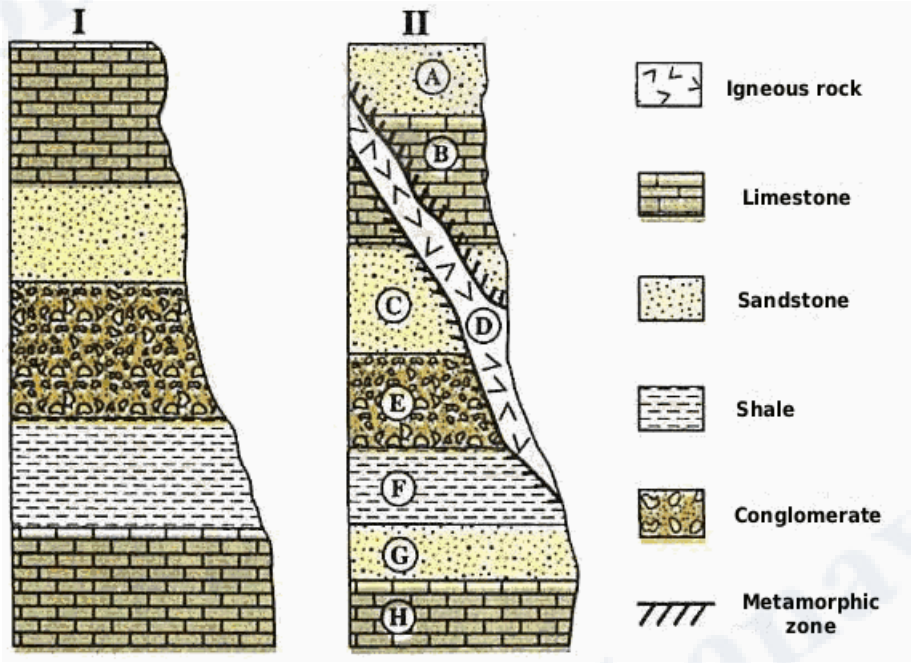
Question (1): Show the position of the unconformity surfaces in the section.

Question (2): Compare the types of unconformity found in the section.

10 In front of you are two vertical sections (I) and (II) of rock layers 15 km apart. Study them well, then answer:

(1) How do you explain the absence of layer (G) from section (I)?

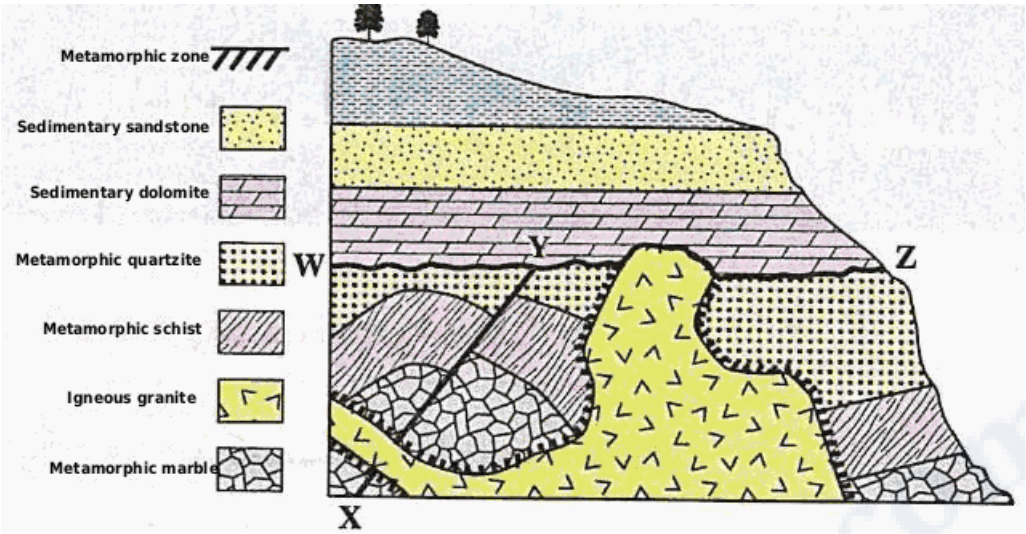
(2) What is the youngest rock in section (II)?



11 The opposite figure represents a vertical section of some rock units. The line (X-Y) is a fault and the line (W-Z) is an unconformity surface. Study it well, then answer:

(1) What is the type of the fault (X - Y)?

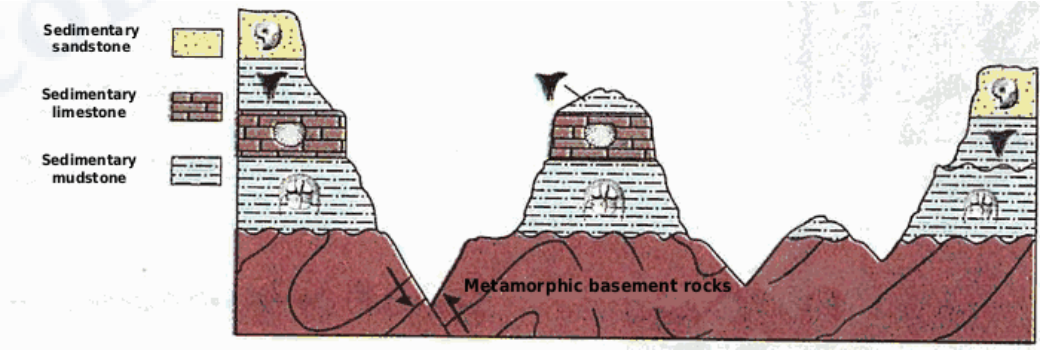
(2) What is the type of the unconformity surface (W - Z)? Explain your answer.



12 Study the following vertical section, then answer:

(1) What is the type of the fault shown in the section?

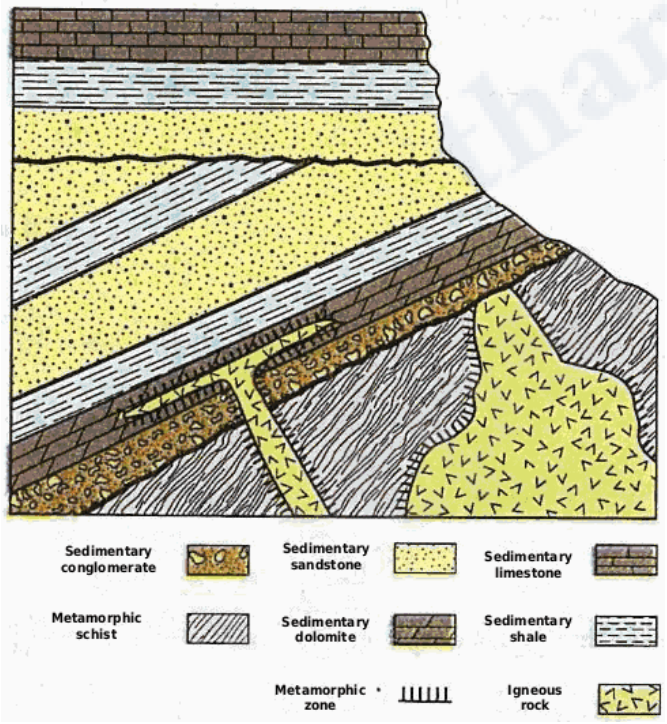
(2) How many unconformity surfaces are there in the section? And what are their types, in the order they happened from oldest to youngest?



13 Study the opposite vertical section, then answer:

(1) Show the types of the unconformity surfaces shown in the section.

(2) If the schist rock is found in the right limb of a fold, what is the type of this fold?



Past exam questions — 48 questions

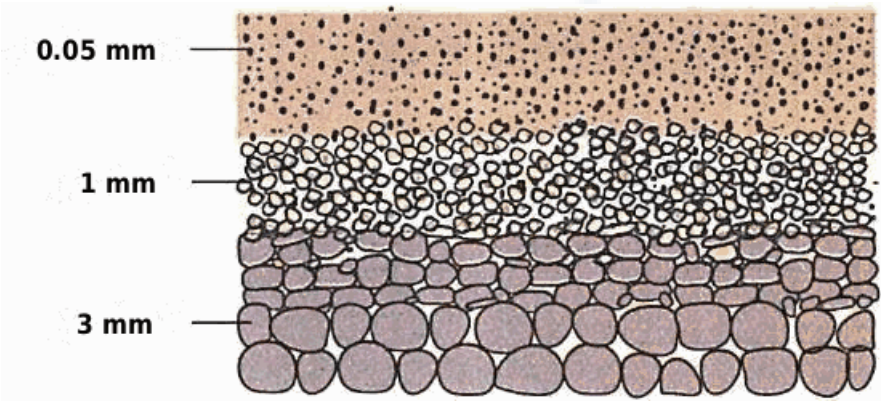
1 From the opposite geological structure, what is the name of the structure? And what is the cause of its formation? (1st session 2022)



(A) Cross bedding - water currents
(B) Graded bedding - water currents
(C) Graded bedding - tectonic pressure
(D) Cross bedding - tectonic pressure

---

2 The opposite vertical section represents a group of sediments in a bed. What is the name of this structure? (1st session 2024)



(A) Graded bedding, one of the primary structures
(B) Ripple marks, one of the secondary structures
(C) Mud cracks, one of the tectonic structures
(D) Cross bedding, one of the geological structures

---

3 A fold consists of five layers. The ratio between the elements of the fold (axial plane, axis and limb), respectively, is ..... (Trial exam / May 2021)

(A) 1:2:5 (B) 2:5:1 (C) 5:1:2 (D) 1:5:2

4 The time relation between the layers can be determined by means of ..... (Trial exam / June 2021, Sample exam 2025)

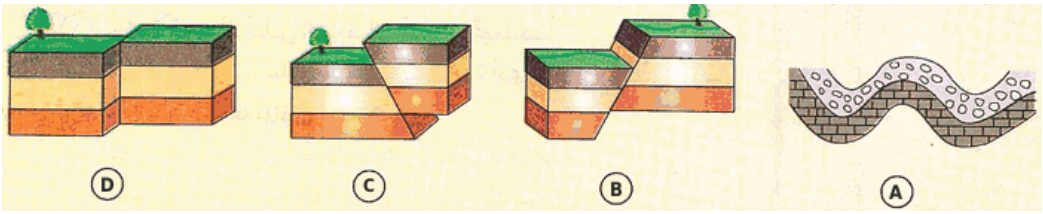
(A) folds
(B) faults
(C) joints
(D) primary structures

5 What characterises the opposite geological structure? (1st session 2021)

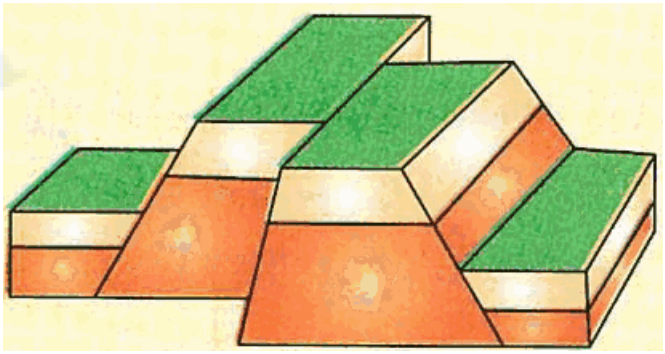


(A) The limbs diverge downwards
(B) The oldest layers are in the centre
(C) The number of limbs equals the number of axes
(D) The number of axes equals the number of layers

6 Which of the following figures helps in knowing the time relation between the rocks of the Earth's crust? (2nd session 2021)



7 The opposite figure represents a model of a group of tectonic structures. Which structure is not found in this figure? (Trial exam / May 2021)



(A) Normal fault (B) Strike-slip fault (C) Horst fault (D) Reverse fault

8 Tectonic compression forces produced a fault (A) whose plane is inclined to the horizontal plane at an angle of 12° and a fault (B) whose plane is inclined to the horizontal plane at an angle of 52°. The expected classification of the faults (A) and (B), respectively, is ..... (Trial exam / May 2021)

(A) (A) reverse / (B) thrust
(B) (A) thrust / (B) normal
(C) (A) thrust / (B) reverse
(D) (A) reverse / (B) normal

9 Some mineral deposits are found on a geological structure resulting from a fracture with movement of the rocks. The structure and the deposits are expected to be, respectively, ... (Trial exam / June 2021, Sample exam 2025)

(A) fold / calcite (B) fault / calcite (C) fault / coal (D) fold / gypsum

10 What is the type of fault in which the layers of the hanging wall move in the direction of gravity? (Trial exam / June 2021, Sample exam 2025)

(A) Reverse (B) Thrust (C) Strike-slip (D) Graben

11 What is the tectonic structure in which a young layer is found surrounded by older layers? (Trial exam / June 2021, Sample exam 2025)

(A) Thrust fault (B) Anticline (C) Normal fault (D) Graben fault

12 The opposite figure represents a hot water spring that formed as a result of ..... (1st session 2021)



(A) compression only acting on the layers, which led to their wrinkling

(B) compression or tension acting on rock layers, which led to their breaking and the change of their level

(C) compression only acting on the layers, which led to their breaking only

(D) an earth movement that led to raising water above the Earth's surface

---

13 A sedimentary sequence was exposed to tectonic tension forces coming from inside the Earth, so we expect to find all of the following except ..... (2nd session 2021)

(A) a horst fault (B) a graben fault (C) a thrust fault (D) a normal fault

---

14 Two tectonic structures: (A) was used to know old geological events, and (B) was used in building the Abu Simbel temple. They are, respectively, ... (2nd session 2021)

(A) (A) joint / (B) fault

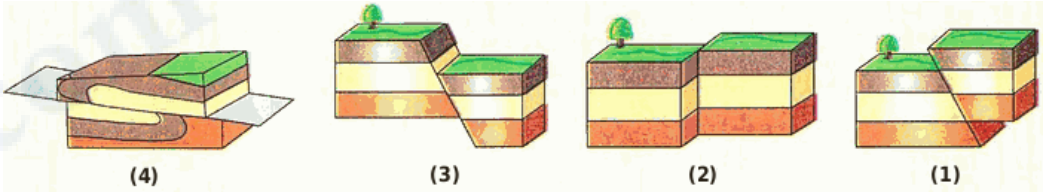
(B) (A) fold / (B) joint

(C) (A) joint / (B) anticline

(D) (A) syncline / (B) fault

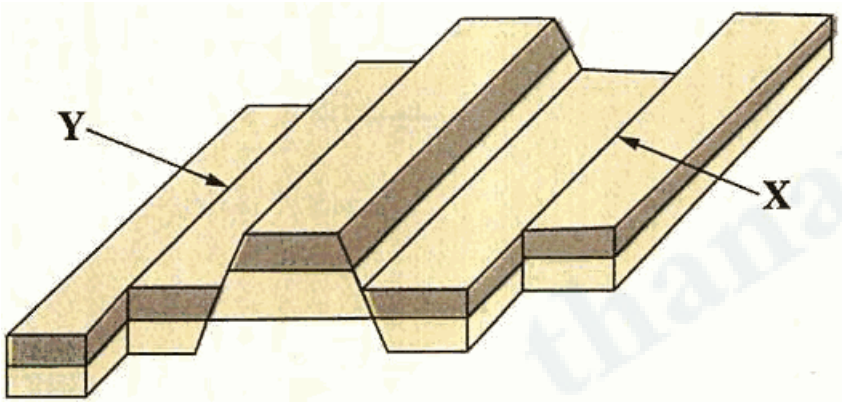
---

15 The following figures formed from fractures accompanied by displacement:
What is the number of the figure in which no difference in the level of the layers on both sides of the fracture happened? (1st session 2022)



(A) (1) (B) (2) (C) (3) (D) (4)

16 What is the direction of movement of the broken blocks in structure (X) and structure (Y), respectively, in the opposite figure? (1st session 2022)

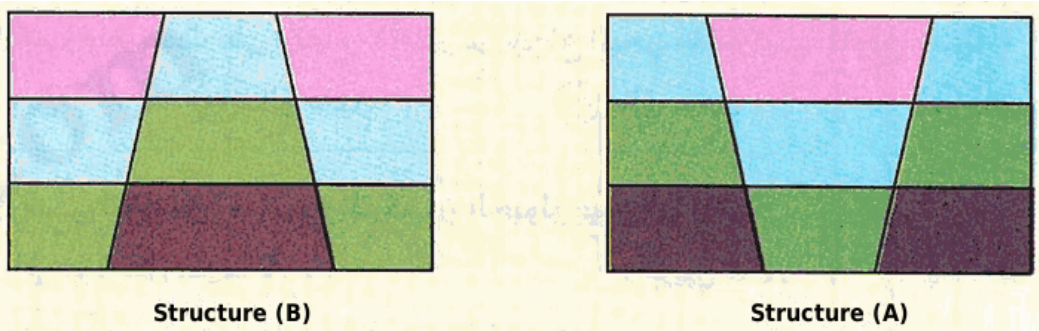


(A) (X) and (Y) in the same plane
(B) (X) and (Y) vertical movement
(C) (X) vertical movement / (Y) in the same plane
(D) (X) in the same plane / (Y) vertical movement

17 What distinguishes an anticline from a reverse fault? (1st session 2022)
(A) The horizontal repetition of some layers
(B) The type of forces causing it
(C) The type of geological structure
(D) The increase in the area of the region where it happens

18 Study the two structures (A) and (B) well, then deduce:

What distinguishes structure (A) from structure (B)? (2nd session 2022)



(A) The older layers are surrounded by the younger layers

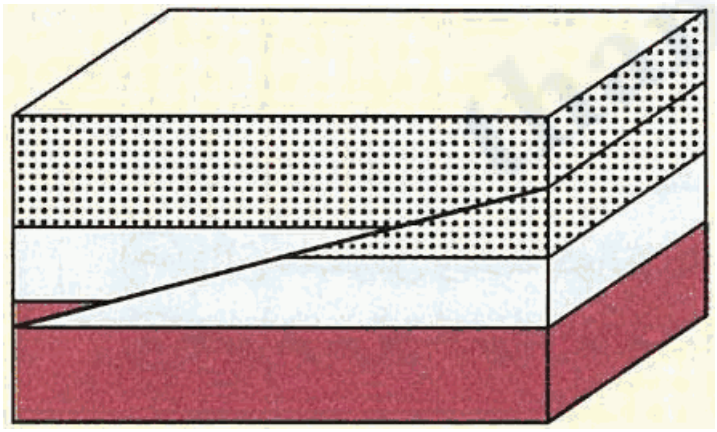
(B) The rocks of the hanging wall moved up

(C) The rocks of the footwall moved down

(D) The younger layers are surrounded by the older layers

---

19 How do you describe the geological structure shown in front of you? (2nd session 2022)



(A) A normal fault in which the rocks of the footwall move up

(B) An overthrust fault in which the rocks of the footwall move down

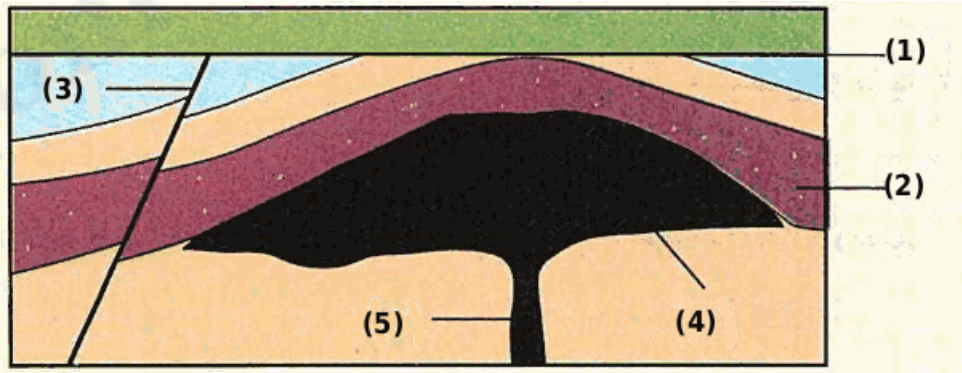
(C) A reverse fault in which the rocks of the hanging wall move down

(D) A normal fault in which the rocks of the hanging wall move up

---

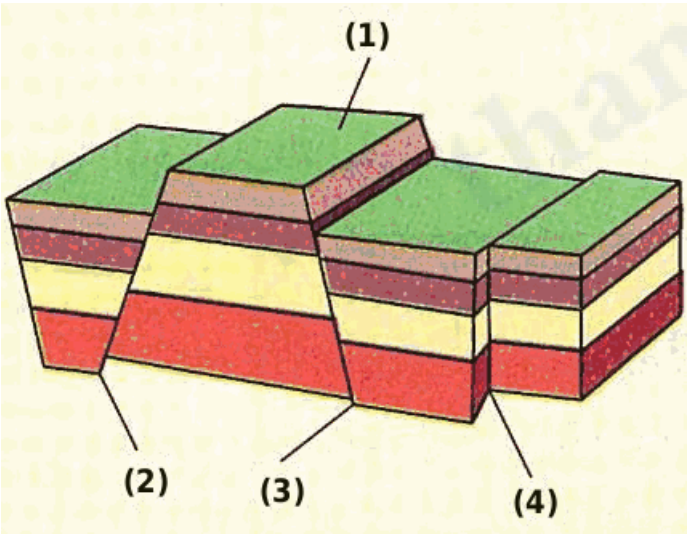
20 By studying the following geological section:

Which numbers refer to the geological structures that resulted from compression forces acting on the layers? (2nd session 2022)



(A) (2), (3) (B) (4), (5) (C) (1), (3) (D) (2), (4)

21 By studying the opposite geological structures, what is the number of the geological structure that does not form as a result of tension forces? (2nd session 2022)

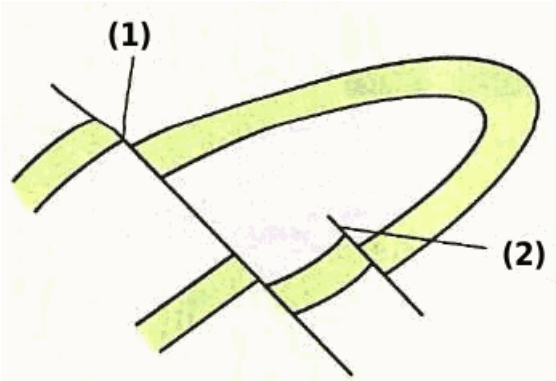


(A) (1) (B) (2) (C) (3) (D) (4)

22 Horizontal rock layers rise 15 metres above sea level and contain an inclined joint. An earthquake moved the block above the fracture plane so that it became 10 metres above sea level. What is the expected structure? (Trial exam 2023)

(A) Reverse fault (B) Thrust fault (C) Normal fault (D) Strike-slip fault

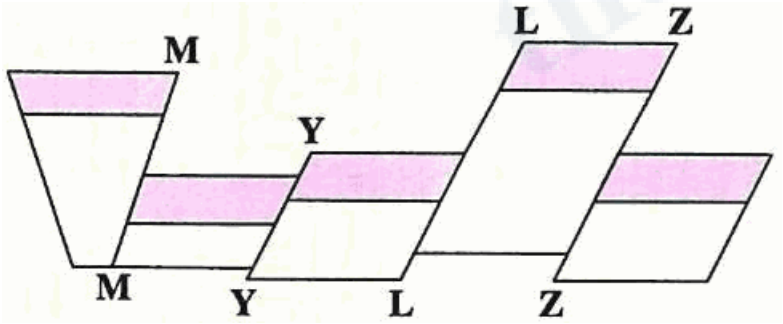
23 In the opposite vertical section, what is the type of the two geological structures (1) and (2)? And what is the type of forces causing each of them? (Trial exam 2023)



(A) (1) normal fault and tension forces, (2) reverse fault and compression forces
(B) (1) reverse fault and compression forces, (2) reverse fault and compression forces
(C) (1) reverse fault and compression forces, (2) normal fault and tension forces
(D) (1) normal fault and tension forces, (2) normal fault and tension forces

---

24 The types of geological structures in the opposite figure are ..... (1st session 2023, Sample exam 2025)



(A) one normal fault and three reverse faults
(B) two reverse faults and two normal faults
(C) one reverse fault and three normal faults
(D) one strike-slip fault and three reverse faults

---

25 A rock containing a fossil 350 million years old has, on both sides, rocks containing a fossil 250 million years old. Which geological structures describe this? (1st session 2023)

(A) Graben fault or anticline
(B) Horst fault or syncline
(C) Horst fault or anticline
(D) Graben fault or syncline

---

26 In which of the following faults do the rocks of the footwall move in the direction of gravity? (2nd session 2023)

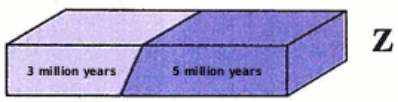
(A) Thrust (B) Horst (C) Strike-slip (D) Normal

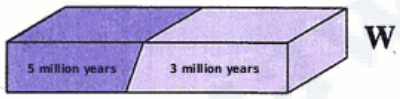
27 An area was exposed to an earthquake that formed a series of normal faults. What is the structure resulting from two faults whose planes come close at the top? And what is the type of forces causing it? (2nd session 2023)

(A) Horst fault - tension forces
(B) Graben fault - tension forces
(C) Graben fault - compression forces
(D) Horst fault - compression forces

28 The following two block diagrams (W) and (Z) show two types of tectonic structures, and the age of the layers is shown in millions of years:

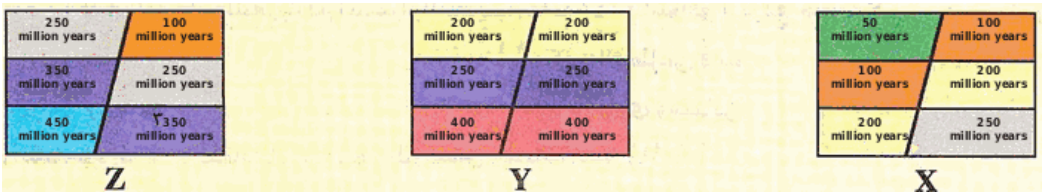
What are the types of the tectonic structures (W) and (Z), respectively? (1st session 2024)





(A) (W) normal fault / (Z) reverse fault
(B) (W) / (Z) both normal faults
(C) (W) reverse fault / (Z) normal fault
(D) (W) / (Z) both reverse faults

29 The correct choice that describes the following tectonic structures is ..... (2nd session 2024)



(A) (X) reverse fault, (Y) normal fault, (Z) joint
(B) (X) normal fault, (Y) reverse fault, (Z) normal fault
(C) (X) normal fault, (Y) strike-slip fault, (Z) reverse fault
(D) (X) reverse fault, (Y) strike-slip fault, (Z) reverse fault

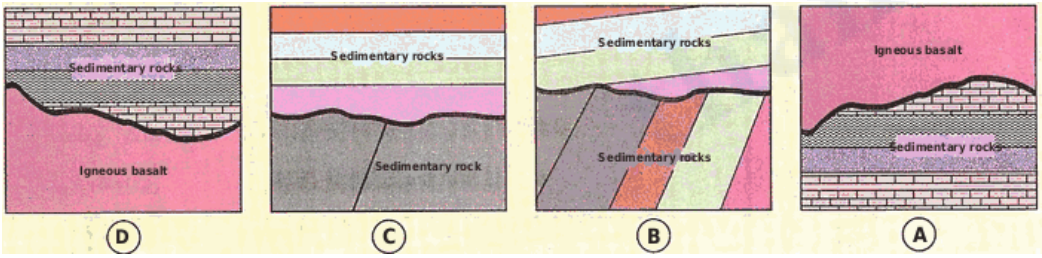
30 Sedimentary layers were exposed to an earth movement, so they became inclined, and after a period of time the sea covered them. What is the resulting geological structure in the area? (2nd session 2021)

(A) Nonconformity
(B) Disconformity
(C) Cross bedding
(D) Angular unconformity

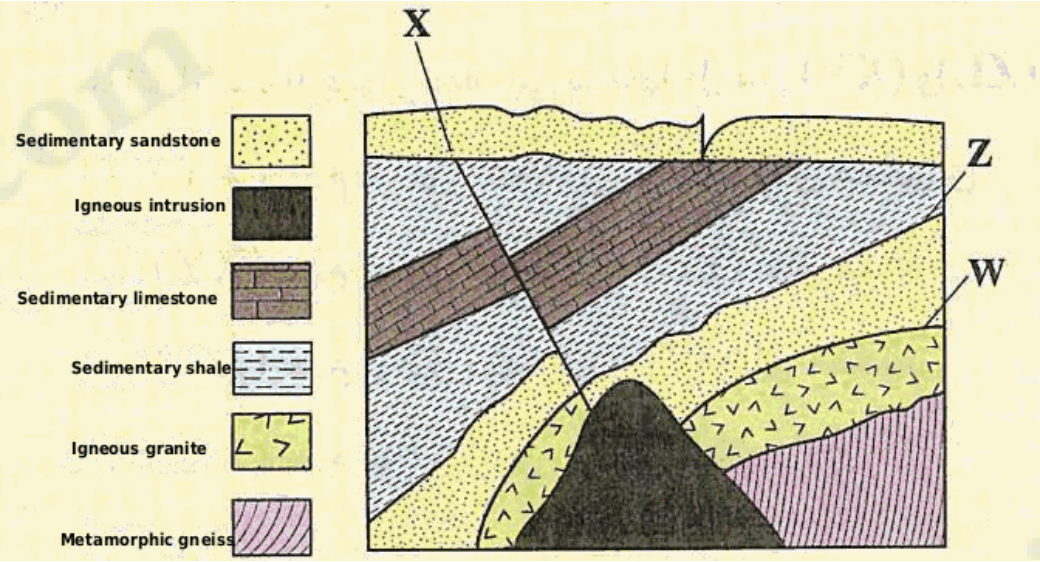
31 What are the similarities between the angular unconformity and the disconformity? (1st session 2022)

(A) Both are found between igneous and sedimentary rocks
(B) Both are found between layers inclined in two different directions
(C) Both are found between parallel layers
(D) Both are found between sedimentary rocks

32 Which of the following figures does not represent an unconformity surface? (2nd session 2022)



33 What are the types of the unconformity surfaces (X), (Z) and (W) in the opposite section? (Trial exam 2023)



(A) (X) angular, (Z) disconformity, (W) nonconformity

(B) (X) angular, (Z) nonconformity, (W) disconformity

(C) (X) disconformity, (Z) angular, (W) nonconformity

(D) (X) nonconformity, (Z) disconformity, (W) angular

---

34 An earth movement raised horizontal layers as they were at the time of deposition, and no strong folding or faulting resulted from it. Assuming one of the layers was exposed to erosion and then deposition continued, what is the type of unconformity expected to happen? (2nd session 2023)

(A) Angular only

(B) Disconformity only

(C) Angular and disconformity

(D) Angular and nonconformity

---

35 Section (X) consists of parallel horizontal layers separated by fragments of rounded gravel.
Section (Z) consists of parallel horizontal layers separated by igneous basalt sheets.
What is the type of unconformity in sections (X) and (Z), respectively? (1st session 2024)

(A) (X) disconformity / (Z) nonconformity

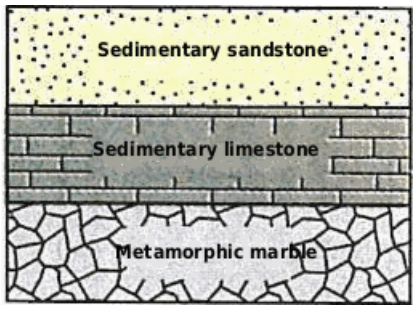
(B) (X) and (Z) both nonconformity

(C) (X) and (Z) both disconformity

(D) (X) nonconformity / (Z) disconformity

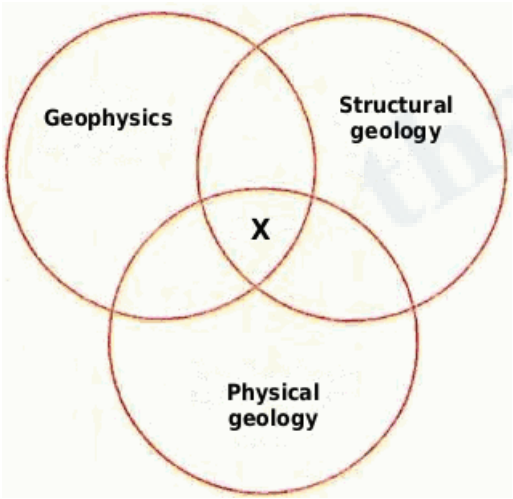
---

36 From the opposite vertical section, what is the type of unconformity surface whose presence is certain? (2nd session 2024)



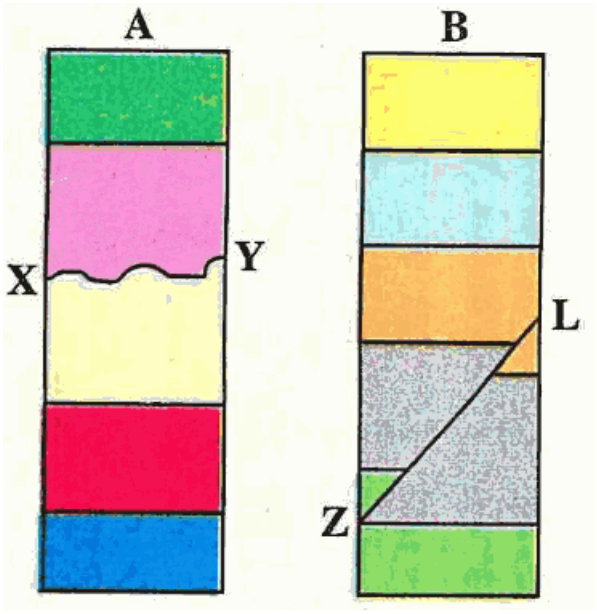
(A) Nonconformity above the marble
(B) Disconformity below the limestone
(C) Nonconformity below the sandstone
(D) Disconformity above the limestone

37 From the opposite diagram, which of the following geological structures does the letter (X) represent, whose study and importance involve the three branches of geology? (Sample exam 2025)



(A) Folds
(B) Mud cracks
(C) Cross bedding
(D) Unconformity

38 The opposite sections (A) and (B) represent sedimentary sequences in distant areas. What geological structures do (XY) and (ZL) represent? (1st session 2025)



(A) (XY) disconformity, (ZL) reverse fault

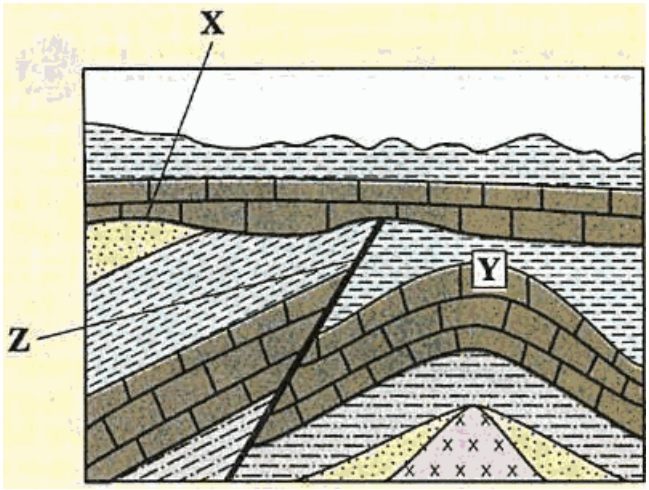
(B) (XY) disconformity, (ZL) normal fault

(C) (XY) nonconformity, (ZL) reverse fault

(D) (XY) angular unconformity, (ZL) normal fault

---

39 The opposite vertical section represents a sedimentary sequence. The structures (X), (Y) and (Z) represent, respectively, ... (2nd session 2025)



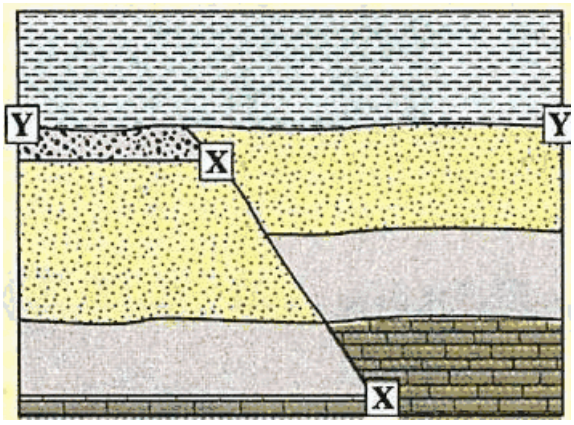
(A) (X) nonconformity surface / (Y) syncline / (Z) reverse fault

(B) (X) angular unconformity surface / (Y) anticline / (Z) normal fault

(C) (X) nonconformity surface / (Y) syncline / (Z) normal fault

(D) (X) angular unconformity surface / (Y) anticline / (Z) reverse fault

40 From your study of the opposite figure, what do (X - X) and (Y - Y) represent, respectively? (2nd session 2025)



(A) (X - X) reverse fault / (Y - Y) disconformity surface

(B) (X - X) reverse fault / (Y - Y) angular unconformity surface

(C) (X - X) normal fault / (Y - Y) nonconformity surface

(D) (X - X) normal fault / (Y - Y) disconformity surface

---

41 A rock section contains two perfectly parallel layers of sandstone, separated by a mass of igneous basalt rock. Which of the following choices correctly describes the geological structure found in the section? (Sample exam 2026)

(A) Angular unconformity

(B) Disconformity

(C) Nonconformity

(D) Ripple marks

---

42 The upper surface of metamorphic slate rock that has layers of sedimentary mudstone above it is considered ..... (Sample exam 2026)

(A) a joint surface

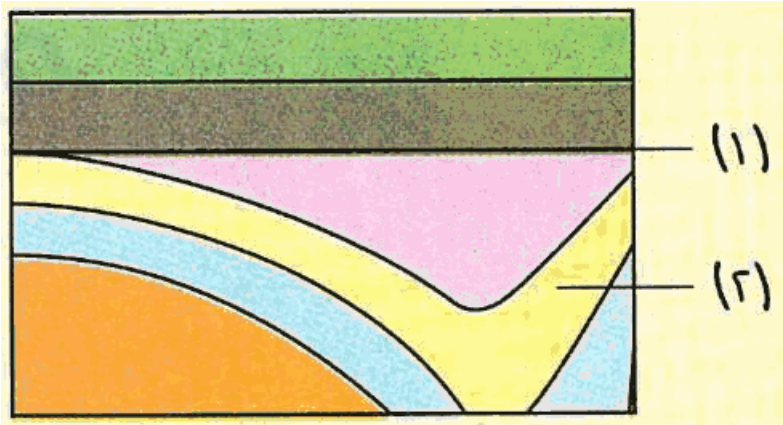
(B) an angular unconformity

(C) a disconformity

(D) a nonconformity

---

43 The opposite figure represents a vertical section of a sedimentary sequence. What geological structures do the numbers (1) and (2) in the figure represent? (Sample exam 2026)



(A) (1) anticline, (2) nonconformity surface
(B) (1) syncline, (2) angular unconformity surface
(C) (1) angular unconformity surface, (2) syncline
(D) (1) disconformity surface, (2) anticline

---

44 Old sedimentary layers were broken and moved as a result of tension forces, then a basalt lava flow covered them at a later time. Which of the following may appear in the vertical section passing through the geological formation? (Sample exam 2026)

(A) Nonconformity (B) Normal fault (C) Disconformity (D) Overthrust fault

---

45 A fold consists of 4 layers. Deduce the following: (Sample exam 2025)

(1) How many limbs are there?
(2) How many axes are there?

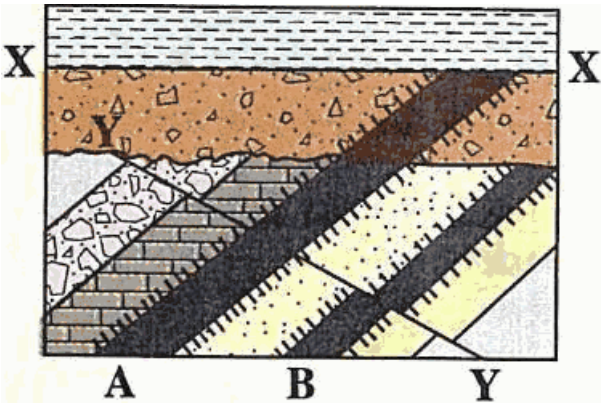
---

46 The opposite figure shows a vertical sedimentary sequence in the Earth's crust with the igneous intrusions (A) and (B). Study it, then answer: (1st session 2023, Sample exam 2025)

(1) What is the geological structure (XX)?

(2) What is the geological structure (YY)?

(3) Which is older, structure (A) or structure (B)?



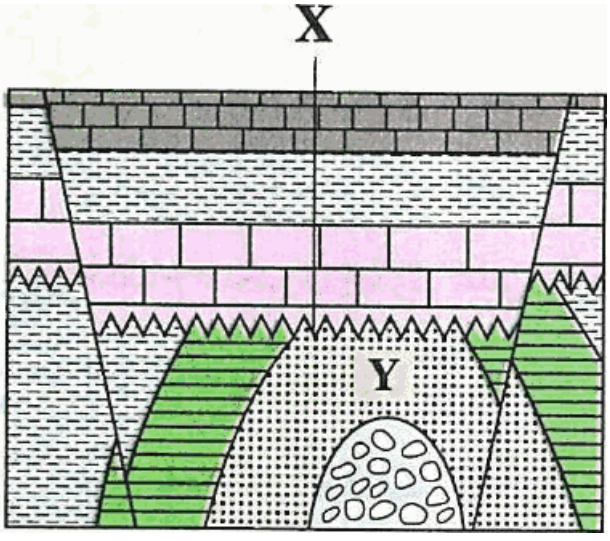
47 The opposite figure shows geological structures. Study them well, then answer: (2nd session 2023)

(1) Deduce structure (Y) before it was exposed to tension.

(2) What is the structure resulting from (Y) after it was exposed to tension?

(3) Identify structure (X).

(4) What is the type of structure (X)?

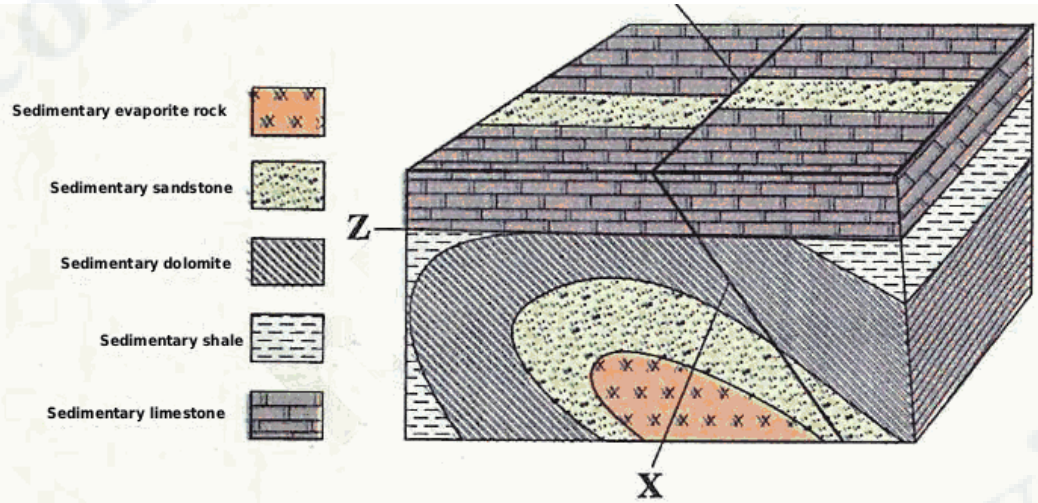


48 Study the opposite section, then answer: (1st session 2024)

(1) What does the structural element (X) represent?

(2) What is the type of the tectonic structure (Y)?

(3) What is the type of unconformity (Z)?



Answer key and solutions

Multiple choice questions

1 B	2 A	3 D	4 A	5 C	6 B	7 A	8 B	9 A	10 A
11 B	12 D	13 A	14 B	15 B	16 B	17 C	18 B	19 A	20 A
21 B	22 A	23 A	24 C	25 B	26 B	27 A	28 B	29 A	30 A
31 B	32 B	33 C	34 B	35 D	36 A	37 D	38 B	39 B	40 A
41 A	42 D	43 C	44 A	45 A	46 C	47 B	48 A	49 A	50 B
51 C	52 A	53 A	54 B	55 D	56 A	57 C	58 B	59 B	60 A
61 A	62 B	63 D	64 D	65 B	66 A	67 B	68 C	69 B	70 B
71 A	72 A	73 C	74 C	75 B	76 C	77 D	78 A	79 C	80 B
81 A	82 A	83 B	84 C	85 B	86 D	87 A	88 A	89 C	

1 **Answer (B)**

(H) shows inclined layers crossing each other inside one bed, which is cross bedding.

(J) shows grains graded in size, which is graded bedding.

2 **Answer (A)**

Ripple marks form on the surface of sediments before they become rocks, by the action of wind or water.

Folds, faults and joints form after lithification as a result of internal forces.

3 **Answer (D)**

The folds (X) are secondary structures that result from internal forces.

Graded bedding (Z) is a primary structure that results from environmental factors.

4 **Answer (A)**

The grains are graded from coarse at the bottom to fine at the top, which is graded bedding.

5 **Answer (C)**

Cross bedding is a primary structure that forms during deposition by water currents.

6 **Answer (B)**

Sand dunes form by the action of wind, which is a climatic factor.

7 **Answer (A)**

The grains are graded in size from gravel at the bottom to sand and then clay at the top, which is graded bedding.

8 **Answer (B)**

Water currents change the direction of deposition while the sediments form, so cross bedding results.

9 **Answer (A)**

Heat and dryness make the mud crack, so mud cracks form.

10 **Answer (A)**

Folds are secondary structures that form after deposition by compression.

Sedimentary layers are deposited horizontal at first.

11 **Answer (B)**

Anticline: its oldest layers are in the centre and its youngest on the outside.

Syncline: its youngest layers are in the centre, and its limbs diverge upwards.

12 **Answer (D)**

The fold is a syncline because the youngest layer (L) is in the centre.

The section (a – b) does not cut layer (L), so layer (Z) is in the centre of the section, and it is a syncline shape.

13 **Answer (A)**

The layers dip away from the centre, which shows an anticline whose oldest layers (the brown bricks) are in the centre.

This is what section (A) shows.

14 **Answer (B)**

The limbs converging upwards indicates an anticline.

A fold has one axial plane, two limbs and one axis for each layer, so it is made of two layers.

15 **Answer (B)**

In an anticline the oldest layer is in the centre. Layer (X) is older, so layer (Y) surrounds it.

16 **Answer (B)**

Every fold has two limbs whatever the number of its layers.

17 **Answer (C)**

Layer (A) is the lowest layer, i.e. the oldest layer in the fold.

18 **Answer (B)**

Each layer has one axis, so the number of axes equals the number of layers.

19 **Answer (A)**

The axial plane cuts the layers, and an axis forms where it intersects each layer.

So the number of axes equals the number of layers.

20 **Answer (A)**

The letter (A) refers to the axial plane, which is the plane that divides the fold into two limbs.

21 **Answer (B)**

Number of limbs = 2 (every fold has two limbs).

Number of axes = 10 (one axis for each layer).

22 **Answer (A)**

A syncline has its youngest layers in the centre, and its limbs converge downwards.

23 **Answer (A)**

Folds help in determining the age relation of rocks and in obtaining groundwater and petroleum.

They have no relation to hot springs.

24 **Answer (C)**

The layers of a fold are arranged in time from the centre outwards, so they show the relation between their ages.

25 **Answer (B)**

The axial plane is what cuts all the layers, even those that have not been eroded.

26 **Answer (B)**

The farther we go from the centre of an anticline, the younger the layers, so the relation is inverse.

27 **Answer (A)**

In a normal fault the hanging wall moves down towards the older layers.

28 **Answer (B)**

The block between the two normal faults drops down, forming a graben.

So young layers appear between them, surrounded by older layers.

29 **Answer (A)**

30 **Answer (A)**

31 **Answer (B)**

Faults allow hot mineral water to come out, so they encourage therapeutic tourism.

32 **Answer (B)**

Cross bedding is a primary structure that forms during deposition, so it appears in sedimentary rocks only.

33 **Answer (C)**

Faults are petroleum traps, places of hot springs and places where manganese is deposited.

Natural gas formation is not one of the importance of faults.

34 **Answer (B)**

In a normal fault the rocks of the hanging wall move down in the direction of gravity.

35 **Answer (D)**

The layers on both sides of the fracture face each other with no vertical displacement, so the movement is horizontal.

36 **Answer (A)**

37 **Answer (D)**

In a strike-slip fault the rocks move horizontally, so no vertical displacement happens.

38 **Answer (B)**

Normal, horst and graben faults result from tension forces, while the thrust fault results from compression forces.

39 **Answer (B)**

The older rocks (600 million years) lie above the younger ones (90 million years), so the hanging wall moved up.

This is a reverse fault.

40 **Answer (A)**

Fault (A) is a normal graben fault, and it happens as a result of tension forces.

41 **Answer (A)**

The faults in this area formed by tension forces.

42 **Answer (D)**

A fault is a fracture in the rocks with displacement, and hot water comes out at the fault, such as Pharaoh's Bath.

43 **Answer (C)**

44 **Answer (A)**

In both sections the older layers appear in the centre, surrounded by younger layers.

45 **Answer (A)**

The structure with horizontal movement results from compression forces, not from tension forces.

46 **Answer (C)**

Compression forces push one block over another, so thrust faults form.

47 **Answer (B)**

The hanging wall rose relative to the footwall, which is a reverse fault.

48 **Answer (A)**

The dropping of the block between two normal faults forms the graben fault.

49 **Answer (A)**

(1) The hanging wall dropped: normal fault.

(2) The hanging wall rose: reverse fault.

(3) A block dropped between two faults: graben fault.

50 **Answer (B)**

Joints are fractures in the rocks with no displacement, unlike faults, in which displacement happens.

51 **Answer (C)**

Block (Y) lies above the plane of fault (F1), so it is its hanging wall.

It lies below the plane of fault (F2), so it is its footwall.

52 **Answer (A)**

In (A) the hanging wall dropped: a normal fault resulting from tension forces.

In (B) the hanging wall rose: a reverse fault resulting from compression forces.

53 **Answer (A)**

The layers are deposited from the oldest (C) to the youngest (A).

The fault (F) is the youngest because it cut the three layers.

54 **Answer (B)**

The fold results from compression, then the increase of compression broke the layers and made the fault.

55 **Answer (D)**

The horst is a type of fault, and faults are petroleum traps.

56 **Answer (A)**

The thicker layer withstands the forces more, so the number of its joints is smaller.

57 **Answer (C)**

58 **Answer (B)**

The greater the ability of the rock to withstand the forces, the smaller the number of joints, so the relation is inverse.

59 **Answer (B)**

The thinner the layer, the larger the number of its joints, and figure (B) is the thinnest.

60 **Answer (A)**

61 **Answer (A)**

62 **Answer (B)**

In the horst fault the middle block rises, so older layers appear surrounded by younger layers.

63 **Answer (D)**

In the horst fault the middle rock is the footwall for both faults, which result from tension forces.

64 **Answer (D)**

Joints are fractures without displacement, and they are used in extracting rock blocks and making obelisks.

65 **Answer (B)**

66 **Answer (A)**

The layers on the right side of the channel are lower than the corresponding ones on the left, so the hanging wall dropped.

This is a normal fault.

67 **Answer (B)**

Fault (F1) does not affect the igneous intrusion, so it is older than it (6 million years).

Fault (F2) displaced the igneous intrusion, so it is younger than it (4 million years).

68 **Answer (C)**

In a normal fault resulting from tension forces, the hanging wall (Y) is younger than the footwall (X).

69 **Answer (B)**

In (F1) the hanging wall is older (400) than the footwall (350): reverse fault.

In (F2) the hanging wall is younger (300) than the footwall (400): normal fault.

70 **Answer (B)**

The youngest in the centre means a syncline, and its layers bend downwards.

71 **Answer (A)**

The two side hanging walls dropped, so the layers of the centre are older than the corresponding ones (100, 200 and 300).

So the ages of A, B and C are 200, 300 and 400 million years.

72 **Answer (A)**

The layers are parallel and separated by an erosion gap: disconformity.

73 **Answer (C)**

In both the angular unconformity and the nonconformity, the younger layers are sedimentary.

74 **Answer (C)**

The older rocks are igneous (granite) and sedimentary rocks lie above them, which is a nonconformity.

75 **Answer (B)**

Angular unconformity: inclined or folded layers with horizontal sedimentary layers above them.

76 **Answer (C)**

The axis of a fold is an imaginary line that cannot be seen.

77 **Answer (D)**

A disconformity separates parallel layers, so there is no difference in dip.

78 **Answer (A)**

(Y – Y) separates the igneous granite from the sedimentary sandstone: nonconformity.

(X – X) separates parallel sedimentary layers: disconformity.

79 **Answer (C)**

The surface separates sedimentary rocks above it from igneous rocks below it: nonconformity.

80 **Answer (B)**

81 **Answer (A)**

The surface separates metamorphic rocks below it (marble and slate) from sedimentary rocks above it: nonconformity.

82 **Answer (A)**

The surface separates sedimentary rocks above it from metamorphic rocks below it: nonconformity.

83 **Answer (B)**

Conglomerate forms above the unconformity surface from the debris of the older rocks that were eroded.

84 **Answer (C)**

The coal is folded while the sandstone above it is horizontal.

So folding and erosion happened after the coal and before the sandstone.

85 **Answer (B)**

D shows folds only, then a fault was added in B, then in C an igneous intrusion cut the fault.

A is the youngest because the upper sediments cover what came before them.

86 **Answer (D)**

87 **Answer (A)**

(X) separates inclined layers from horizontal layers above them: angular unconformity.

(Z) separates an igneous lava flow below it from sedimentary rocks above it: nonconformity.

88 **Answer (A)**

89 **Answer (C)**

The youngest layers are at the top, and the brown sandstone lies above the rest of the choices in sections B and C.

Essay questions

1 **Model answer**

(1) Structure (1): strike-slip fault, structure (2): reverse fault.

(2) Structure (4), the graben fault: two normal faults that affect the rocks and join in the rocks of the hanging wall, and the young rocks are surrounded on both sides by older rocks.

Structure (5), the horst fault: two normal faults that affect the rocks and join in the rocks of the footwall, and the old rocks are surrounded on both sides by younger rocks.

(3) A normal fault happens as a result of rock blocks breaking because of tension forces, with the rocks of the hanging wall moving down relative to the rocks of the footwall.

2 **Model answer**

(1) (X): syncline, (Y): anticline.

(2) The axial plane - the two limbs.

3 **Model answer**

(1) (W) horst fault: the older layers are surrounded on both sides by younger layers.

(X) syncline: the younger layers are surrounded by older layers.

(2) (W): tension forces, (X): compression forces.

4 **Model answer**

(1) Syncline, compression forces.

(2) Layer (4).

(3) One axial plane.

5 **Model answer**

(1) Reverse fault, because the rocks of the hanging wall were displaced upwards relative to the rocks of the footwall.

(2) It is one of the traps of petroleum, natural gas and groundwater, and it is also characterised by the deposition of minerals of economic value (such as calcite, manganese, copper and tin ores) on the fault plane.

6 **Model answer**

(1) Structure (X): angular unconformity, structure (Y): normal fault.

(2) As a result of being exposed to tectonic forces.

7 **Model answer**

(1) (C) angular unconformity surface: an erosion surface or a break in deposition that separates two groups of sedimentary rocks, the older inclined and the younger horizontal.

(D) disconformity surface: an erosion surface or a break in deposition that separates two parallel groups of sedimentary rocks, with both groups almost horizontal.

(2) (A) and (B) are similar in economic importance, as they are both traps for petroleum, groundwater and natural gas, and mineral ores are deposited in them.

(3) The group (1) to (5) being affected by compression forces.

8 **Model answer**

(1) Structures (1) and (4) represent two normal faults, because the rocks of the hanging wall moved down relative to the rocks of the footwall as a result of tectonic tension forces.

Structure (3) represents an angular unconformity surface.

(2) Structure (2) represents an anticline, because the layers bend upwards and the oldest layers are found in the centre.

9 **Model answer**

(1) A nonconformity between the granite and the sand, and a disconformity between the clay and the lime.

(2) Nonconformity: forms between older igneous or metamorphic rocks and younger sedimentary rocks.

Disconformity: forms between two parallel groups of sedimentary rocks because of an erosion surface or a break in deposition.

10 **Model answer**

(1) Because there is an erosion surface between layers (F) and (H).

(2) The igneous rock (D).

11 **Model answer**

(1) Normal fault.

(2) Nonconformity, because it is found between an older metamorphic rock and a younger sedimentary rock.

12 **Model answer**

(1) Reverse fault.

(2) Two surfaces: a nonconformity, then a disconformity.

13 **Model answer**

(1) A nonconformity and an angular unconformity.

(2) A syncline.

Past exam questions

1	2	3	4	5	6	7	8	9	10
A	A	D	A	D	A	D	C	B	D
11	12	13	14	15	16	17	18	19	20
D	B	C	B	B	A	A	D	B	A

21 D	22 C	23 D	24 B	25 C	26 A	27 A	28 C	29 C	30 D
31 D	32 A	33 A	34 B	35 A	36 A	37 A	38 A	39 D	40 A
41 C	42 D	43 C	44 B	45 —	46 —	47 —	48 —		

1 **Answer (A)**

Inclined layers inside one bed in different directions: cross bedding.

It forms by the action of water or air currents during deposition.

2 **Answer (A)**

Large grains at the bottom and fine grains at the top: graded bedding.

It is one of the primary structures that form during deposition.

3 **Answer (D)**

The fold has one axial plane and two limbs, and each layer has one axis, so the number of axes is 5

Axial plane : axis : limb = 1 : 5 : 2

4 **Answer (A)**

In folds, the oldest and youngest layers can be determined from the position of the layers relative to the centre.

5 **Answer (D)**

The layers are folded, and in a fold the number of axes equals the number of layers.

6 **Answer (A)**

(A) folds: the oldest layers are in the centre of the anticline and the youngest in the centre of the syncline, so they determine the time relation between the rocks.

7 **Answer (D)**

The figure has normal faults that form a horst fault and a graben fault, and a strike-slip fault.

There is no reverse fault.

8 **Answer (C)**

Both result from compression, so they are reverse faults.

A reverse fault whose plane is inclined at a small angle (less than 45°) is called a thrust: (A), and (B) is reverse.

9 **Answer (B)**

A fracture with movement of the rocks: fault.

Calcite is one of the minerals deposited on the fault plane.

10 **Answer (D)**

The hanging wall moves down (the direction of gravity) in the normal fault.

And the graben fault consists of two normal faults.

11 **Answer (D)**

In the graben fault the middle block drops, so the young layers in the middle are surrounded by older layers.

12 **Answer (B)**

A hot water spring comes out along a fault.

A fault is a fracture in the layers with a change of their level by compression or tension.

13 **Answer (C)**

Tension forces form normal, horst and graben faults.

The thrust is a reverse fault that results from compression forces.

14 **Answer (B)**

(A) Folds determine the time relation between the layers, so they help in knowing old events.

(B) Joints were used by the ancient Egyptians in cutting rocks and building the Abu Simbel temple.

15 **Answer (B)**

Figure (2) is a strike-slip fault: the two blocks move horizontally, so the level of the layers on both sides of the fracture does not differ.

16 **Answer (A)**

The blocks on both sides of each of (X) and (Y) moved horizontally and the level of the layers did not change, so the movement is in the same plane.

17 **Answer (A)**

In an anticline the layers are repeated horizontally on the limbs.

A reverse fault repeats the layers vertically, and both result from compression forces.

18 **Answer (D)**

(A) graben fault: the middle block dropped, so the younger layers in the middle are surrounded by the older ones.

(B) horst fault: the older ones in the middle are surrounded by the younger ones.

19 **Answer (B)**

The fault plane has a small dip (overthrust fault), and it results from compression forces.

The hanging wall moves up, i.e. the footwall moved down relative to it.

20 **Answer (A)**

(2) is an anticline and (3) is a reverse fault, and both result from compression forces.

21 **Answer (D)**

Structures (1), (2) and (3) are normal faults (horst and graben) resulting from tension.

(4) is a strike-slip fault, which does not result from tension forces.

22 **Answer (C)**

The block above the fracture plane (the hanging wall) dropped from 15 m to 10 m.

The hanging wall dropping: normal fault.

23 **Answer (D)**

In both faults (1) and (2), the block above the fault plane dropped relative to the other.

So they are two normal faults resulting from tension forces.

24 **Answer (B)**

In the figure there are two faults in which the hanging wall moved up (reverse) and two faults in which it moved down (normal).

25 **Answer (C)**

The older rock (350 million years) is in the middle, surrounded by younger rocks (250 million years).

This happens in the horst fault and the anticline.

26 **Answer (A)**

In the thrust (a reverse fault) the hanging wall moves up, i.e. the footwall moves down relative to it.

27 **Answer (A)**

Two normal faults whose planes come close at the top and join in the rocks of the footwall: horst fault.

Normal faults result from tension forces.

28 **Answer (C)**

In (W) the block above the fault plane carries the older layer (5 million years), i.e. it rose: reverse fault.

In (Z) the block above the fault plane carries the younger layer, i.e. it dropped: normal fault.

29 **Answer (C)**

(X) the hanging wall dropped (normal), (Y) the same layers on both sides without a change of level (strike-slip), and (Z) the hanging wall rose (reverse).

30 **Answer (D)**

Inclined layers were eroded, then horizontal layers were deposited above them after the sea covered them: angular unconformity.

31 **Answer (D)**

The angular unconformity and the disconformity both separate two groups of sedimentary rocks.

32 **Answer (A)**

In (A) the igneous basalt lies above the sedimentary rocks, so it is not an erosion surface with younger sedimentary rocks above it.

In (B) angular, in (C) disconformity, and in (D) nonconformity.

33 **Answer (A)**

(X) between inclined layers and horizontal ones: angular, and (Z) between two parallel layers: disconformity.

(W) between igneous and metamorphic rocks and younger sedimentary rocks: nonconformity.

34 **Answer (B)**

The layers stayed horizontal and parallel (no folding and no faulting), and erosion then deposition happened: disconformity only.

35 **Answer (A)**

(X) parallel sedimentary layers separated by rounded gravel (an erosion surface): disconformity.

(Z) its layers are separated by an igneous rock: nonconformity.

36 **Answer (A)**

Marble is a metamorphic rock with sedimentary rocks above it: nonconformity above the marble.

37 **Answer (A)**

Folds are studied by structural geology, physical geology and geophysics because of their importance, such as in searching for petroleum.

38 **Answer (A)**

(XY) an irregular erosion surface between parallel sedimentary layers: disconformity.

(ZL) the block above the fault plane rose: reverse fault.

39 **Answer (D)**

(X) inclined layers with horizontal layers above them: angular unconformity.

(Y) layers bending upwards: anticline, and (Z) reverse fault.

40 **Answer (A)**

(X - X) a fault in which the hanging wall moved up: reverse.

(Y - Y) an erosion surface between parallel sedimentary layers: disconformity.

41 **Answer (C)**

The mass of igneous basalt between two sedimentary layers forms a nonconformity surface.

42 **Answer (D)**

Slate is a metamorphic rock with sedimentary rocks above it: nonconformity.

43 **Answer (C)**

(1) separates folded inclined layers from horizontal layers: angular unconformity.

(2) layers bending downwards: syncline.

44 **Answer (B)**

Breaking and movement by tension forces form a normal fault.

45 **Model answer**

(1) Two limbs.

(2) 4 axes.

46 **Model answer**

(1) Disconformity.
(2) Normal fault.
(3) Structure (B) is older.

47 **Model answer**

(1) Anticline.
(2) Graben fault or normal faults.
(3) Unconformity.
(4) Angular.

48 **Model answer**

(1) The fault plane.
(2) Strike-slip fault.
(3) Angular unconformity.