The figures above are cross-sections of road cuts at two related but distant locations.
- a1 through a8 and b1 through b6 are sedimentary rocks units. A, X and Y are igneous rocks.
- X and Y are mafic rocks from the same source and age.
- The top of b3 was metamorphosed by X.
- The surface of Y has a vesicular texture and the base of b4 is not metamorphosed.
- b2 and a6 both have fragments of a1 through a5 in them.
- b1 and a3 are both shale with similar fossil (these fossils are not present in any of the other rock units).
- b4 and a8 are both limestone with similar fossils (these fossils are not present in any of the other rock units).
- A has fragments of X and a6 in it.

1) Which is the youngest:  
   a) A,  b) X,  c) a1  d) the event that tilted a1 through a5  e) E
2) Which is the oldest:  
   a) A,  b) X,  c) b4  d) the event that tilted a1 through a5  e) a8
3) Which is the youngest:  
   a) b1,  b) Y,  c) b5  d) b6
4) Which is the oldest:  
   a) A,  b) a8,  c) b4  d) X  e) not enough information provided
5) Which is the youngest:  
   a) Y,  b) b3,  c) E  d) a7  e) not enough information provided

6) Which of the following planets have a strong magnetic field?  
   a) Venus  b) Earth  c) Mars  d) Mercury  e) all of the above
7) Transgression is caused by:  
   A) Local Subsidence  B) Rising Sea Levels  C) Fast Spreading Mid-Ocean Ridges  
   D) Melting Ice Caps  E) All of the Above
8) If a specimen has 48 parts C-14 (the radiogenic parent element) for every 8 parts N-14 (the daughter product) and the half-life of this decay sequence is 5,700 years, the age is:  
   a) less than 5,700 years  b) 5,700 years  c) 11,400 years  
   d) 17,100 years  e) 22,800 years
9) If a specimen has 2 parts C14 (the radiogenic parent element) for every 6 parts N14 (the daughter product) and the half-life of this decay sequence is 5,700 years, the age is:
   a) less than 5,700 years   b) 5,700 years   c) 11,400 years
   d) 17,100 years   e) 22,800 years

10) A typical transgressive depositional sequence is
    a) shale, limestone, sandstone   b) sandstone, shale, sandstone
    c) limestone, shale, sandstone   d) sandstone, shale, limestone

11) What planet other than Earth appears to have two different types of crust?
    a) Mars,   b) Mercury,   c) Venus,   d) no other planet   e) b and c

12) What is force per unit area?
    a) strain   b) folding   c) stress   d) deformation

13) What is the usual cause for high grade metamorphic rock to be found at Earth’s surface:
    a) original horizontality   b) erosion   c) isostatic uplift
    d) b and c   e) a and b

14) Which of the following is evidence for the big bang theory:
    a) 98% of the universe is filled with H and He,
    b) a red shift in light from most distant galaxies
    c) a blue shift in light from most distant galaxies
    d) a and b   e) a and c

15) What causes a mineral to leak radiogenic daughter products?
    a) weathering   b) heat   c) age dating   d) both a and b   e) both b and c

16) Local transgression is caused by which of the following:
    a) ice caps melting   b) spreading of mid-ocean ridges   c) subsidence
    d) A & B   e) all of the above

17) In an eroded anticline the oldest rock will be found in the center:  a) true  b) false

18) A good index fossil must have which of the following properties:
    a) hard part,   b) exist for a long period of geological time
    c) found in few locations   d) a and b   e) a and c

19) The densest planet is:
    a) Mercury,   b) Venus,   c) Earth   d) Mars   e) the moon

For each of the following use:  a) for true,   and   b) for false

20) Normal faults are caused by tensile stress.

21) Transform faults never leave fault scarps.

22) The theory of nuclear synthesis says everything heavier than iron was created in a supernova.

23) The continental keel refers to the hot dense (enriched in iron) mantle beneath continents.

24) In electron capture radioactive decay a proton turns into a neutron.

25) Folding is where a rock is deformed under stress.

26) Prevailing theory is that the moon formed at the same time as the Earth.

27) The greenstone belts appear to be metamorphosed fragments of back arc oceanic crust.

28) Accretion only happens at subduction zones.

29) If a mineral leaks the radiogenic daughter products it will result in an age date that is too young.

30) Plunge is the compass orientation of the line made by a bedding plane and the horizontal plane.