1. When you see a green “leafy” moss, you are looking at the _____.
   A. Structure where meiosis occurs
   B. Sporophyte generation
   C. Gametophyte generation
   D. Spore-producing structure
   E. None of the above

2. Which of the following traits are possessed by both land plants and charophytes?
   A. Phragmoplasts
   B. Embryophytes
   C. Cell walls made of cellulose
   D. A & C only
   E. All of the above

3. In the life cycle of ferns, the multicellular female gametangium is a(n) _____.
   A. Antheridium
   B. Archegonium
   C. Sporangium
   D. Sporocyte
   E. None of the above

4. The gametophyte generation of a moss _____.
   A. Is rarely encountered
   B. Produces spores
   C. Is dependent on the sporophyte
   D. Is haploid
   E. Has tracheids, but no vessel elements

5. How are gametes produced by bryophytes?
   A. Mitosis of gametophyte cells
   B. Meiosis of gametophyte cells
   C. Mitosis of sporophyte cells
   D. Meiosis of sporophyte cells

6. Fertilization in moss occurs when sperm swim from a(n) _____ and down the neck of a(n) _____.
   A. Antheridium; sporangium
   B. Sporangium; antheridium
   C. Antheridium; archegonium
   D. Archegonium; antheridium
   E. Sporangium; archegonium

7. Nonvascular plants are commonly known as _____, and vascular plants are commonly known as _____.
   A. Bryophyta; tracheophyta
   B. Tracheophyta; bryophyta
   C. Bryophytes; tracheophytes
   D. Tracheophytes; bryophytes
   E. None of the above

8. Sori can be found on which of the following?
   A. Pterophytes
   B. Mosses
   C. Liverworts
   D. Hornworts
   E. Charophytes

9. Why are ferns and mosses mostly limited to moist environments?
   A. Their seeds do not store water
   B. They lack vascular tissue
   C. Their pollen is carried by water
   D. They lack cuticles and stomata
   E. They have swimming sperm

10. Which of the following produce eggs and sperm?
   A. Moss gametophytes
   B. Moss sporophytes
   C. Moss sporangia
   D. Fern sporophytes
   E. None of the above

11. Plants undergo alternation of generations in which _____.
   A. The sporophyte generation alternates with the gametophyte generation
   B. The vascular generation alternates with the nonvascular generation
   C. Male plants alternate with female plants
   D. A & B only
   E. All of the above

12. In mosses, haploid _____ directly produce buds that grow into gametophores
   A. Archegonia
   B. Antheridia
   C. Protonemata
   D. Sporocytes
   E. Zygotes

13. During pollination of flowering plants, pollen grains are transferred from the _____ to the _____.
   A. Ovary; anther
   B. Anther; sepal
   C. Anther; stigma
   D. Stigma; ovary
   E. Carpel; stigma

14. The cells within pollen grains are _____ and together comprise the _____.
   A. Diploid; spores
   B. Diploid; sperm nuclei
   C. Haploid; spores
   D. Haploid; male gametophyte
   E. None of the above

15. The pollen tube releases two sperm cells into the embryo sac. The result of this is the _____.
   A. Fusion of the two sperm nuclei with the egg nucleus to form a triploid zygote
   B. Union of the two sperm nuclei to form a diploid zygote
   C. Union of one sperm nucleus with the egg nucleus and the disintegration of the other sperm nucleus
   D. Formation of a gametophyte
   E. None of the above

16. The triploid nucleus of the embryo sac develops into the _____.
   A. Haploid embryo
   B. Diploid embryo
   C. Haploid endosperm
   D. Diploid endosperm
   E. Triploid endosperm

17. In ovulate cones, megasporocytes undergo _____ and produce _____ megaspores.
    A. Meiosis; haploid
    B. Meiosis; diploid
    C. Mitosis; haploid
    D. Mitosis; diploid
    E. Fertilization; diploid

18. Which of the following are true of seed plants, but not true of seedless plants?
    A. The gametophyte is small and independent of the sporophyte.
    B. The spore is the main means of dispersing the offspring.
    C. The gametophyte is reduced and dependent on the sporophyte.
    D. A & B only
    E. None of the above

19. A plant is said to be cross-pollinated if _____.
    A. Pollen grains are transferred to a flower on a different plant
    B. It is pollinated by wind
    C. It is pollinated by insects
    D. Its source of pollen is a different species of plant
    E. Pollen grains are transferred from a different flower on the same plant

20. After fertilization, the _____ develops into a seed and the _____develops into a fruit.
    A. Ovule; ovary
    B. Pollen grain; ovule
    C. Ovary; ovule
    D. Egg; ovule
    E. Egg; ovary

21. Of the following, which is a difference in how reproduction occurs in gymnosperms compared to angiosperms?
    A. Only angiosperms have reduced gametophytes.
    B. Double fertilization only occurs in gymnosperms.
    C. Only angiosperm pollen grains form pollen tubes.
    D. Only gymnosperms can contain male and female sporangia on the same plant.
    E. Only the sperm of angiosperms combine with megagametophyte nuclei to form triploid endosperm.

22. All of the following physical characteristics describe eudicots, except _____.
    A. Fibrous root system
    B. Stems with scattered vascular tissue
    C. Embryos with one cotyledon
    D. All of the above characteristics describe eudicots
    E. None of the above characteristics describe eudicots

23. At the stage in a non-woody dicot plant's life when only primary growth has occurred, the inner portion of the stem tissue is called the _____ and the outer portion is called the _____.
    A. Cambium; cortex
    B. Cambium; cork
    C. Endodermis; pith
    D. Pith; cortex
    E. Cork; cortex

24. In what order would you pass through tissues when moving from the epidermis to the pith in a plant possessing secondary vascular tissue?
    A. Primary phloem, secondary phloem, vascular cambium, secondary xylem, primary xylem
    B. Primary phloem, primary xylem, vascular cambium, secondary phloem, secondary xylem
    C. Primary xylem, secondary xylem, vascular cambium, secondary phloem, primary phloem
    D. Primary xylem, primary phloem, vascular cambium, secondary xylem, secondary phloem
    E. Secondary phloem, primary phloem, vascular cambium, primary xylem, secondary xylem

25. In most leaves, chloroplast-containing cells are most closely compacted in _____.
    A. The vein
    B. The upper epidermis
    C. The lower epidermis
    D. The mesophyll
    E. The stomata

26. Which best describes a characteristic of tracheids?
    A. They are only found in gymnosperms.
    B. They are only produced early in the growing season.
    C. They are also called vessel elements.
    D. They maximize the delivery of water to new, expanding leaves.
    E. All of the above

27. Parenchyma cells _____.
    A. Are flexible, occur in strands or cylinders, and support young parts of the plant without restraining growth
    B. Have thick secondary walls and are dead at maturity
    C. Can differentiate into other types of plant cells under particular conditions, such as when the plant is wounded
    D. A & C only
    E. All of the above

28. In the phloem, the _____ are conductive cells, whereas the _____ are nonconductive cells.
    A. Tracheids; vessel elements
    B. Sieve-tube elements; vessel elements
    C. Companion cells; tracheids
    D. Vessel elements; companion cells
    E. Sieve-tube elements; companion cells

29. There are two types of _____, the _____, which adds layers of secondary xylem and phloem, and the _____, which replaces the epidermis with thicker, tougher cork cells.
    A. Apical meristems; vascular cambium; cork cambium
    B. Apical meristems; cork cambium; vascular cambium
    C. Lateral meristems; vascular cambium; cork cambium
    D. Lateral meristems; cork cambium; vascular cambium
    E. None of the above

30. If you pound a nail into a tree 1 meter off the ground and come back to find it in 20 years, it will be_____.
    A. 1 meter off the ground and more deeply embedded in the tree
    B. More than 1 meter off the ground and more deeply embedded in the tree
    C. 1 meter off the ground and the same depth in the tree
    D. More than 1 meter off the ground and the same depth in the tree
    E. None of the above

31. Which example below is the site of primary growth?
    A. Apical meristem
    B. Axillary bud
    C. Lateral meristem
    D. Node
    E. Internode

32. Which of the following cells are dead at maturity?
    A. Parenchyma and sclerenchyma cells
    B. Collenchyma and sclerenchyma cells
    C. Sieve-tube elements and companion cells
    D. Tracheids and companion cells
    E. Tracheids and vessel elements

33. What type of root architecture allows plants to grow taller?
    A. Rhizoids
    B. Taproots
    C. Fibrous roots
    D. Root hairs
    E. None of the above

34. Which of the following is true for a plant that is wilting?
    A. The pressure potential in the xylem will be more negative than in the turgid plant.
    B. The pressure potential in guard cells will be high to keep them closed.
    C. The pressure potential in endodermal cells will be positive.
    D. Root hair cells will have a positive pressure potential.
    E. Mesophyll cells will have a positive pressure potential.

35. What contributes directly to turgor pressure that opens and closes stomata?
    A. Respiration
    B. Guttation
    C. Plasmolysis
    D. Transpiration
    E. Potassium accumulation in guard cells

36. What is the main source of energy that moves water upward in the trunk of a tree?
    A. Contraction of xylem cells
    B. Pressure exerted by root cells
    C. Osmotic changes caused by alterations in salt content
    D. Evaporation of water by the sun
    E. Breakdown and release of energy of sugar molecules

37. A plant placed in a solution with a higher water potential will _____.
    A. Lose water and crenate
    B. Lose water and plasmolyze
    C. Lose water and become turgid
    D. Gain water and become turgid
    E. Gain water and plasmolyze

38. In a plant root, the one cell type in which water cannot move via the apoplast is the _____.
    A. Cortex
    B. Endodermis
    C. Epidermis
    D. Pericycle
    E. Vascular tissues

39. The continuum of cell walls connecting neighboring cells is called the _____.
    A. Apoplast
    B. Aquaporin
    C. Symplast
    D. Plasmodesmata
    E. None of the above

40. Which of the following processes is aided by the membrane potential established by the proton pump?
    A. Uptake of cations such as potassium
    B. Cotransport of anions
    C. Cotransport of neutral solutes
    D. B & C only
    E. All the above

41. Water molecules cross a plasma membrane of a plant cell due to _____.
    A. Diffusion
    B. Aquaporins
    C. Transport proteins
    D. Increase in cytoplasmic calcium levels
    E. All the above

42. Nitrogen fixation is _____.
    A. Absorbing N_2 from the soil
    B. Converting nitrogen in the air to a form usable by plants
    C. Using nitrogen to build molecules such as proteins and nucleic acids
    D. Recycling nitrogen from organic matter in the soil
    E. Performed by fungus inhabiting root nodules

43. Mycorrhizae develop _____.
    A. When nutrients are required by plants in relatively small amounts
    B. When soil is too compact and lacks sufficient air space
    C. Between roots and beneficial fungi
    D. In plants such as mistletoe that parasitize other plants
    E. To control the evaporation of water from leaves

44. The particles in soil are important because they _____.
    A. Are composed of nitrogen needed by plants
    B. Fill spaces and keep oxygen out of the soil
    C. Supply humus needed by plants
    D. Are charged and hold ions needed by plants
    E. Eliminate spaces for air and facilitate drainage

45. The enzyme that catalyzes the conversion of atmospheric nitrogen to ammonia is _____.
    A. Nitrogenase
    B. Nodulase
    C. Rhizobium
    D. Hydrogenase
    E. Kinase

46. Plants absorb nitrogen in the form of _____, but they actually use it in the form of _____.
    A. Nitrate; ammonia
    B. Nitrate; ammonium ions
    C. Nitrite; ammonia
    D. Nitrite; ammonium ions
    E. None of the above

47. During root nodule formation, the _____ are released by the plant, and the _____ are released by the rhizobacteria.
    A. Flavonoids; Nod factors
    B. Flavonoids; Nod D
    C. Nod factors; Nod D
    D. Nod factors; Flavonoids
    E. Nod D; Flavonoids

48. Nod factors _____.
    A. Are proteins
    B. Are enzymes
    C. Turn on nodulin genes in plants
    D. A & C only
    E. All of the above

49. _____ absorb sugars and minerals from their living hosts.
    A. Epiphytes
    B. Parasitic plants
    C. Carnivorous plants
    D. Mutualist plants
    E. None of the above

50. What is the process in which positively charged minerals are made available to a plant when protons in the soil displace mineral ions from the soil particles?
    A. Anion exchange
    B. Cation exchange
    C. Ion transfer
    D. A & C only
    E. None of the above