EOSC 114 MIDTERM 3 **Last Name, First Name: _____**

2010 Fall - Term 1 **Student Number: _____**

Instructions: Closed book. No calculator. Indicate all your answers on the Scantron sheet. Only the Scantron sheet will be marked, but turn in both the Scantron (answer) sheet and this question packet. Put your name and student number on both the Scantron sheet and the question packet. There is only one best answer to each question. Don't leave any questions unanswered (if you don't know the answer, then guess). Good luck!

This is "Test Form" (A). Please indicate (A) in the "Test Form" column on your Scantron sheet.

1. Given the damage from a tornado shown in the photograph to the right, estimate the tornado strength on the Enhanced Fujita scale:
   A) EF1
   B) EF2
   C) EF3
   D) EF4
   E) EF5

2. When you see a tornado approaching you, which option should you choose to be safe?
   A) Find the nearest tree and hold tightly to it to prevent yourself from being blown away.
   B) Get in a car and park it under a bridge overpass in the storm's path.
   C) Get in a ditch or basement.
   D) Enter the nearest mobile home and phone for help.
   E) Get your camera to record a video that you can post on YouTube.

3. The continent that has the greatest risk of tornadoes is:
   A) North America B) South America C) Eurasia D) Africa E) Australia

4. The photograph to the right shows _____ clouds attached to the underside of the thunderstorm anvil.
   A) nimbus
   B) haboob
   C) funnel
   D) arc
   E) mammatus

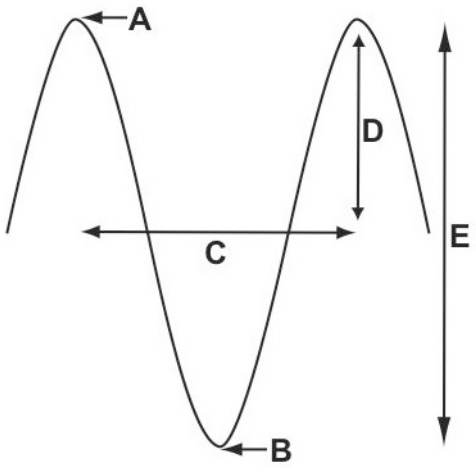
5. Which statement is FALSE?
   A) Buoyancy force and continuity can combine to create horizontal and vertical winds.
   B) Pressure-gradient force and continuity can combine to create horizontal and vertical winds.
   C) A horizontal change in temperature can cause a vertical change in buoyancy force.
   D) A horizontal change in temperature can cause a vertical change in pressure-gradient force.
   E) Atmospheric forces cause the air to accelerate, thus creating winds.

6. Hurricanes have
   A) high pressure near sea level due to all the rain falling around the eye.
   B) low pressure near sea level due to the strong winds around the eye wall.
   C) strong winds in the eye due to the strong downdraft of air there.
   D) high pressure at the top of the storm due to the warm core near the eye.
   E) low pressure at the top of the storm due to the warmer, less-dense air that rises there.

7. In the Northern Hemisphere, hurricanes in the Atlantic and typhoons in the Pacific
   A) usually start as clusters of tropical thunderstorms.
   B) form when mid-latitude (extratropical) cyclones move into the tropics.
   C) generally move from west to east in the tropics.
   D) rotate in opposite directions,
   E) intensify over land in summer because land surfaces are usually hotter than the sea surface.

8. In North America, several different types of weather messages are presented to the public when thunderstorms or hurricanes approach. The type of message for which you need to take immediate action to stay safe is a/an:
   A) alert
   B) watch
   C) warning
   D) priority message
   E) text

9. Referring to the wave diagram to the right, which is the wave height?
   A) A
   B) B
   C) C
   D) D
   E) E



10. A wave with wavelength 5 m moving through water of depth 15 m will transport water:
    A) horizontally, back and forth.
    B) up and down.
    C) sinusoidally.
    D) in orbitals.
    E) chaotically, impossible to predict.

11. As a wave shoals:
    A) the wave height stays the same.
    B) the wave length stays the same.
    C) the wave period stays the same.
    D) the wave speed stays the same.
    E) the wave steepness stays the same.

12. A wave will form a plunging breaker if it encounters:
    A) a flat beach.
    B) a gently sloping beach.
    C) a steeply sloping beach.
    D) a sandy beach.
    E) a rocky beach.

13. Wave energy is most concentrated:
    A) within bays.
    B) slightly upstream of river mouths.
    C) at headlands.
    D) downdrift of jetties.
    E) in the open ocean.

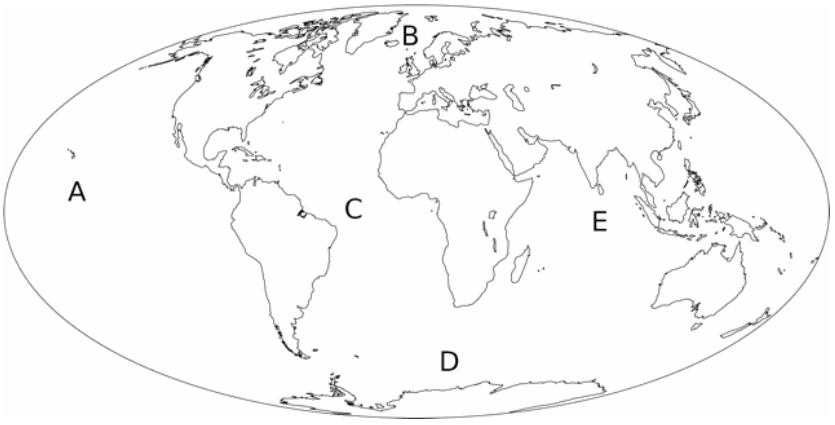
14. Which statement is TRUE?
    A) Blue jets and sprites occur above thunderstorm tops.
    B) Lightning that strikes houses is called sheet lightning.
    C) Negatively charged lightning coming from the top of the thunderstorm to the ground causes the greatest natural threat of starting forest fires.
    D) Cloud-to-cloud lightning can cause trees to explode.
    E) If you are outdoors, you are generally safe from lightning if you are not under the precipitation region of the thunderstorm.

15. Which statement best describes how thunderstorms get their energy?
    A) Radiation from the sun heats the atmosphere, and this warm air is absorbed into thunderstorms.
    B) Evaporation of raindrops releases a lot of latent heat, which causes powerful updrafts.
    C) The daily cycle of heating and cooling causes the most heating at noon, making thunderstorms most likely in mid-day.
    D) Condensation of water vapour releases latent heat into the storm.
    E) Strong winds from different directions begin to swirl around each other, causing kinetic energy to be converted into heat.

16. Which statement is FALSE?
    A) Microbursts are small-scale violent downdrafts of air.
    B) Haboobs are dust or sand storms.
    C) Derechos are violent updrafts of air.
    D) Gust fronts mark the leading edges of thunderstorm outflow air.
    E) Arc clouds are associated with gust fronts.

17. A community installs a porous breakwater. After installation:
    A) erosion will occur updrift, and depletion downdrift of the breakwater.
    B) rip currents will be much stronger.
    C) wave energy will be reflected.
    D) wave energy will be dissipated.
    E) sediment transport will cease.

18. Using the map to the right, where in the world is the risk of rogue waves the GREATEST?
    A) A
    B) B
    C) C
    D) D
    E) E



19. A resonant wave in a body of water is called a:
    A) monster wave.
    B) seismic sea wave.
    C) harbour wave.
    D) storm surge.
    E) seiche.

20. A diver returning to the surface feels wave motion a few meters lower than when she started her dive. She can predict that:
    A) a tsunami is passing.
    B) the surface waves now have a shorter wavelength than earlier waves
    C) the surface waves now have a greater wave height than earlier waves.
    D) conditions are identical as at the start of her dive.
    E) conditions are different than at the start of her dive, but it is impossible to predict how they've changed.

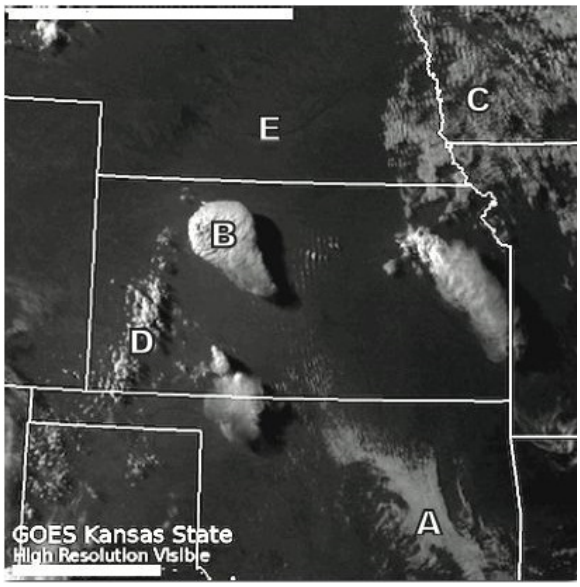
21. *Removed due to content change*

22. Generating forces acting on waves are:
    A) gravity and interference.
    B) gravity and surface tension.
    C) gravity and wind.
    D) wind and interference.
    E) wind and surface tension.

23. A tsunami event may be caused by:
    A) a landslide.
    B) an iceberg calving from a glacier.
    C) an earthquake.
    D) a meteor impact.
    E) all of the above.

24. The damage from a tsunami:
    A) occurs during wave advance and retreat.
    B) may be outrun.
    C) is a result of the high wave steepness in the open ocean.
    D) can be entirely mitigated with an early warning system.
    E) all of the above.

25. In the visible satellite image to the right, which feature is a thunderstorm?
    A) A
    B) B
    C) C
    D) D
    E) E



26. Suppose that rising air parcels do not cool at the adiabatic lapse rate of about 10°C/km, but instead maintain constant temperature as they rise. For this situation, thunderstorms would ...
    A) be stronger, because the rising air is warmer and more buoyant.
    B) be stronger, because the warm air can hold more water vapour - an important source of latent heat.
    C) be nearly the same as thunderstorms in our real atmosphere
    D) be weaker, because the saturation point for water vapour decreases as the pressure in the air parcel decreases to match the surrounding environmental pressure.
    E) not exist, because there would be no condensation of water vapour to create a thunderstorm cloud.

27. Tornadoes often descend out of a thunderstorm feature called ____.
    A) a wall cloud
    B) a cap cloud
    C) a tail cloud
    D) an anvil cloud
    E) an arc cloud

28. The characteristic of a supercell thunderstorm that is MOST responsible for the ability to form tornadoes is
    A) its long lifetime.
    B) its heavy rainfall.
    C) its ability to create hail.
    D) its rotation.
    E) its downbursts.

29. If you feel strong shaking while at the beach, you should:
    A) hide in the nearest house.
    B) find a boat and sail to open ocean.
    C) head for high ground.
    D) put on a life vest.
    E) do nothing unless you hear an official warning.

30. A storm surge can last:
    A) seconds to minutes.
    B) minutes to hours.
    C) hours to days.
    D) days to weeks.
    E) weeks to months.

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