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NCEES - FE Civil Engineering 2023

Question: 92
A line is measured as 1,200 ft at 98° F. Using a standard tape, what is the true length of the line?

A. 1,197.70 ft
B. 1,199.77 ft
C. 1200.23 ft
D. 1202.30 ft

Answer: C

The true length of a line that is measured as 1,200 ft at 98°F is 1,200.23 using a standard tape. Solution Correction = (steel tape coefficient of expansion)(outside temperature standard temperature)(measured length) Correction = (0.00000645 * 1/°F) (98°F - 68°F) (1,200) = +0.23 ft True length = distance + correction True length= 1,200.00 ft + 0.23 ft = 1,200.23 ft

Question: 93
Which of the following statements expresses Hooke's Law of simple harmonic motion?

A. Speed of a wave = frequency x wavelength
B. Spring force = -(spring constant x displacement)
C. Average speed = distance traveled / time of travel
D. None of the above

Answer: B

Hooke's Law of simple harmonic motion can be expressed as spring force = -(spring constant x displacement). Spring force always pushes or pulls a mass towards its original equilibrium position, and as such, is referred to as a restoring force. Hooke's Law describes the relationship of the restoring force as being directly proportional to the displacement of the mass.

Question: 94

Which of the following sentences provides an example of effective diction?

A. A good writer will only use big words when necessary.
B. The shrewd author will always endorse himself by providing imposing and superlative language.
C. As I struggled to carry my instruments across the vast expanse of the project area, I paused to reflect on the magnificence of the setting sun.
D. All of the above

Answer: A

The sentence “A good writer will only use big words when necessary.” provides an example of effective diction. Good writers understand that fancy words are often distracting and condescending. Avoid using overblown vocabulary unless you are writing the next Great American novel.

Question: 95
A 2.2 kg object is sliding across a smooth surface. If the net force acting on the object is 1.6 N to the right, what is the acceleration of the object?

A. -3.52 m/s2to the left
B. -0.73 m/s2to the right
C. 3.52 m/s2to the left
D. 0.73 m/s2to the right

Answer: D

The acceleration of a 2.2 kg object sliding across a smooth surface with a net force of 1.6 N to the right acting on it is 0.73 m/s2 to the right. Solution Use Newton’s Second Law S F = ma Where S F = net force = 1.6 N to the right m = mass = 2.2 kg a = acceleration S F = ma, so a = S F/m a = 1.6 N / 2.2 kg 1 N = 1 kgm/s2, so a = (1.6 kg m/s2)/2.2 kg = 0.73 m/s2

Question: 96
Which of the following type of error is least likely to affect the measured value for a horizontal angle?

A. Instrument
B. Environment
C. Terrain
D. Personnel

Answer: C

Terrain errors are the least likely type of errors affecting the measured value for a horizontal angle when compared to the other listed error types. The impact of instrument errors can be mitigated by properly adjusting the devices used and by using systematic observation procedures. Environmental errors affecting horizontal angle measurement may be due to temperature differentials and the horizontal refraction of the line of sight. Personnel errors can be prevented through proper training and following standard procedures.

Question: 97
Which of the following scenarios can be modeled mathematically?

A. Flow of water through a watershed
B. Migration of a pollutant through a groundwater aquifer
C. Dispersion of particulates through the air
D. All of the above

Answer: D

All of the scenarios listed can be modeled mathematically. With technology available today, engineers and planners are able to model the flow of water, migration of pollutants, and dispersion of particulates through air. Mathematical models can be built using specialized computer software linked to geographic information systems and real-time sampling equipment. These models can be used for predictive forecasting, planning, and mitigation purposes.

Question: 98
For which of the following is a Digital Terrain Modeling (DTM) application most useful?

A. Planning flight lines

B. Generating high quality cartographic contours
C. Setting slope stakes
D. All of the above

Answer: B

Of the answers listed, Digital Terrain Modeling is most useful for generating high quality cartographic contours. DTMs are digital representations of a portion of the Earth's surface. The input data, data models, and algorithms required to generate a digital model of a terrain's surface are significantly different from those needed to represent planimetric data. For example, most DTM data is derived from a combination of ground surveys, photogrammetric resources, digitized cartographic data, and altimetry data.

Question: 99
Cross-section measurements were taken at 100 ft intervals along a proposed roadway alignment. The cross-sectional areas of the material above the proposed roadway elevation shown in two consecutive sections were found to be 420 sqft and 332 sq ft. What is the approximate volume (in cubic yards) of the material that will need to be excavated between the two cross-sections?

A. 1,393
B. 12,640
C. 37,600
D. None of the above

Answer: A

The approximate volume of the material that will need to be excavated between the two cross-sections is 1,393 cubic yards. Solution Use the volume equation averaged over the two cross-sections v = L (A1 + A2)/2 Where L = length = 100 ft A1 = 420 sqft and A2 = 332 sqft V = (100 ft) (420 ft2 + 332ft2) / 2 = 37,600 ft3 = 37,600 ft3 x (1 cubic yard/ 27 ft3) = 1,393 cubic yards (approximate)

Question: 100
What is the sum of the exterior angles of an eight-sided traverse?

A. 180°
B. 1,440°
C. 1,800°
D. None of the above

Answer: C

Use the sum of exterior angles of a polygon equation: S = (n+2) x 180° Where n = 8 S = (8+2) x 180° = 1,800°

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