ONWARD UPWARD

MARK MATTSON, PE

Name: MM

Course: CTC485   Assignment: FE Review

Description: Surveying (v1.1)

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These problems address topics from the NCEES FE Civil CBT Exam Specifications at https://ncees.org/wp-content/uploads/FE-Civil-CBT-specs-1.pdf, see below.

FE Civil Review 2022
Surveying

NCEES Fundamentals of Engineering (FE)
CIVIL CBT Exam Specifications

Effective Beginning with the July 2020 Examinations

YouTube Playlist

Knowledge	Number of Questions
9. Surveying	**6–9**

    A.   Angles, distances, and trigonometry
    B.   Area computations
    C.   Earthwork and volume computations
    D.   Coordinate systems (e.g., state plane, latitude/longitude)
    E.   Leveling (e.g., differential, elevations, percent grades)

Notes
V1.0 published 4/9/2022
V1.1 correction 5/10/2022

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A. Angles, distances, and trigonometry

Question 1: Given an angle of 114°15'24, what is the equivalent angle in decimal degrees?

A. 114.1524°

B. 114.2511°

C. 114.2568°

D. 114.3324°

A. Angles, distances, and trigonometry

Question 2: A survey has a control point A with coordinates of N:1,000.00, E:1,000.00. The coordinates of a second point, point B, are N: 1230.30, E:1476.59. The bearing of course AB is most nearly:

A. N 25°47'28" E 529.32'

B. N 25°47'28" E 1921.97'

C. N 64°12'32" E 529.32'

D. N 64°12'32" E 1921.97'

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A. Angles, distances, and trigonometry

Question 3: The following table gives survey information obtained by a closed traverse. Using the compass rule, the corrected coordinates for point B are most nearly:

STA	Course	HD	Lat.	Dep.	Northing (Y)	Easting (X)
A	AB	95.49	-82.62	-47.88	1000.00	1000.00
B	BC	88.96	-32.17	82.94		
C	CA	120.26	115.12	-34.79		

A. N 917.38 E 952.12

B. N 917.27 E 952.03

C. N 917.28 E 952.04

D. N 917.49 E 952.21
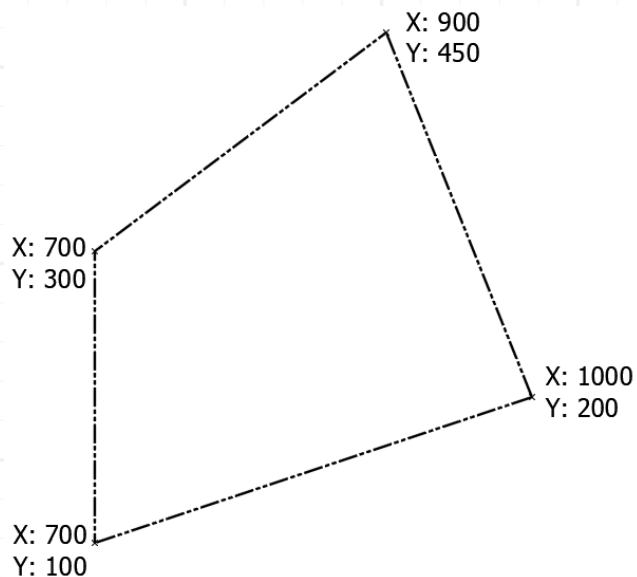
A. Angles, distances, and trigonometry

Question 4: A surveyor has been tasked with laying out a horizontal curve with radius 500 feet and deflection angle of 40°. The PC and PI have already been established. The surveyor will set up at the PC at station 10+00 and establish a zero-reference angle to the PI. The station, chord length and angle that would need to be turned (from PI to PT) required to layout this curve are most nearly:

	PT	LC	Angle
A.	13+42	349 ft	20°
B.	13+42	342 ft	40°
C.	13+49	342 ft	20°
D.	13+49	349 ft	40°

B. Area computations

Question 5: The coordinates of an irregularly shaped plot are shown below. The area of the plot is most nearly:

X: 900
Y: 450

X: 700
Y: 300

X: 1000
Y: 200

X: 700
Y: 100

A. 1.34 acres

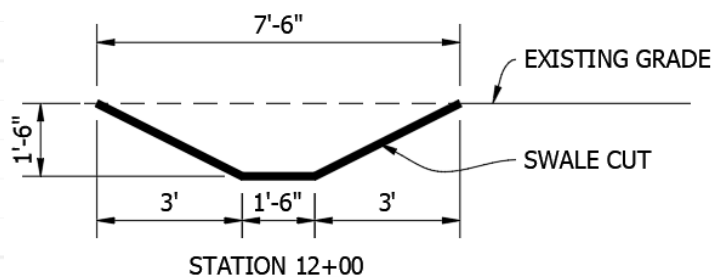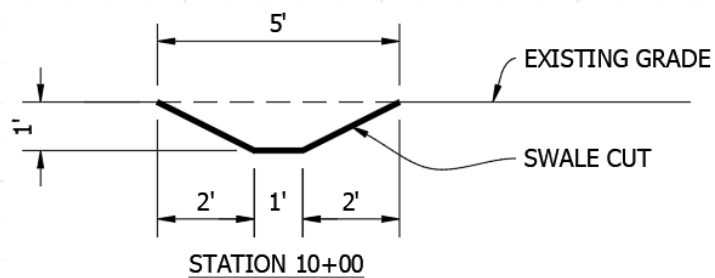B. 1.38 acres

C. 1.43 acres

D. 1.47 acres

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B. Area computations

Question 6: The station cross sections for the beginning and end of a 200-ft long swale cut are given below. The cut uniformly increases in size from the beginning to the end station. Using the **Average End Area Formula**, the total cut volume in CY is most nearly:
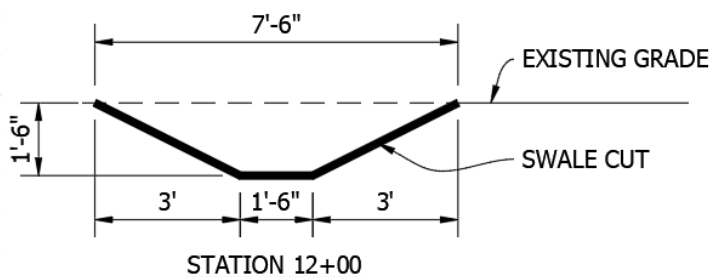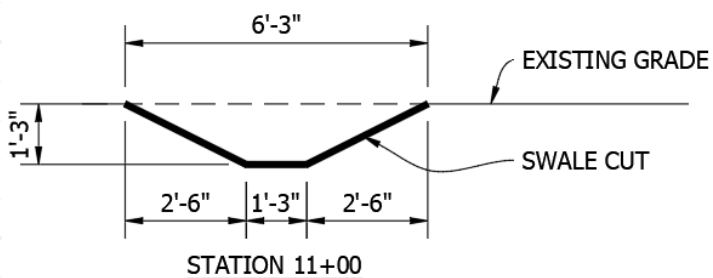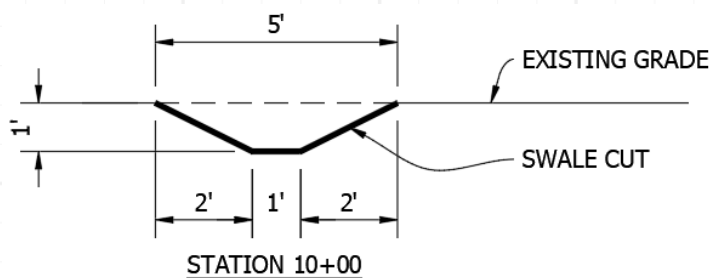
A. 33

B. 34

C. 35

D. 36

STATION 10+00

STATION 12+00

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B. Area computations

Question 7: The station cross sections for the beginning, middle and end of a 200-ft long swale cut are given below. The cut uniformly increases in size from the beginning to the end station. Using the **Prismoidal Formula**, the total volume required for fill material in CY is most nearly:
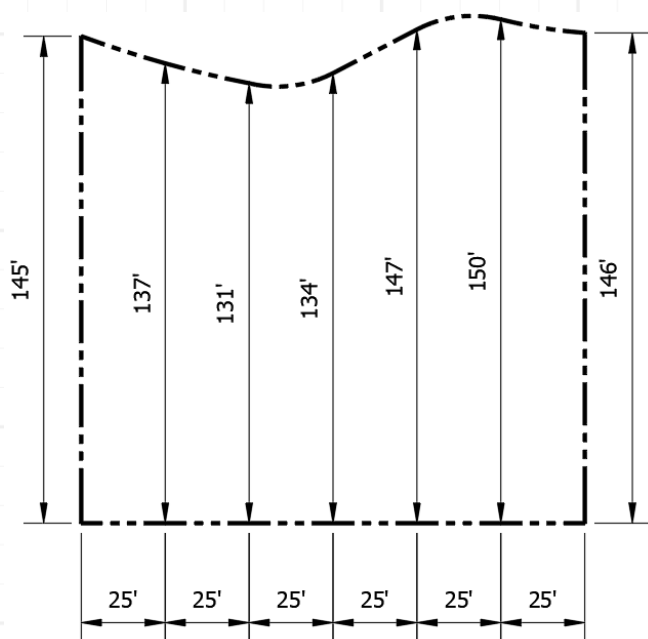
A. 33

B. 34

C. 35

D. 36

STATION 10+00

STATION 11+00

STATION 12+00

B. Area computations

Question 8: Distances were measured at intervals along a traverse to a boundary that is irregular on one side. Using the **trapezoidal rule**, the area of this plot can be estimated as most nearly:
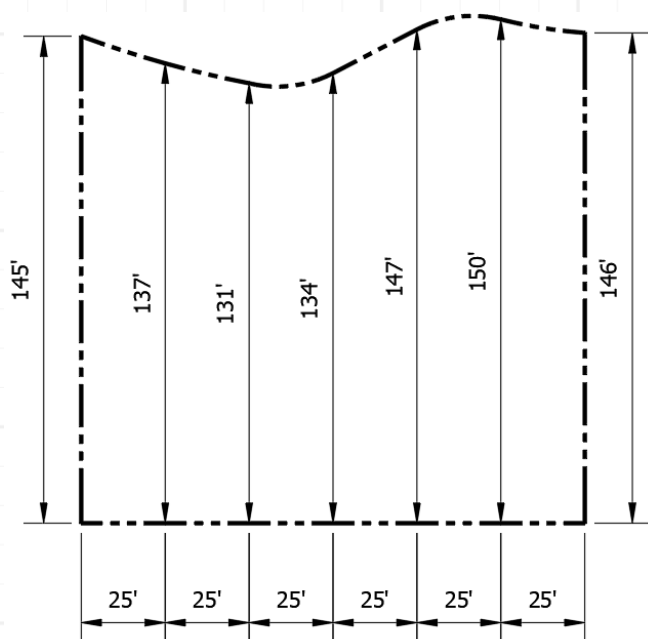
A. 21,090 ft^2

B. 21,110 ft^2

C. 21,180 ft^2

D. 21,220 ft^2

145' 137' 131' 134' 147' 150' 146'

25' 25' 25' 25' 25' 25'

B. Area computations

Question 9: Distances were measured at intervals along a traverse to a boundary that is irregular on one side. Using **Simpson's 1/3 rule**, the area of this plot can be estimated as most nearly:
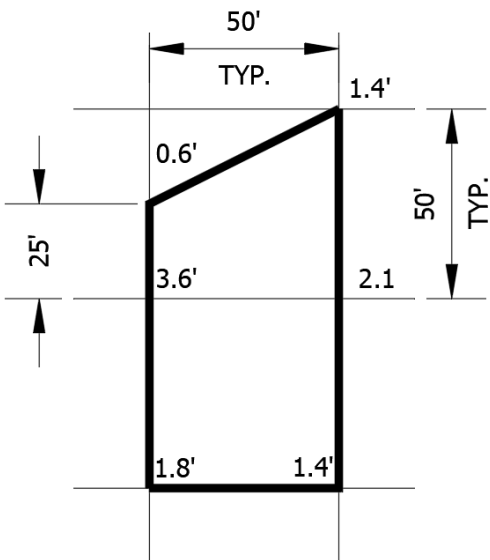
A. 21,090 ft^2

B. 21,110 ft^2

C. 21,180 ft^2

D. 21,220 ft^2

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C. Earthwork and volume computations

Question 10: The following depth of cut in a borrow hole was measured at points on a grid.   The approximate volume of fill needed to level the area in CY is most nearly:
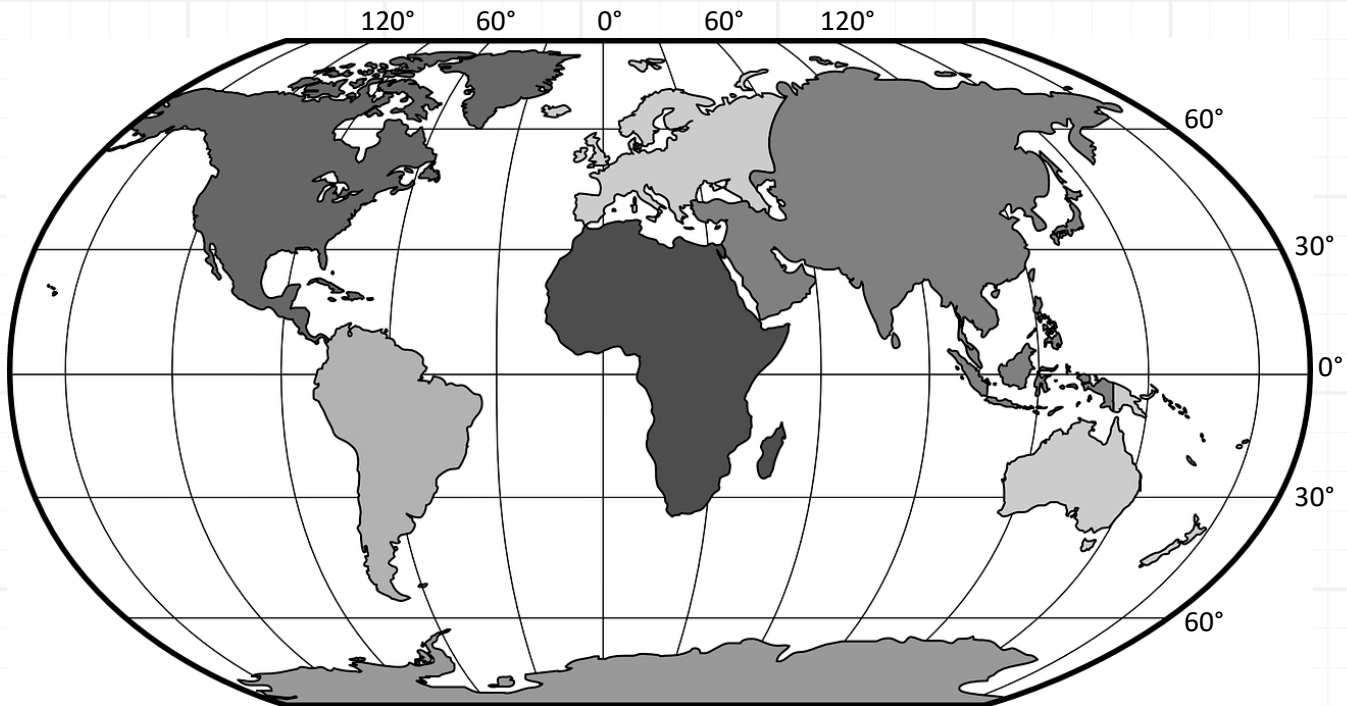

- 50'
- TYP.
- 1.4'
- 0.6'
- 50' TYP.
- 25'
- 3.6'
- 2.1
- 1.8'
- 1.4'

A. 240

B. 280

C. 310

D. 340

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D. Coordinate systems

Question 11: A map of the world with latitude and longitude lines is shown below. The geographic coordinates that most nearly represent the center of New York State are most nearly:

A. 38° N 62° W

B. 43° N 75° W

C. 38° N 95° W

D. 43° N 98° W

D. Coordinate systems

Question 12: Statements related to coordinate systems are found below. Select **all** that identify benefits of State Plane Coordinate Systems.

☐ Use cylindrical projections of the earth to establish plane or flat surfaces for mapping
☐ Eliminate mapping errors related to the curvature of the earth
☐ Are adopted and referenced by local municipalities
☐ Are developed in length units of both feet and meters
☐ Are used for national mapping
☐ Converts latitude and longitude coordinates to northing and easting values on a plane
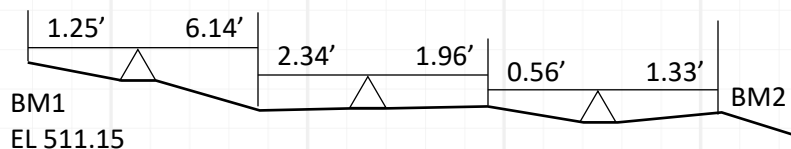
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E. Leveling

Question 13: Given the benchmark elevation at point 1 and the leveling measurements below, the elevation of the benchmark at BM2 is most nearly:

1.25'   6.14'   2.34'   1.96'   0.56'   1.33'

BM1
EL 511.15

BM2

A. 504.23

B. 504.96

C. 505.87

D. 505.94

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E. Leveling

Question 14: Two points were taken using a total station and a prism pole. The field notes and sketch are given below. Determine the elevation at Point A. (10 points)

Vertical Elevation Calculation

PT	SD	ZA	HA	Desc.
BM1	61.25'	88° 17'	0°0'0"	BS to BM1 EL 518.30
A	58.45'	92° 46'	20°0'0"	Control Point

Calculate Elev. Point A

Date: 12/2016
Weather: Cold

Crew Members
Inst.: Chris P. Bacon
Rod: San. T. Claus

Field Sketch:

4.75'   BM1

4.75'

Point A
Elev:

A. 513.64

B. 517.31

C. 520.28

D. 522.96