

- 1) Under the 1973 Manual of Surveying Instructions, what is the maximum allowable error of closure of a perimeter in either latitude or departure for public land surveys?
- (A) 1 part in 1280
  - (B) 1 part in 2000
  - (C) 1 part in 10,000
  - (D) 1 part in 5000
- 2) Mr. Zambezi engaged a surveyor to stake the boundary of a parcel of land. He told the surveyor that he had adversely possessed the parcel for the past 11 years. The surveyor asked him if he had occupied the land under color of title. Mr. Zambezi answered yes and produced a letter that the abutting owner, Kevin Wannamaker, wrote to him 7 years ago, in which Mr. Wannamaker stated that he knew Mr. Zambezi was on his property and gave him permission to be there. What should the surveyor tell Mr. Zambezi?
- (A) There is no ill will between the parties, so no adverse possession is possible.
  - (B) The letter does not constitute color of title, and therefore Mr. Zambezi's possession must continue another 11 years.
  - (C) A surveyor cannot survey land that has been stolen.
  - (D) Possession by permission of the record owner cannot ripen into adverse possession.
- 3) If the sine of  $A$  in the accompanying right triangle is  $x$ , what is the cotangent of  $A$  in terms of  $x$ ?
- (A)  $(1 - \cos A)x$
  - (B)  $b/cx$
  - (C)  $(c/a)x$
  - (D)  $(\tan A)x$
- 4) Although exceptions may arise, which of the following reflects the priority of calls most often used in interpreting legal land descriptions?
- (A) artificial monuments, natural monuments, direction, distance, and area
  - (B) natural monuments, artificial monuments, direction, distance, and area
  - (C) date of survey, area, artificial monuments, natural monuments, and coordinates
  - (D) direction, distance, area, coordinates, and artificial monuments
- 5) What is the relationship between the mapping angle,  $0$ , and the distance from the central meridian for a station in a zone of a state plane coordinate system based upon the Lambert projection?
- (A) The absolute value of  $0$  is always larger than the difference in longitude from the central meridian.
  - (B)  $0$  is not always the same for a specific meridian of longitude.
  - (C) The absolute value of  $0$  is always the same as the difference in longitude from the central meridian.
  - (D) The absolute value of  $0$  is always smaller than the difference in longitude from the central meridian.

- 6) What is a pseudo-range measurement in GPS?
- (A) a distance measured between a GPS satellite and receiver based on a time shift that depends on the correlation of the codes each generates to reveal the biased time delay between their respective clocks
  - (B) a distance measured between a GPS satellite and receiver that depends on the observed phase difference between the carrier signals each generates to reveal the number of wavelengths between the two standards
  - (C) a measurement of a time series of coordinates using GPS satellites, one stationary receiver, and one roving receiver that depends on the corrected range misclosures between the two receivers
  - (D) a measurement of the accuracy—that is, the standard deviation—of positions derived from GPS satellites in a particular configuration

- 7) Which statement is true about a deed?

- (A) A deed is proof of ownership of real property.
- (B) A deed is the only legal method of conveying real property.
- (C) A deed must have sufficient and legal words in its description of the property.
- (D) A deed must be signed by the grantee to be valid.

- 8) The following field data have been used to set a slope stake. The width of the roadway is 60 feet and the side slopes are 1 1/2 : 1. The elevation of the subgrade is 609.45 feet.

$$\begin{aligned} \text{HI} &= 618.23 \text{ feet} \\ \text{Ground rod} &= 7.3 \text{ feet} \end{aligned}$$

What is the distance from the center of the roadway to the slope stake?

- (A) 30 feet
  - (B) 32.22 feet
  - (C) 34.17 feet
  - (D) 35.67 feet
- 9) Which values correctly represent the base and height of a right triangle containing 510 square feet in which the base is 4 feet shorter than the height?

- (A) base = 25 feet; height = 29 feet
- (B) base = 30 feet; height = 34 feet
- (C) base = 16 feet; height = 20 feet
- (D) base = 32 feet; height = 36 feet

- 10) Which of the following discharge rates and periods of time will most nearly accumulate one acre-foot?

- (A) 1 ft<sup>3</sup>/sec for 12 hr
- (B) 25 gal/min for 24 hr
- (C) 30 miner's in for 6 hr
- (D) 30 gal/min for 8 hr

- 11) Which of the following best defines the meaning of the term *meander corner*?
- (A) a corner established at each deflection point of a meander line
  - (B) a corner established at the intersection of each aliquot line with a meander line
  - (C) a randomly placed corner used to control a meander line
  - (D) a corner established at the intersection of a meander line with a standard, township, or section line
- 12) A surveyor landed a lucrative government contract and needed additional equipment and personnel on short notice. He borrowed \$20,000.00. The loan was discharged five years later with a total payment of \$30,772.48. What was the interest on the loan if it was compounded annually?
- (A) 9.5%
  - (B) 9.0%
  - (C) 8.5%
  - (D) 8.0%
- 13) Which value corresponds to the sum of a star's hour angle and its right ascension?
- (A) the azimuth of the star
  - (B) the longitude of the observer
  - (C) the zenith distance of the star
  - (D) the sidereal time at the observer's position
- 14) Which of the following specifications would typically achieve a standard length from a 100-foot steel tape?
- (A) a tape supported throughout its length under 25 lb of tension at 72° F
  - (B) a tape supported only at its end under 25 lb of tension at 72° F
  - (C) a tape supported throughout its length under 12 lb of tension at 68° F
  - (D) a tape supported only at its end under 15 lb of tension at 68° F
- 15) Gunter's chain was invented by Thomas Gunter in eighteenth century England. The instrument was used in public surveys throughout the nineteenth century. These chains tended to increase in length with extended use. Why?
- (A) the constant repairs required by frequent breaks
  - (B) the elasticity of the materials from which the chains were made
  - (C) the wearing down of the links and the rings that joined them together
  - (D) all of the above
- 16) Which of the following lost corners would be restored by double proportionate measurement?
- (A) a lost quarter corner
  - (B) a lost corner on a township boundary that is common to four sections
  - (C) a lost standard corner on a correction line
  - (D) a lost corner common to four townships

- 17) A part of an old deed reads, "to an iron buggy axle; thence N 85°15'E, 18 chains and 86 links to a wooden stake; thence S 02°30'E, 16 chains and 98 links to a 3" diameter iron pipe". The wooden stake has decayed. Current measurements yield the following coordinates:

iron buggy axle	7631.413N
	5723.610E

3" iron pipe	6615.016N
	7012.813E

The decision was made to define the position of the decayed wooden stake by relying on the distances alone. Which coordinates would correspond to the position of the stake under these circumstances?

- (A) 8223.869N; 7509.105E
  - (B) 7734.636N; 6964.083E
  - (C) 6401.105N; 5912.738E
  - (D) 6512.043N; 5774.562E
- 18) By the highway definition of the term, what would be the degree of curve, to the nearest minute, of a circular curve with a radius of 450.00 ft?
- (A) 12°45'
  - (B) 12°44'
  - (C) 13°00'
  - (D) 15°53'
- 19) The manipulation of random errors in surveying measurement rests on the application of assumptions from the theory of probability. Which of the following answers best describes these assumptions?
- (A) Small errors occur more often than large ones, large errors occur infrequently, and there is an equal opportunity for the occurrence of positive and negative errors.
  - (B) There is an equal opportunity for the occurrence of large and small errors, errors cancel each other, and the error of closure of a traverse is the sum of its accumulated random errors.
  - (C) Large errors occur more often than small ones, and there is an equal opportunity for the occurrence of random and systematic errors.
  - (D) Errors remain the same under the same set of conditions, large mistakes and small mistakes occur with equal frequency, and the error of closure of a traverse is the sum of its accumulated random errors.
- 20) The standard lines of the Public Land Surveying System include principal meridians, baselines, standard parallels, and guide meridians. Which of the following statements is not true regarding the general plan for the establishment of these standard lines under current instructions?
- (A) Guide meridians and principal meridians are intended to follow astronomical meridians within 00°03'
  - (B) Standard parallels and baselines are intended to follow parallels of latitude within 00°03'
  - (C) The difference between two sets of measurements of a standard line should not differ by more than 25 links in 40 chains.
  - (D) Double corners will eventually stand on standard parallels and baselines.

- 21) Lot 3 is bounded on the south by Utah Street. The street was originally established by the Sedgwick Subdivision plat. There is some talk that Utah Street may have been formally abandoned. What rights, if any, will the owner of the lot have in the roadbed of the old public way if the street has been abandoned?
- (A) None; there is no mention of Utah Street in the description. If the grantor had wanted to convey title to the street, it should have been clearly expressed.
  - (B) Unless the contrary is clearly expressed, Lot 3 has always held, and still holds, title to the middle of the street, whether Utah Street has been abandoned or not.
  - (C) The owner of Lot 3 could acquire title to the roadbed only after it has been abandoned by the public.
  - (D) A metes and bounds description might have extended ownership to the center of the street, but the current description cannot possibly do so.

The following three problems refer to the illustration shown.

Consider the area shown as being virtually level. The coverage of the project with vertical aerial photography should be sufficient to produce a photo-scale of 1:10,000. The end-lap is to be 60% and the side-lap is to be 30% at a minimum. The camera is to have a 6-in focal length and the format is 9 in x 9 in.

- 22) Given these parameters, what is the ground dimension along the side of a single aerial photograph?
- (A) 5250 ft
  - (B) 3750 ft
  - (C) 833.33 ft
  - (D) 7500 ft
- 23) What would be the maximum spacing between adjacent flight lines for the project illustrated?
- (A) 7500 ft
  - (B) 5250 ft
  - (C) 3750 ft
  - (D) 2250 ft

- 24) Which of the following best accommodates the necessary photo coverage required of the northernmost flight line of the project?
- (A) The first, or northernmost, strip should be photographed flying either east or west along the northern boundary of the project.
  - (B) The first, or northernmost, strip should be photographed flying either east or west along a line about 1500 ft south of the northern boundary of the project
  - (C) The first, or northernmost, strip should be photographed flying either east or west along a line about 3750 feet north of the northern boundary of the project.
  - (D) The first, or northernmost, strip should be photographed flying either east or west along a line about 3750 feet south of the northern boundary of the project.
- 25) An observed altitude of the sun is  $35^{\circ} 15' 42''$ , the refraction correction is  $00^{\circ} 01' 24''$ , and the parallax correction is  $00^{\circ} 00' 07''$ . What is the true altitude of the sun?
- (A)  $35^{\circ} 14' 11''$
  - (B)  $35^{\circ} 14' 25''$
  - (C)  $35^{\circ} 16' 59''$
  - (D)  $35^{\circ} 17' 13''$
- 26) A surveyor is asked to perform a survey of public lands under contract to the Bureau of Land Management (BLM). However, the surveyor is not licensed in the state where the work must be done. What should the surveyor do?
- (A) decline the project
  - (B) find a licensed surveyor in the state who will assume responsible charge for the project
  - (C) accept the project
  - (D) investigate whether the surveyor may acquire a license in the state by comity
- 27) Which statement correctly describes the minimum requirement regarding the delivery of the plat of an ALTA/ACSM Land Title Survey to the client title insurance company?
- (A) The surveyor must furnish three copies of the plat and the associated boundary description, which must be attached to the face of the plat if feasible.
  - (B) The surveyor must furnish two copies of the plat drawn in ink on mylar and four copies of the associated boundary description on separate sheets.
  - (C) The surveyor must furnish two copies of the plat and the associated boundary description, which must be attached to the face of the plat if feasible. If multiple sheets are required, each sheet will be numbered, the total number of sheets will be indicated on each, and match lines will be shown.
  - (D) The surveyor must furnish two copies of the plat drawn in ink on mylar and four copies of the associated boundary description on separate sheets. The plat must be under the title *ALTA/ACSM Land Survey Title Plat*, and the section, township, and range must be indicated on the plat.

28) Concerning a modern EDM that uses coherent laser light, which of the following atmospheric factors will be the least critical to the accuracy of its measurement of distance?

- (A) the relative humidity
- (B) the barometric pressure
- (C) the air temperature
- (D) each is equally significant

29) The interior angles of a closed traverse of six sides are given.

$118^{\circ} 15' 58''$

$93^{\circ} 59' 01''$

$23^{\circ} 44' 10''$

$269^{\circ} 21' 00''$

$98^{\circ} 00' 39''$

$116^{\circ} 38' 12''$

Each angle has been measured with equal precision. Which of the following angles would be the correct adjusted value for the first angle?

- (A)  $118^{\circ} 16' 08''$
- (B)  $118^{\circ} 15' 48''$
- (C)  $118^{\circ} 15' 58''$
- (D)  $118^{\circ} 16' 15''$

30) A surveyor retracing a boundary that was originally established in 1886 using magnetic bearings finds that a particular line has a magnetic bearing of record of  $N 01^{\circ} 20' W$ , when the magnetic declination was  $0^{\circ} 31' E$ . Today the magnetic declination is  $0^{\circ} 12' W$ , and the true bearing of the same line is  $N 00^{\circ} 09' W$ . Which pair of angles correctly reflects the difference between the two magnetic bearings of the line and the two true bearings of the line, respectively?

- (A)  $01^{\circ} 23'$  (magnetic bearing difference);  $00^{\circ} 40'$  (true bearing difference)
- (B)  $00^{\circ} 52'$  (magnetic bearing difference);  $00^{\circ} 40'$  (true bearing difference)
- (C)  $01^{\circ} 17'$  (magnetic bearing difference);  $00^{\circ} 59'$  (true bearing difference)
- (D)  $01^{\circ} 23'$  (magnetic bearing difference);  $00^{\circ} 59'$  (true bearing difference)

The following five problems refer to the illustration shown.

- 31) Which of the following best describes the part of Section 15 labeled *A*?
- (A) SE 1/4 Sec. 15, T3N, R10W, 6th P.M.
  - (B) Beginning at the E 1/4 corner of Sec. 15, T3N, R10W, of the 6th P.M.; thence south along the east line of said section to the SE corner thereof; thence west along the south line of said section to the S 1/4 corner thereof; thence north along the centerline of said section to the C 1/4 thereof; thence east to the point of beginning
  - (C) E 1/2 of the E 1/2 Sec. 15, T3N, R10W, of the 6th P.M.
  - (D) SW 1/4 of Sec. 15, T3N, R10W, of the 6th P.M.
- 32) Which of the following best describes the area labeled *B*?
- (A) NE 1/4 of the NE 1/4 of Sec. 15, T3N, R10W, of the 6th P.M.
  - (B) NW 1/4 of the NW 1/4 of Sec. 15, T3N, R10W, of the 6th P.M.
  - (C) NE 1/4 of the NW 1/4 of Sec. 15, T3N, R10W, of the 6th P.M.
  - (D) NE 1/4 NW 1/4 Sec. 15, T3N, R10W, of the 6th P.M.
- 33) Which of the following fractions is the correct unit of subdivision for the area labeled *C*?
- (A) 1/4
  - (B) 1/8
  - (C) 1/16
  - (D) 1/64
- 34) Which of the following best describes the area labeled *D*?
- (A) NE 1/4 NE 1/4 SE 1/4 SW 1/4 Sec. 15, T3N, R10W, 6th P.M.
  - (B) NE 1/4 NW 1/4 SW 1/4 SE 1/4 Sec. 15, T3N, R10W, 6th P.M.
  - (C) NE 1/4 NE 1/4 SE 1/4 SE 1/4 Sec. 15, T3N, R10W, 6th P.M.
  - (D) NE 1/4 NW 1/4 SE 1/4 SW 1/4 Sec. 15, T3N, R10W, 6th P.M.
- 35) Assuming a standard section, what is the approximate total area of the aliquot parts labeled in the illustration?
- (A) 530 acres
  - (B) 425 acres
  - (C) 212.5 acres
  - (D) 106.25 acres
- 36) A differential level line was run ascending a grade. The sights were not balanced. The backsights were consistently 325 feet, and the foresights were 210 feet. The elevation difference between BM1 at the bottom of the grade and BM2 at the top of the grade was calculated to be 96.32 feet. The run required 24 setups. Later, the level was discovered to be out of adjustment. During the level work, the line of sight of the instrument was inclined downward 0.02 ft in 300 ft. In light of this information, what is the adjusted difference in elevation between BM1 and BM2?
- (A) 96.50 ft
  - (B) 96.14 ft
  - (C) 96.41 ft
  - (D) 96.23 ft



- 37) When looking through the telescope of a particular instrument after focusing, an observer finds that if the eye is shifted slightly, the cross hairs appear to move with respect to the object being sighted. What is the cause of this effect and what should be done about it?
- (A) The effect is due to normal refraction and nothing can be done to eliminate it.
  - (B) The effect is known as *parallax* and the instrument should be adjusted to eliminate it.
  - (C) The effect is known as *halation* and the instrument should be adjusted to eliminate it.
  - (D) The effect is caused by heat waves and nothing can be done to eliminate it.
- 38) Which of the following statements does not describe a portion of the procedure known as *double-centering*?
- (A) A backsight is taken once with the telescope of the instrument in the direct position and once with the telescope in the inverted position.
  - (B) One point is set on the line described with the telescope in the direct position and another with the telescope in the inverted position.
  - (C) The angle is measured between the two points, subtracted from  $180^\circ$ , and the resulting angle is set off from the backsight to correctly prolong the line.
  - (D) Midway between the two temporary points, a third point is set on the correct prolongation of a straight line.
- 39) A surveyor receives a request from a client on a control project to report the results in state plane coordinates, expressed in meters. The project is in a state that has adopted the U.S. survey foot as its standard. In such a state, which relationship is correct?
- (A)  $1 \text{ ft} = 0.3048006 \text{ m}$
  - (B)  $1 \text{ m} = 3.2808000 \text{ ft}$
  - (C)  $1 \text{ m} = 3.2808399 \text{ ft}$
  - (D)  $1 \text{ ft} = 0.3048000 \text{ m}$
- 40) Which statement does not correctly represent a criterion for the placement of a witness corner monument?
- (A) The preferred location of a witness corner is on one of the surveyed lines that leads to the true corner.
  - (B) A witness corner monument is established near a corner when the true corner falls in a position that makes monumentation and subsequent use impractical.
  - (C) The preferred distance between a witness corner and the true corner is 10 chains or less when the witness corner can be placed on a surveyed line that leads to the true corner.
  - (D) The *1973 Manual of Surveying Instructions* calls for two witness corners to be placed near inaccessible true corners.

The following three problems refer to the Fairview Tract, described as follows. Mr. Holland owns a parcel of land known as the Fairview Tract. The Fairview Tract has been platted and recorded as a square parcel, with each side 650.00 ft long and oriented in a cardinal direction. No improvements have been made, but the parcel has been surveyed and its four corners monumented. The monuments are still in place.

41) Mr. Holland sold the east 325 ft of the Fairview Tract to Mr. Clark by deed dated October 12, 1988. A year later, Mr. Holland sold to Mr. Brown the west 325 ft of the Fairview Tract, described as extending to the west line of Mr. Clark's property. A new survey finds that the distance between the SW and SE corners of the Fairview Tract is 655.00 ft. What distance should be measured from the SW corner of the Fairview Tract to establish the SE corner of Mr. Brown's property?

- (A) 325.00 ft
- (B) 327.50 ft
- (C) 330.00 ft
- (D) 325.50 ft

42) Mr. Holland sold the east 325 ft of the Fairview Tract to Mr. Clark by deed dated October 12, 1988. Mr. Holland then sold the west 325 feet of the Fairview Tract to Mr. Brown by deed dated January 29, 1990. A new survey finds that the distance between the SW and SE corners of the Fairview Tract is 645.00 feet. What distance should be measured from the SW corner of the Fairview Tract to establish the SE corner of Mr. Brown's property?

- (A) 323.00 ft
- (B) 324.50 ft
- (C) 330.00 ft
- (D) 320.00 ft

43) Mr. Holland sold the east 325 feet of the Fairview Tract to Mr. Clark and the west 325 feet to Mr. Brown by the same deed dated July 2, 1989. The distance measured between the SW corner and the SE corner of the Fairview Tract is 658.24 ft. What distance should be measured from the SW corner of the Fairview Tract to establish the SE corner of Mr. Brown's property?

- (A) 329.12 ft
- (B) 333.24 ft
- (C) 325.00 ft
- (D) 322.23 ft

(NOT YOUR)

LAND SURVEYOR'S

LICENSING EXAMINATION

(BUT CLOSE ENOUGH TO BE

IRRITATING)