

Test

1. The abbreviation of TST means...

- a) total station theodolite;
- b) test student teaching;
- c) true student transition;
- d) transit system travel.

2. Total station is an ... instrument used in modern surveying and building construction.

- a) electronic/optical;
- b) direct/indirect;
- c) old/new;
- d) alternative/modern.

3. There are ... parts of a total station.

- a) 26;
- b) 13;
- c) 16;
- d) 29.

4. The ... function of surveying instruments is to measure distances, angles and heights.

- a) final;
- b) primary;
- c) main;
- d) second.

5. It takes ... by calculating the deviation of the wavelength of the reflected light.

- a) distances;
- b) beams;

- c) measurements;
- d) seconds.

6. Total stations are able to measure distances to an accuracy of ... millimeters per kilometer, and angles to 1-second ($1^\circ/3,600^\circ$) accuracy.

- a) 4-5;
- b) 6-7;
- c) 2-3;
- d) 5-6.

7. One second in an angle is equivalent to the width of pencil lead at ... meters.

- a) 100;
- b) 200;
- c) 300;
- d) 400.

8. Surveying instruments measure ... using a built-in encoder.

- a) pipes;
- b) trunks;
- c) points;
- d) angles.

9. The encoder detects the ... angle of the motor by reading changes in the intensity of the projected light.

- a) indirect;
- b) direct;
- c) rotation;
- d) obtuse.

10. There are ... methods of measuring distance.

- a) two;
- b) three;
- c) four;
- d) five.

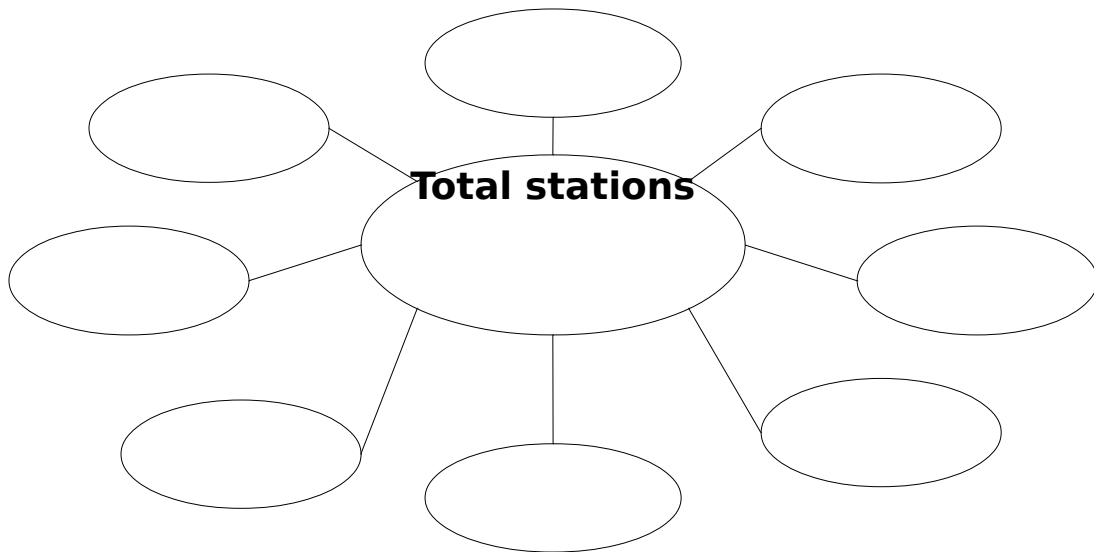
Answers:

1) a; 2) a; 3) d; 4) b; 5) c; 6) c; 7) a; 8) d; 9) c; 10) a

Additional tasks



1. Fill in the spidergram with the words associated with total stations.



2. Name these total stations and talk about their peculiarities.



3. Discuss with your groupmates. What are applications of total stations nowadays?



4. Discuss with your groupmates. What do you know about types of measurement with the help of total stations nowadays?

Angle measurement

Most modern total station instruments measure angles by means of electro-optical scanning of extremely precise digital bar-codes etched on rotating glass cylinders or discs within the instrument. The best quality total stations are capable of measuring angles to 0.5 arc-second. Inexpensive “construction grade” total stations can generally measure angles to 5 or 10 arc-seconds.

Distance measurement

Measurement of distance is accomplished with a modulated infrared carrier signal, generated by a small solid-state emitter within the instrument's optical path, and reflected by a prism reflector or the object under survey. The modulation pattern in the returning signal is read and interpreted by the computer in the total station. The distance is determined by emitting and receiving multiple frequencies, and determining the integer number of wavelengths to the target for each frequency. Most total stations use purpose-built glass corner cube prism reflectors for the EDM signal. A typical total station can measure distances with an accuracy of about 1.5 millimeters (0.0049 ft) + 2 parts per million over a distance of up to 1,500 meters (4,900 ft).

Reflectorless total stations can measure distances to any object that is reasonably light in color, up to a few hundred meters.

Coordinate measurement

Some total stations can measure the coordinates of an unknown point relative to a known coordinate can be determined using the total station as long as a direct line of sight can be established between the two points. Angles and distances are measured from the total station to points under survey, and the coordinates (X, Y, and Z or easting, northing and elevation) of surveyed points relative to the total station position are calculated using trigonometry and triangulation. To determine an absolute location a Total Station requires line of sight observations and must be set up over a known point or with line of sight to 2 or more points with known location.

For this reason, some total stations also have a Global Navigation Satellite System receiver and do not require a direct line of sight to determine coordinates. However, GNSS measurements may require longer occupation periods and offer relatively poor accuracy in the vertical axis (http://en.wikipedia.org/wiki/Total_station)

5. State whether the sentences are true or false. If true, add the information on the statement. If false, correct the sentence.

1. The best quality total stations are capable of measuring angles to 0.5 arc-second.	T	F
2. Inexpensive “construction grade” total stations can generally measure angles to 12 or 14 arc-seconds.	T	F
3. Measurement of distance is accomplished with a modulated infrared carrier signal.	T	F
4. The distance is determined by emitting and receiving multiple frequencies.	T	F
5. A typical total station can measure distances with an accuracy of about 3.5 millimeters.	T	F
6. Reflectorless total stations can measure distances to no object.	T	F
7. Angles and distances are measured from the total station to points under survey.	T	F



6. Discuss with your groupmates and find peculiarities between these total stations.



7. Discuss and list the important parts of a total station using figure 1.

No	Parts of a total station
1.	
2.	
3.	

Figure 1.

