Homework Assignment No. 7
Level Equipment

Part A- Mark the correct answer for the following:

1. **Automatic level uses one of the following to adjust line of sight to be exactly horizontal**
   a. ○ longitudinal bubble b. ○ tilt screw c. ○ foot screws d. ○ pendulum prisms (compensator)

2. **When using an automatic level**
   a. ○ The compensator must be checked before every reading
   b. ○ The compensator ensures that the viewed line of sight is horizontal
   c. ○ The coincidence bubble reader must be set carefully
   d. ○ It does not have to be leveled e. ○ It is not necessary to check any readings

3. **When using a digital level**
   a. ○ It is not necessary to level the instrument as this is done electronically
   b. ○ Readings are taken automatically without the need to read a staff
   c. ○ Great care is needed when writing staff readings on the booking form
   d. ○ It must be connected to a computer for data transfer
   e. ○ None of these apply

4. **The surveying equipment shown in the next figure is :**

   a. ○ Automatic level
   b. ○ Laser level
   c. ○ Digital level
   d. ○ Theodolite
   e. ○ None of the above

5. **photoelectric detector is a main part for:**
   a. ○ digital level staff b. ○ optical level staff c. ○ laser level staff d. ○ none of these

6. **Concerning reduction of personal error the ----------level is recommended**
   a. ○ laser b. ○ automatic c. ○ digital d. ○ tilt

7. **Sensitivity of level bubble with radius of curvature 100 m is:**
   a. ○ 4.1" b. ○ 41" c. ○ 2 mm d. ○ 4.1 mm e. ○ none of these

8. **Surveying telescope is recommended to be with:**
   a. ○ High magnification and minimum resolving angle.
   b. ○ High magnification and maximum resolving angle.
   c. ○ Low magnification and minimum resolving angle
   d. ○ Low magnification and maximum resolving angle.

9. **According to the next levels specifications, multiplication factor means:**
   a. ○ factor to compute distance between level and staff
   b. ○ factor for curvature error compensation.
   c. ○ factor to correct readings for refraction error.
   d. ○ none of the above.

Technical Data	Leica NA720	Leica NA724	Leica NA728	Leica NA730
Magnification	20x	24x	28x	30x
Telescope Image	Upright			
Gas Filled Telescope	Yes			
Diameter of objective	30 mm	36 mm	40 mm	
Shortest focusing distance	0.5 m			0.7 m
Angle Measurement	360 degree/400 gon, selectable			
Distance Measurement				
– Multiplication Factor	100			
– Additive Constant	0			
Circular Bubble	10'/2mm			
Focus Drive	rough		rough / fine	
Horizontal Drive	both sides, endless			
Accuracy (Standard deviation)				
Per km double-run	2.5 mm	2 mm	1.5 mm	1.2 mm
Single measurem. with 30m target dist.	1.5 mm	1.2 mm	1 mm	0.8 mm
Compensator				
Setting Accuracy	‹0.5"		‹0.3"	
Working Range	±15'			
Environmental				
Impact	ISO 9022-33-5			
Water and Dust Resistance	IP57 (immersion)			
Temperature Range				
– Operation	–20 to +50 °C			
– Storage	–40 to +70 °C			
Dimensions				
Size	19 x 12 x 12 cm		21 x 12 x 12 cm	
Weight	1.6 kg		1.7 kg	

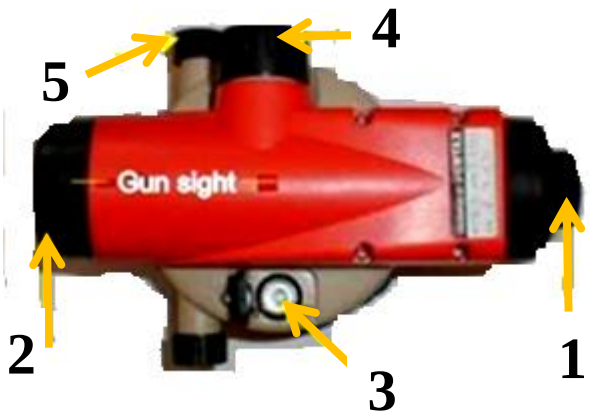
10. **According to the next level specifications, circular bubble=10'/2mm means:**
   a. ○ maximum allowable collimation error for level.
   b. ○ Angle of view
   c. ○ Sensitivity of circular bubble
   d. ○ Angle of tilt measured by circular bubble.

11. **According to the above level specifications, The best model to be chosen is:**

a. ○ Leica NA720 b. ○ Leica NA724 c. ○ Leica NA728 d. ○ Leica NA730

Part B- Answer the followings:

1. Add the required labels for the next level.



1. ……. **2.**

3- **4-**

5- **6-**

7- **8-**

2. The following is the technical specifications for group of levels. Discuss the different elements of the specifications. Arrange the elements of specifications according to their importance and mention your reasons. Chose the best one for your construction site and give your justifications.

C Series Specifications

	C20	C22	C24	C26	C28
Telescope					
Length	7.5 in. (190 mm)	8.5 in. (215 mm)			
Objective Aperture	1.2 in. (30 mm)	1.3 in. (32 mm)		1.4 in. (36 mm)	
Magnification	20x	22x	24x	26x	28x
Field of View	1°30' (2.6 m at 100 m)	1°25' (2.5 m)			
Minimum Focusing Distance	3.0 ft. (0.9 m)	1.0 ft. (0.3 m)			
Reticle	Cross Hairs with Stadia				
Stadia - Multiplication Constant	100				
Coarse Sighting	Gun Sight			Peep Sight	
Compensator, Auto Leveling Mechanism					
Damping System, Working Range, Setting Accuracy	Magnetic, ± 15', 0.5"				
Leveling Accuracy					
Standard Deviation for 1 km Double-Run Leveling	0.1 in. (2.5 mm)	0.08 in. (2.0 mm)			
Typical Working Accuracy	1/8" @ 100 ft.	1/8" @ 200ft.			
Typical Working Range (Max)	150'	200'	250'	300'	350'
Horizontal Circle					
Diameter	3.9 in. (98 mm)	4.1 in. (103 mm)			
Graduation	1°				
Estimation	0.2°	0.1°			
General					
Sensitivity Of Circular Level	10'/2 mm				
Horizontal Fine Motion	Endless Drive				
Base	Fits Concave and Flat Tripods				
Base Screw	Ø 5/8 in.				
Size (W x D x H)	4.5 x 7.5 x 4.8 in. (115x190x122 mm)	5.2 x 8.5 x 5.3 in. (133x215x135 mm)			
Weight	2.2 lbs. (1 kg)	4.0 lbs. (1.8 kg)			