9. In the RTD experiment , the relationship between the Resistance and temperature is linear.
A. True
B. False

10. Thermi stors are
A. Less sensitive than RTDs
B. More sensitive than RTDs

11. With all co mmon types of RTD, the resistance increases as Temperature increases.
A. True
B. False

12. RTDs t ypically have much higher nominal resistance values than thermistors.
A. True
B. False

13. - _____ refers to the predominant direction of the surface texture.
A. Form
B. Lay
C. Profile
D. Center line

14. The inside micrometer is one of the indirect measuring instruments
A. True
B. False

Question 2:
Define the following Terminology from the Surface Texture Experiment. 9 Points

A. Roughness

B. Waviness

C. Lay

D. Profile

E. Center line

F Form

---------- can be used to measure the pitch size of an external thread.

- a. the micrometer
- b. the vernier caliper
- c. the three wires
- d. the pitch gauge

B

Clear my choice

estion 1

t yet
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00

Flag question

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344, the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to --------

Select one:

- a. 19.8002 mm
- b. 20.1998 mm
- c. 22.0686 mm
- d. None of the above is correct

Clear my choice

Quiz

1
10
19

Finish att

Time left

Question 2

Not yet

The bottom of the groove between the two flanking surfaces of the thread whether internal or external

Type here to search

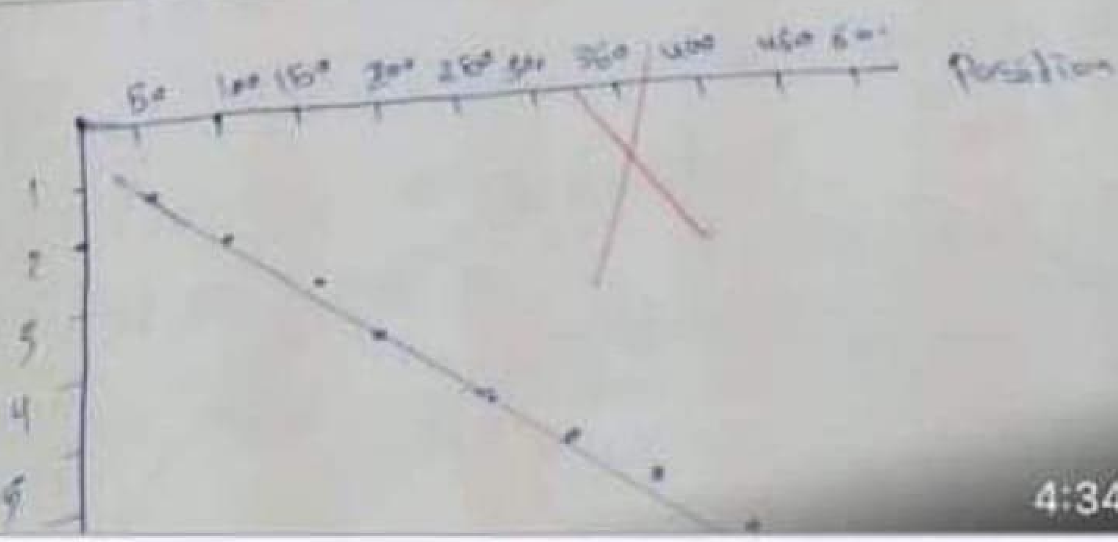
udent name: [illegible] Student number: 0121380 section 5 [illegible]

Question 1: (8 points)

A surface was tested for straightness using an autocollimator and reflector; the readings are shown in the following table, if one second of arc increase in angle observed corresponds to a rise of 0.25 micron of the front end of the reflector relative to its rear end.

1. Construct a profile graph of the surface relative to the initial points (0-50 mm). (5 points)
2. Using the end points method to calculate the max deviation of the profile from the straight line. (3 points)

position	Autocollimator reading	Difference from first reading	Rise or fall over 50 mm	Cumulative rise or fall	Adjustment required	error
mm	Sec	Sec	micrometer	micrometer		
0		0	0			
0-50	40	40	20			
50-100	36	-4	-2.0			
100-150	32	-4	-2.0			
150-200	20	-12	-6.0			
200-250	28	8	4.0			
250-300	48	20	1.0			
300-350	44	-4	-2.0			
350-400	36	-8	-4.0			
400-450	20	-16	-8.0			
450-500	16	-4	-2.0			



In the strain gauge experiment a load of 2 N were applied at a distance of 250 mm from the strain gauge, the dimensions of the steel cantilever beam ($b = 19.75mm$), and ($h = 4.75\ mm$) where b is the width of the cantilever beam and h is the thickness

($the\ cross\ section\ area = b.h$)

The sensitivity of the strain gauge : $k = 2.05$

The modulus of elasticity for steel : $E = 210000\ N/mm^2$

The reading of the measuring instrument $U_A/U_E = -0.069\ mV/V$.

Calculate the strain

- a. $7068.293\ N/mm^2$
- b. $7.068293\ N/mm^2$
- c. 0.033659
- d. $3.3659 * 10^{-5}$

C

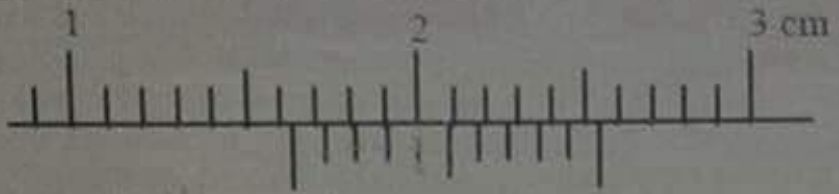
Question 1: **10 points**

A. What size is the gauge block build-up used with a 5 inches sine bar to set the workpiece at an angle of 4° 30'? show your calculations (3 points)

$\theta = 4.5^\circ$ $\quad$ L = 5 inche = 12.7 cm

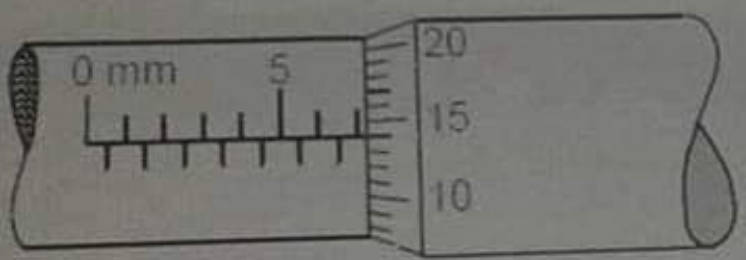
$\sin\theta = \frac{h}{L} \Rightarrow h = \sin 4.5^\circ \times 12.7 = 0.9996$ cm = ..393 inch

B. A student used a vernier caliper to measure the diameter of a cylinder. The diagram shows an enlargement of the caliper scales. What reading was recorded? (2 points)



11 mm + 0.1 × 4 = 11.4 mm

C. What is the reading of the following micrometer? (2 points)



7 mm + 0.14 mm =

7.14 mm

D. Using the following set of gauge blocks, what is the minimum number of blocks to be wrung together to produce an overall dimension of 47.765 mm

Show your calculations (3 points)

Metric 103 pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01-1.49) mm	0.01 mm
49 pieces (0.5- 24.5) mm	0.5 mm
4 pieces (25-100) mm	25 mm

25 we need 5 block gauge

47.765
① 1.005
46.760
② 1.26
45.50
③ 0.5
45.0
④ 25.00
20.00
⑤ 20.00
0.00

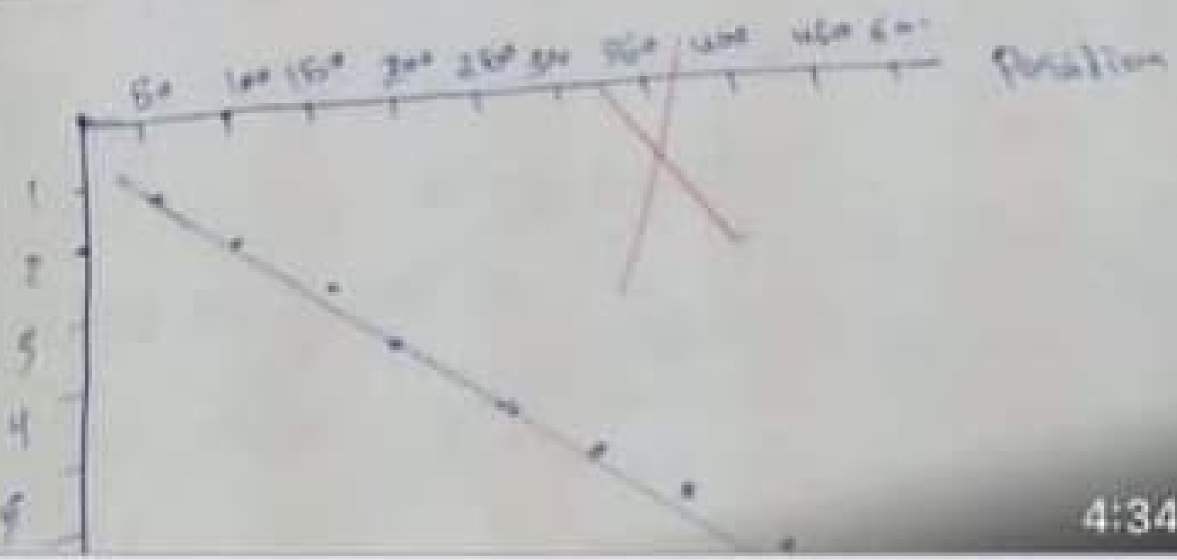
udent name: [illegible] Student number: [illegible] section [illegible]

uestion 1: (8 points)

. surface was tested for straightness using an autocollimator and reflector; the readings are hown in the following table, if one second of arc increase in angle observed corresponds to a ise of 0.25 micron of the front end of the reflector relative to its rear end.

1. Construct a profile graph of the surface relative to the initial points (0-50 mm). (5 points)
2. Using the end points method to calculate the max deviation of the profile from the straight line. (3 points)

position	Autocollimator reading	Difference from first reading	Rise or fall over 50 mm	Cumulative rise or fall	Adjustment required	error
mm	Sec	Sec	micrometer	micrometer		
0		0	0			
0 -50	40	40	20			
50-100	36	-4	-2.0			
100-150	32	-4	-2.0			
150-200	20	-12	-6.0			
200-250	28	8	4.0			
250-300	48	20	1.0			
300-350	44	-4	-2.0			
350-400	36	-8	-4.0			
400-450	20	-16	-8.0			
450-500	16	-4	-2.0			



Q1

1) B
2) D
3) A
4) A
5) A
6) C
7) C
8) B
9) A
10) A
11) A
12) B
13) A
14) B

9) True
10) A

In order to calculate the error of straightness using Autocollimator

- a. we can use the least square method
- b. we can use the end points method
- c. both a and b are correct
- d. none of the above is correct

C

Next page

ous activity

Jump to...

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search

Question 3: (4 points)

Using the following set of gauge blocks, list the minimum number of blocks to produce an overall dimension of 100.995 mm. (show your calculations)

Metric (103) pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01 to 1.49) mm	0.01
49 pieces (0.5 to 24.5) mm	0.5
4 pieces (25- 100) mm	25

100.995
1 .005
99.99
1.49
98.5
24.5
74.00
24.00
50.00
50.00
0 0

3/4

98.9
- 1.49
98.5
24.5
74.00

B. Why do we always choose the minimum number of blocks combinaton?

because accuracy Reading end standard measurment & calibration

6/6

Question 4: (6 points)

Describe the working principle of the clinometer

Colominilor its device using for angular measurment how colominilor its device using for each other put the colominar on face aligned for each other put the colominar on face check the reading of Bubble equal zero if not you have more knap and reverstal untill the Bubble gives zero reading colominator consist of two Scale main scale in degree vernier Scale The reading in second by reverse work pices after that add all resar to set the movement of all alligned measure angle

Q2

A) is a component of surface texture.

B) measurment of the more widely spaced component of surface texture

C)

9. In the RTD experiment , the relationship between the Resistance and temperature is linear
A. True
B. False

10. Thermi stors are
A. Less sensitive than RTDs
B. More sensitive than RTDs

11. With all co mmon types of RTD, the resistance increases as Temperature increases.
A. True
B. False

12. RTDs t ypically have much higher nominal resistance values than thermistors.
A. True
B. False

13. ---------- refers to the predominant direction of the surface texture.
A. Form
B. Lay
C. Profile
D. Center line

14. The inside micrometer is one of the indirect measuring instruments
A. True
B. False

Question 2:

Define the following Terminology from the Surface Texture Experiment. 5 Points

A. Roughness

B. Waviness

C. Lay

D. Profile

E. Center line

F. Form

Question 2:

Describe the working principle of the Clinometer **[illegible] points**

Clinometer [illegible] device using for angular measurement & used to [illegible] surface, when i put the clinometer on the [illegible] surface the reading of bubbles equal zero if not you have to [illegible] and [illegible] until the bubbles [illegible] reading clinometer consist of two scale main scale in degree, vernier scale in minutes you [illegible] get the reading in second [illegible] after that [illegible] reading [illegible]

Question 3:

14 points

A surface was tested for straightness using an autocollimator and a reflector; the readings are shown in the following table. [illegible] 5.21 [illegible] of the front end of the reflector relative to its rear end.

A. Construct a profile graph of the surface relative to the [illegible] (0-500, [illegible] points)

B. Calculate the maximum deviation of the profile from the straight line using the least square method. (10 points)

Position	Autocollimator reading	Difference from first reading	Rise or fall over 50 mm	Cumulative rise or fall	[illegible]	[illegible]	Xm (x - x̄)	Ym (y - ȳ)	Xm·Ym	[illegible]
Mm	Sec	sec	micron	micron						
0	[illegible]	0	0	0	0		-250	-3.7	925	[illegible]
0-50	22	0	0	0	1	1	-200	-3.7	740	[illegible]
50-100	20	-2	-0.5	-0.5	2	1.5	-150	-4.2	630	[illegible]
100-150	18	-4	-1	-1.5	3	1.5	-100	-5.2	520	[illegible]
150-200	12	-10	-2.5	-4	4	0	-50	-7.7	385	-3.77
200-250	16	-6	-1.5	-5.5	5	-1.5	0	-9.2	0	-4.65
250-300	26	4	1	-4.5	6	1.5	50	-8.2	-410	[illegible]
300-350	24	2	0.5	-4	7	3	100	-7.7	-770	[illegible]
350-400	20	-2	-0.5	-4.5	8	3.5	150	-8.2	-1230	[illegible]
400-450	12	-10	-2.5	-7	9	-3	200	-10.7	[illegible]	[illegible]
450-500	19	-3	-0.75	-7.75	10	0	250	-11.5	[illegible]	

250

ȳ = -3.7

$m = \frac{\sum Y_m X_m}{X_m^2} = \frac{-4575}{275000} = -0.017$

$y = -0.017x + 0.48$

$c = \bar{y} - m\bar{x}$

$c = -3.7 - (-0.017 \times 250)$

$c = 0.48$

Straightness error = +1.88 - (-5.5) = 7.47 micron

-4.18
-4.27
-3.37
-4.38
-5.43
-3.58
-2.37
[illegible]
[illegible]

...stion 1: 6 points

In the strain gauge experiment a load of 3 N were applied at a distance of 250 mm from the strain gauge, the dimensions of the steel cantilever beam ($b = 19.75mm$), and ($h = 4.75\ mm$) where b is the width of the cantilever beam and h is the thickness
(*the cross section area* $= b.h$)
The sensitivity of the strain gauge : $k = 2.05$
The modulus of elasticity for steel : $E = 210000\ N/mm^2$
The reading of the measuring instrument $U_A/U_E = -0.104\ mV/V$.

Calculate the strain(ε), the experimental value of the stress (σ), and the theoretical value of the stress (σ).

$A = b.h$

$= 19.75 \times 4.75$

$= 93.8125$

$\varepsilon = \frac{2.05}{4} * (-0.104 - 1)$

$= -2.2632$

$\sigma = E\ \varepsilon$

$= 210000 * -2.2632$

$= -475272$

2/6

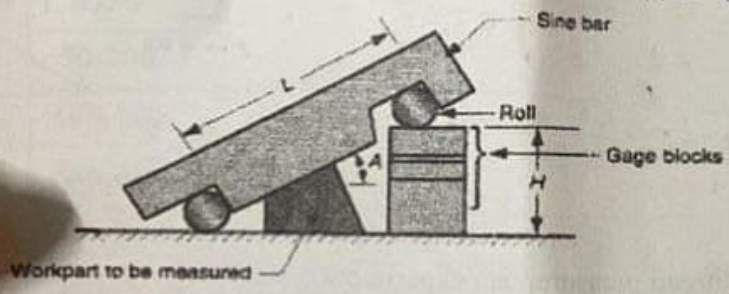
Question 5:

8 Points

A. Describe the working principle of the clinometer.

the clinometer is special case of the application of sipirt level in this instance level is mounted in relatable body carried in housing are face of which forms the base of an instrument

B. A sine bar was used to measure the angle (A) of a certain specimen as shown in the following figure , the center-to-center distance between the cylinders on the sine bar (L) is equal to 100 mm. and the height of the block gauges (H) was equal to 49.535mm. Calculate the angle A.



$L = 100\ mm$

$H = 49.535$

$\sin\theta = \frac{H}{L}$

$= \frac{49.535}{100}$

$= \sin^{-1}(0.49535)$

$A = 29.6928$

Question 6:

7 Points

A. Write three reasons why the thermocouple has been popular choice over the years.

1. cost
2. ~~It's very accurate~~ availability
3. It's very accurate

B. Compare between the RTD and the thermistor, include the following in your answer: (resistance response to temperature change, and sensitivity)

	RTD	thermistor
resistance response	~~high~~ low	high
temep	~~high~~ leanir	leanir
sensitivity	~~high~~ stable	high

lainar

Question 3: 8 Points

A bench micrometer was used to measure the dimensions for an external thread, the readings are given as:

The reading over the thread =	9.6320 mm
The reading over the cylinder =	9.7216 mm
The reading over the thread (with wires) =	10.0766 mm
The reading over the cylinder (with wires) =	13.2838mm
The reading over the thread (with prisms) =	11.9356 mm
The reading over the cylinder (with prisms) =	15.5464 mm

And you know that the diameter of the standard cylinder is equal to 30.0000 mm, the flank angle of the thread $(\theta) = 30^{0}$, the diameter of the wire $(d) = 2.0207$ mm , and the pitch size of the thread $(p) = 3.5$ mm

The effective diameter equation is

$$D_{eff} = T + \frac{p}{2}\cot\theta - (\operatorname{cosec}\theta - 1) * d$$

where T is the dimension under the wire

Calculate the major diameter, the minor diameter, and the effective diameter of the thread. (Show your calculations)

In the strain gauge experiment a load of 2 N were applied at a distance of 250 mm from the strain gauge, the dimensions of the steel cantilever beam ($b = 19.75mm$), and ($h = 4.75\ mm$) where b is the width of the cantilever beam and h is the thickness

(*the cross section area* $= b.h$)

The sensitivity of the strain gauge : $k = 2.05$

The modulus of elasticity for steel : $E = 210000\ N/mm^2$

The reading of the measuring instrument $U_A/U_E = -0.069\ mV/V$.

Calculate the strain

- a. $7068.293\ N/mm^2$
- b. $7.068293\ N/mm^2$
- c. 0.033659
- d. $3.3659 * 10^{-5}$

C

Q1)

1) B
2) D
3) A
4) A
5) A
6) C
7) C
8) B
9) A
10) A
11) A
12) B
13) A
14) B

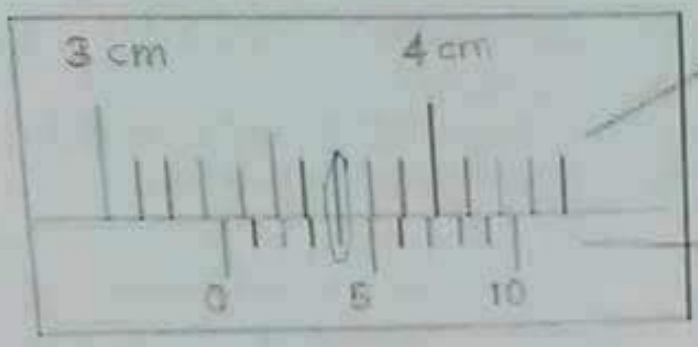
9) True
10) A

4/12

Question 2: (12 points)

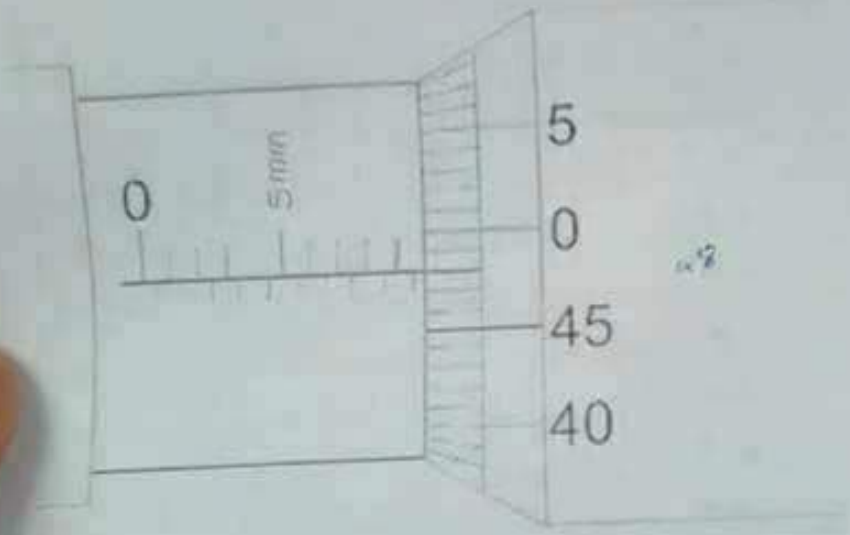
Fill in the space:

A. The reading of the following vernier caliper is 3.34 cm, and the accuracy is 0.05 mm



3.3
0.04
3.34

B. The reading of the following micrometer is 9.28 mm and the accuracy is 0.1 mm



C. The reading of the following vernier bevel protractor is 49° 20', and the accuracy is 0.05

Question 3: 5 Points

Using the root mean squared (RMS) method of surface roughness calculate the value of the surface roughness for the following ordinates obtained from testing a work piece of a length equal to 0.5 mm, where **h** are the ordinates of surfaces from mean line, and the vertical magnification factor is equal to 200000 times.

ordinates	h(mm)
1	0.45
2	- 0.55
3	0.65
4	0.20
5	-0.35
6	0.12
7	0.06
8	-0.12
9	-0.17
10	0.12

$cla = \frac{h_{max} - h_{mb}}{Magnification}$

$= \frac{0.65 - (-0.55)}{200000} = 6 \times 10^{-6}$

$\frac{(1.54) - (1.25)}{5 \times 200000} = 2.9 \times 10^{-7}$

$\sqrt{\frac{\Sigma h^2}{n}} \times \frac{1}{m} = \sqrt{\frac{1.1657}{10}} \times \frac{1}{200000} = 1.707 \times 10^{-}$

$\frac{0.65 + (-0.55)}{L} = \frac{0.65 - 0.55}{0.5} = 0.2$

4/5

Question 4: 6 Points

Define the following terminology from the (thread measurement experiment)

1. major diameter $d_{major} = D(R_{th} - R_c)$

   The outside main diameter

2. minor diameter $d_{minor} = D(R_{th} - R_c)$

   the inside diameter

3. crest

   the tooth of

6/6

Time left 0:37:52

the bottom of the groove between the two flanking surfaces of the thread, whether external or internal, is called ----------

- a. the root of the thread
- b. the crest of the thread
- c. the flank of the thread
- d. the angle of the thread

Clear my choice

Thermistors exhibit a fast response rate, they are limited for use up to the 300 °C temperature range. This, along with their high nominal resistance, helps to provide precise measurements in lower-temperature applications.

Select one:

- True
- False

Next page

Finish attempt ...

8

d

out of

question

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is divided into 10 divisions, then the accuracy of the device is

Select one:

- a. 0.01 mm
- b. 0.1 mm
- c. 0.05 mm
- d. 1 mm

Clear my choice

In an external thread, the distance between two consecutive crests parallel to the axis of the thread is called ----------

- a. the pitch size
- b. the lead of the thread
- c. the height of the thread
- d. the major diameter of the thread

A

if the smallest division of the sleeve of the micrometer is equal to 0.5 mm and the number of divisions on the thimble scale is equal to 50 divisions, and the number of divisions on the veriner scale is 10 divisions then the accuracy of the device is equal to ----------

- a. 0.01 mm
- b. 0.02 mm
- c. 0.001 mm
- d. 0.002 mm

C?

Next page

b. the vernier caliper

c. the three wires

d. the pitch gauge

Clear my choice

In the strain gauge experiment , we found that the experimental value of the stress and the theoretical one are equal.

Select one:

True

False

Next page

tivity

Jump to...

Clear my choice

stion 21
yet
wered
rked out of
0
Flag question

The accuracy of the vernier bevel protractor is

Select one:

- a. 1 min
- b. 2.5 min
- c. 5 min
- d. 1 degree

Clear my choice

Question 2: (14 points)

A. Describe with a simple sketch the working principle of the autocollimator. (6 points)

B. Describe the working principle of the clinometers (4 points)

C. Does the external micrometer obeys to the Abbe's Principle? Explain (4 points)

Question 3: (4 points)

A. Using the following set of gauge blocks, list the minimum number of blocks to produce an overall dimension of 76.575 mm. (show your calculations)

Metric (103) pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01 to 1.49) mm	0.01
49 pieces (0.5 to 24.5) mm	0.5
4 pieces (25- 100) mm	25

B. Write two applications of block gauges.

1)

2)

Final exam
Measurement lab (0906442)

Eng. Lamees Al-Dorghom
may, 8,2018

Student name: _____ Student no: _____ Section: _____

Question 1)

Select the best answer for each of the following paragraph: (5 Points)

1. What device is similar to an RTD but has a negative temperature coefficient?
A. Strain gauge
B. Thermistor
C. Negative-type RTD
D. Thermocouple

2. Temperature sensing can be achieved by the use of
A. Thermocouples
B. RTDs
C. Thermistors
D. All of the above

3. The output voltage of a typical thermocouple is
A. less than 100 mV
B. greater than 1 V
C. Thermocouples vary resistance, not voltage
D. None of the above

4. The connections to a thermocouple:
A. can produce an unwanted thermocouple effect, which must be compensated for
B. produce an extra desirable thermocouple effect
C. must be protected, since high voltages are present
D. both B and C are correct

5. The purpose of compensation for a thermocouple is:
A. to cancel unwanted voltage output of a thermocouple
B. to decrease temperature sensitivity
C. to increase voltage output
D. used for high-temperature circuits

6. The strain gauge resistance varies with:
A. Vibration
B. Heat
C. Weight
D. Bending

7. RTD stands for
A. Relative Thermal Devices
B. Radioactive Thermonuclear Dipoles
C. Resistance Temperature Detectors
D. Resistive Temperature Devices

8. The decrease of resistance with the temperature increase is a property of:
A. Thermocouple
B. bimetallic thermometer
C. Thermistor
D. RTD

Final exam

Measurement lab (0906442)

Eng. Lamees Al-Durgham

may, 8,2018

Student name: ______________________ Student no.:______________________ Section: ________

Question 1: (8 Points)

Select the best answer for each of the following paragraph

1. What device is similar to an RTD but has a negative temperature coefficient?
A. Strain gauge
B. Thermistor
C. Negative-type RTD
D. Thermocouple

2. Temperature sensing can be achieved by the use of
A. Thermocouples
B. RTDs
C. Thermistors
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A. to cancel unwanted voltage output of a thermocouple
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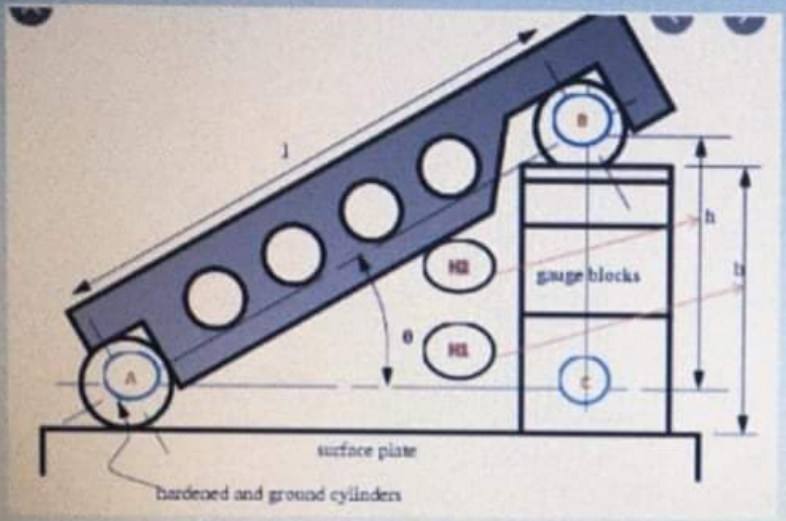
A. Relative Thermal Devices
B. Radioactive Thermonuclear Dipoles
C. Resistance Temperature Detectors
D. Resistive Temperature Devices

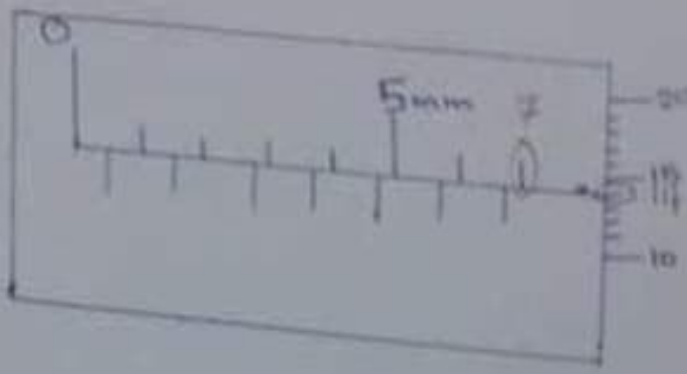
8. The decrease of resistance with the temperature increase is a property of
A. Thermocouple
B. bimetallic thermometer
C. Thermistor
D. RTD

If the length of the sine bar (L = 100 mm), and the height of the gauge blocks (h=50 mm), then the angle theta is equal to ----------



30

- a. 30 degree
- b. 45 degree
- c. 60 degree
- d. none of the above is correct



$\Longrightarrow$ 7.14 mm

What size is the gauge block build-up used with a 10 inches sine bar to set the work piece at an angle of $4^\circ 30'$? show your calculations

$\sin\theta = \frac{h}{L} \Rightarrow \boxed{h = \sin\theta * L}$

Describe the working principle of the Auto collimator?

The Auto Collimator is an optical device used to measure small angles with very high sensitivity. The Auto collimator projects a beam of collimated light. An external reflector reflects all or part of the beam back into the instrument where the beam is focused and detected by a photodetector

3

the Auto Collimator measures the deviation between the

uestion 2

8 po...

surface was tested for straightness using an autocollimator and reflector; the readings are hown in the following table, if one second of arc increase in angle observed corresponds to a ise of 0.25 micron of the front end of the reflector relative to its rear end.

1. Construct a profile graph of the surface relative to the initial points (0-50 mm). (5 points)
2. Using the end points method to calculate the max deviation of the profile from the straight line. (3 points)

Position	Autocollimator reading	Difference from first reading	Rise or fall over 100 mm	Cumulative rise or fall	Adjustment required	error
mm	Sec	sec	micrometer	micrometer		
0		0	0	0	0	
0 -50	8	0	0	0	1	
50-100	10	2	0.5	0.5	2	
100-150	18	10	2.5	3	3	
150-200	22	14	3.5	6.5	4	
200-250	24	16	4	10.5	5	
250-300	14	6	1.5	12	6	
300-350	10	2	0.5	12.5	7	
350-400	16	[illegible]	2	14.5	8	
400-450	18	10	2.5	17	9	
450-500	20	12	3	20	10	

$m = \frac{y_2 - y_1}{x} = 12.7$

$\bar{y} = 1.81818$

$C = \bar{y} - m\bar{x}$

$= 1.8181 - 250 \times 12.7$

$= -3173.1817$

The reading of the vernier bevel protractor is

- a. 28 degrees and 34 minutes
- b. 28 degrees and 15 minutes
- c. 34 degrees and 15 minutes
- d. 15 degrees and 34 minutes

B

Question 4)

In the strain gauge experiment a load of 2 N were applied at a distance of 250 mm from the strain gauge , the dimensions of the steel cantilever beam (b = 19.75mm), and (h = 4.75 mm) where b is the width of the cantilever beam and h is the thickness

(*the cross section area* = $b.h$)

The sensitivity of the strain gauge : k = 2.05

The modulus of elasticity for steel : $E = 210000\ N/mm^2$

The reading of the measuring instrument $U_A/U_B = -0.069\ mV/V$.

A. Calculate the strain(ε), the experimental value of the stress (σ), and the theoretical value of the stress (σ).

B. Comment on the results of the stress you calculated in A.

The block gauges can be used to check the accuracy of the micrometer

Select one:

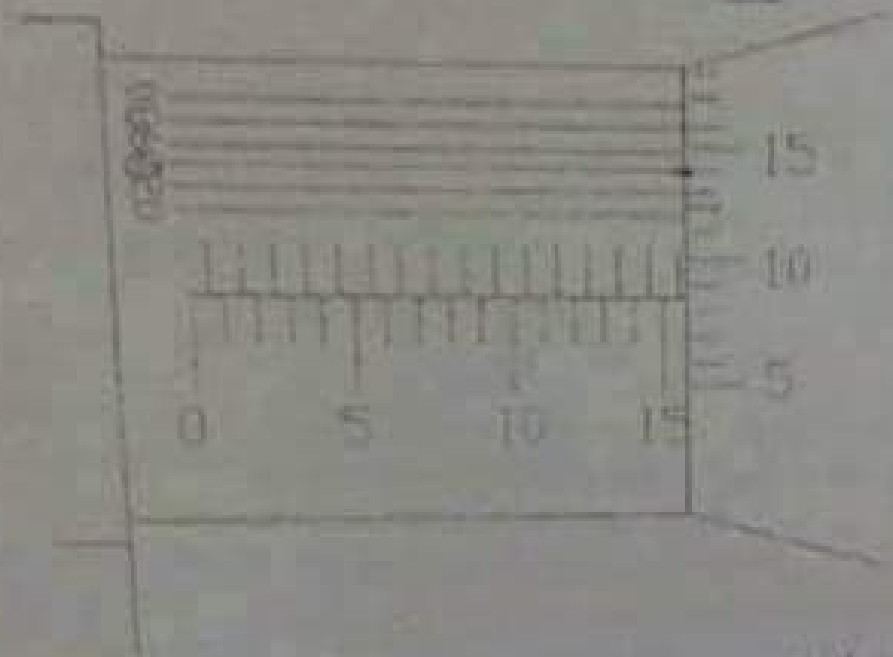
True

- a. True
- b. False

16 Points

A student used a vernier micrometer to measure a certain dimension. The diagram shows an enlargement of the micrometer scales. What reading was recorded?

Note: the dimensions on the sleeve are in mm.

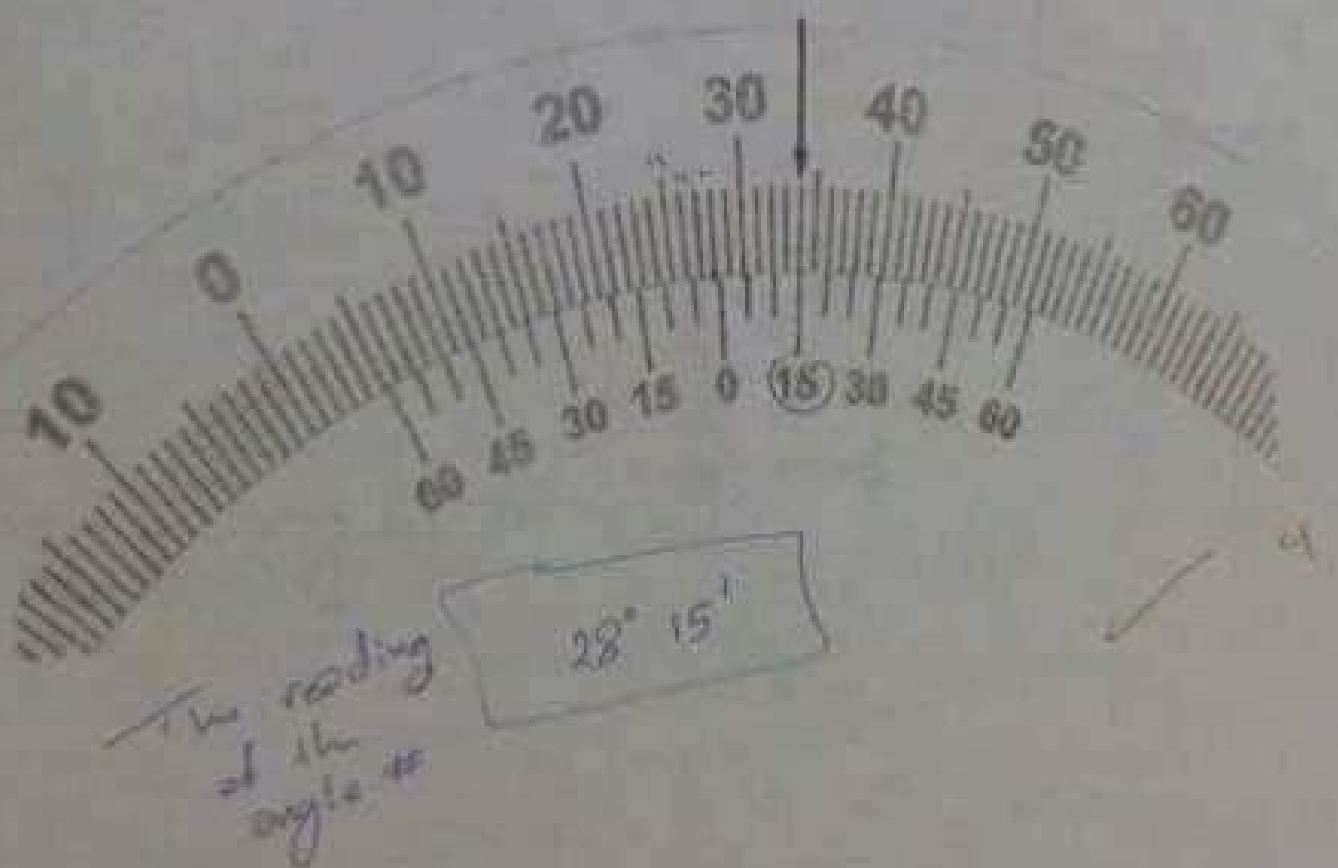


16.34 mm = 163.4 mm

2

15.50 +
0.80
0.04
16.34

B. A student used a vernier bevel protractor to measure a certain angle. The diagram below shows the reading of the angle. What reading was recorded?



28° 15'

The reading of the angle is

4

We can use ---------- to measure wires, spheres, shafts, and blocks.

Select one:

- a. External micrometer
- b. Internal micrometer
- c. Depth micrometer
- d. Gauge blocks
- e. None of the above is correct

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is di
divisions, then the accuracy of the device is

c. Clinometer

d. Mechanical comparator

Clear my choice

Question 11

Not yet answered

Marked out of 2.00

Flag question

RTDs are more sensitive than thermistors

Select one:

a. True

b. False

Clear my choice

Question 12

Not yet answered

Marked out of 2.00

Flag question

The prominent part of a thread, whether internal or external is called ----------

Select one:

a. The major diameter

b. The crest of the thread

c. The root of the thread

Type here to search

O c. Line standard measuring devices

O d. None of the above

RTD stands for

Select one:

O a. Relative Thermal Devices

O b. Radioactive Thermonuclear Dipoles

◉ c. Resistance Temperature Detectors

O d. Resistive Temperature Devices

Clear my choice

The external micrometer is one of the indirect meas

Select one:

O a. True

O b. False

c. Thermistors have either a NTC or a PTC , but

Clear my choice

The firm joint calipers are examples of

Select one:

a. Direct measuring devices

b. Indirect measuring devices

c. Line standard measuring devices

d. None of the above

The bottom of the groove between the two flanking surf

Select one:

a. The major diameter

b. The crest of the thread

c. The root of the thread

d. The minor diameter

The bottom of the groove between the two flanking surfaces of the thread whether internal or external

Select one:

- a. The major diameter
- b. The crest of the thread
- c. The root of the thread
- d. The minor diameter

Clear my choice

d. Both A and B are correct

Clear my choice

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344, the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to ----------

Select one:

- a. 19.8002 mm
- b. 20.1998 mm
- c. 22.0686 mm
- d. None of the above is correct

Clear my choice

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is divided into 10 divisions, then the accuracy of the device is

Select one:

Q2

A) is a component of surface texture.

B) measurment of the more widely spaced component of surface texture

C)

Question 1

Not yet answered

Marked out of 2.00

Flag question

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is divided into 10 divisions, then the accuracy of the device is

Select one:

- a. 0.01 mm
- b. 0.1 mm
- c. 0.05 mm
- d. 1 mm

Clear my choice

Question 2

Not yet answered

Marked out of 2.00

Flag question

The accuracy of the vernier bevel protractor is

Select one:

- a. 1 min
- b. 2.5 min
- c. 5 min
- d. 1 degree

Quiz navigation

Finish attempt ...

Time left **0:32:45**

1.005 | 25.000 | 10.500 | 1.170

C. Using the following set of gauge blocks, what is the minimum number of blocks to be wrung together to produce an overall dimension of 37.675 mm
Show your calculations.

Metric 103 pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01-1.49) mm	0.01 mm
49 pieces (0.5- 24.5) mm	0.5 mm
4 pieces (25-100) mm	25 mm

D. Compare between line standards and end standards; give an example on each type

line standard: → the measurement may be subdivided ex 1.5, 2.1, 3.8 ...

end standards → the point that used to measure found at the end face not subdivided

ex 1, 2, 3, 4 → ex ... vernier

14 points

Question 2:

A surface was tested for straightness using an autocollimator and a reflector; the readings are shown in the following table, if one second of arc increase in angle observed corresponds to a rise of 0.25 micron of the front end of the reflector relative to its rear end.

A. Construct a profile graph of the surface relative to the initial points (0- 50) (4 points)

... the maximum deviation of the profile from the straight line using the end points

d. Mechanical comparator

Clear my choice

The prominent part of a thread, whether internal or external is called ----------

Select one:

a. The major diameter

b. The crest of the thread

c. The root of the thread

d. The minor diameter

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is

re to search

Question 1 :-

A. $\sin\theta = \frac{h}{L} \rightarrow h = \sin(4.5°) \cdot 5$

$h = .392"$

$L = 5$ inches

$\theta = 4° 30' = 4.5°$

B. 1.654 cm → 1.64 cm

C. 7.14 mm

D.
$$\begin{array}{r} 47.765 \\ -\ 1.005 \\ \hline 46.760 \\ -\ 1.26 \\ \hline 45.50 \\ -\ 20.5 \\ \hline 25.0 \\ -\ 25 \\ \hline \end{array}$$

using the following gauge blocks :-

1.005
1.26
20.5
25.0

} 4 gauges blocks

A. 15.584 mm

B. $28° 15'$

Which of the following is correct

Select one:

- a. All thermistors are classified as a PTC devices
- b. All thermistors are classified as a NTC devices
- c. Thermistors have either a NTC or a PTC , but the first is more common.

Clear my choice

Which of the following is considered as manufacturing configuration of the RTD

Question 2:-

A. 3.34 cm .01 cm → vernier caliper

B. 9.5
+ .48

9.98 mm

.01 mm → micrometer

C. 50° 20' 5' (5 minute)

Question 17

Not yet answered

Marked out of 2.00

Flag question

The pitch diameter of the thread is another name for the effective diameter

Select one:

- a. True
- b. False

Clear my choice

Question 18

Not yet answered

Marked out of 2.00

Flag question

The block gauges are examples of end standard

Select one:

- a. True
- b. False

Clear my choice

Question 19

We can use ---------- to measure wires, spheres, shafts and blocks

Q4

السؤال الرابع

$$\varepsilon = \frac{1}{2.05} * (-0.069 * 10^{-3})$$

$$\varepsilon = -3.36 \times 10^{-5}$$

Q4

$$\sigma = \varepsilon * E$$

$$= -3.36 \times 10^{-5} * 210000$$

$$\sigma = -7.056 \text{ Mpa}$$

20

Clear my choice

1

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344, the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to -------

Select one:

- a. 19.8002 mm
- b. 20.1998 mm
- c. 22.0686 mm
- d. None of the above is correct

Clear my choice

Finish attempt ...

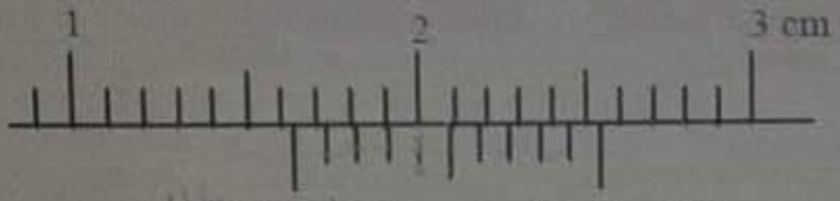
Question 1: **10 points**

A. What size is the gauge block build-up used with a 5 inches sine bar to set the workpiece at an angle of 4° 30'? show your calculations (3 points)

$\theta = 4.5^\circ$ Bar $L = 5$ inche $= 12.7$ cm

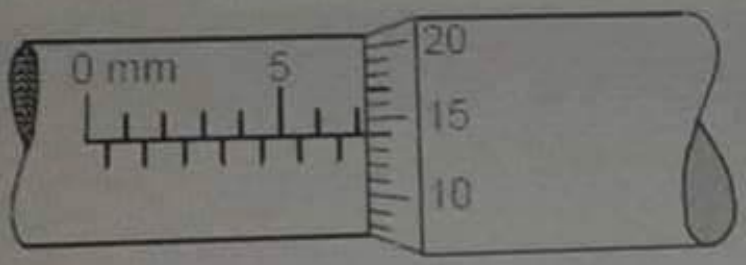
$\sin\theta = \frac{h}{L} = h = \sin 4.5^\circ * 12.7 = 0.9996$ cm $=$ ..393 inch

B. A student used a vernier caliper to measure the diameter of a cylinder. The diagram shows an enlargement of the caliper scales. What reading was recorded? (2 points)



11 mm + 0.1 × 4 = 11.4 mm

C. What is the reading of the following micrometer? (2 points)



7 mm + 0.14 mm =

7.14 mm

D. Using the following set of gauge blocks, what is the minimum number of blocks to be wrung together to produce an overall dimension of 47.765 mm

Show your calculations (3 points)

Metric 103 pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01-1.49) mm	0.01 mm
49 pieces (0.5- 24.5) mm	0.5 mm
4 pieces (25-100) mm	25 mm

25 we need 5 block gauge

47.765
① 1.005
46.760
② 1.26
45.50
③ 0.5
45.0
④ 25.00
20.00
⑤ 20.00
0.00

The bottom of the groove between the two flanking surfaces of the thread whether internal or external

Select one:

- a. The major diameter
- b. The crest of the thread
- c. The root of the thread
- d. The minor diameter

Clear my choice

Question 3

Not yet answered

Marked out of 2.00

Flag question

Which of the following is not an angular measuring device / instrument

Select one:

- a. Vernier bevel protractor
- b. Sine bar
- c. Clinometer
- d. Mechanical comparator

Clear my choice

4

The spring joint caliper is one of the direct measuring devices

Select one:

- a. True
- b. False

a. Heating

b. Cooling

c. Bending

d. Both A and B are correct

Clear my choice

The spring joint caliper is one of the direct measuring devices

Select one:

a. True

b. False

Clear my choice

A bench micrometer was used to measure the major diameter of an exter
the standard cylinder is 20.0000 mm, the micrometer reading over the sta
micrometer reading over the thread was 21.1342 mm, then the major diam

Select one:

c. Both A and B are correct

Clear my choice

Question 7

Not yet answered

Marked out of 2.00

Flag question

We can use ---------- to measure wires, spheres, shafts, and blocks.

Select one:

- a. External micrometer
- b. Internal micrometer
- c. Depth micrometer
- d. Gauge blocks
- e. None of the above is correct

Clear my choice

Question 8

Not yet answered

The block gauges are examples of end standard

Select one:

Type here to search

In order to measure the effective diameter of the external thread using a bench micrometer, it is required to measure the major diameter and the minor diameter of the thread.

Select one:

- a. True
- b. False

We can use ..... to measure wires, spheres, shafts, and blocks.

Select one:

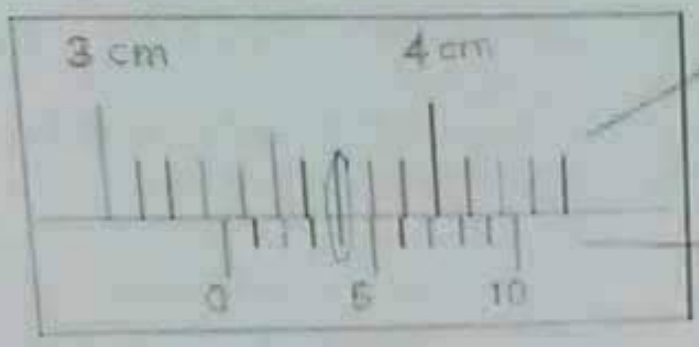
- a. External micrometer
- b. Internal micrometer
- c. Depth micrometer
- d. Gauge blocks
- e. None of the above is correct

search

Question 2: (12 points)

Fill in the space:

A. The reading of the following vernier caliper is 3.34 cm, and the accuracy is 0.05 mm

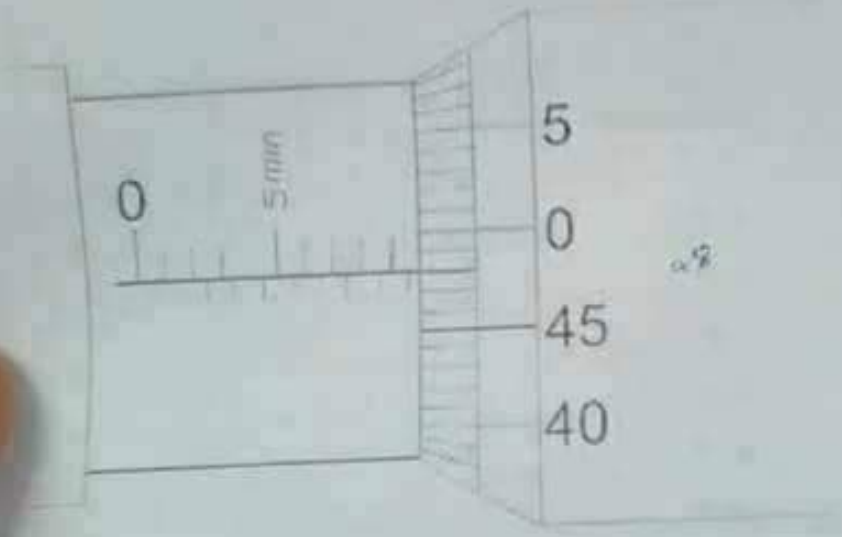


main scale

vernier scale

3.3
0.04
3.34

B. The reading of the following micrometer is 9.28 mm and the accuracy is 0.1 mm



C. The reading of the following vernier bevel protractor is 49° 20', and the accuracy is 0.05

Question 13

Not yet answered

Marked out of 2.00

Flag question

In order to measure the effective diameter of the external thread using a bench micrometer, it is required to measure the major diameter and the minor diameter of the thread.

Select one:

- a. True
- b. False

Clear my choice

Question 14

Not yet answered

Marked out of 4.00

Flag question

A bench micrometer was used to measure the minor diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm, the micrometer reading over the standard cylinder using a prism was 30.3218 mm, the micrometer reading over the thread using a prism was 25.7424 mm, then the minor diameter of the thread is equal to ----------

Select one:

- a. 15.4206 mm
- b. 24.5794 mm
- c. 36.0642 mm
- d. None of the above is correct

Clear my choice

Q3 (السؤال الثالث)

$D_{Major} = D + (R_{th} - R_c)$

$= 30 + (9.6320 - 9.7216)$

$D_{Major} = 29.9104$ mm

$D_{minor} = 30 + (11.9356 - 15.5464)$

$D_{minor} = 26.3892$ mm

$T = 30 + (10.0766 - 13.2838)$

$T = 26.7928$ mm

$D_{eff} = 26.7928 + \frac{3.5}{2} * \frac{1}{\tan(30)} - \left(\frac{1}{\sin(30)} - 1\right) *$

20207

$D_{eff} = 27.805$ mm

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is divided into 10 divisions, then the accuracy of the device is

Select one:

- a. 0.01 mm
- b. 0.1 mm
- c. 0.05 mm
- d. 1 mm

Clear my choice

15

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344, the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to -------

Select one:

Question 2: (14 points)

A. Describe with a simple sketch the working principle of the autocollimator. (6 points)

B. Describe the working principle of the clinometers (4 points)

C. Does the external micrometer obeys to the Abbe's Principle? Explain (4 points)

Question 3: (4 points)

A. Using the following set of gauge blocks, list the minimum number of blocks to produce an overall dimension of 76.575 mm. (show your calculations)

Metric (103) pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01 to 1.49) mm	0.01
49 pieces (0.5 to 24.5) mm	0.5
4 pieces (25- 100) mm	25

B. Write two applications of block gauges

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eExam

Clear my choice

Question 11

not yet answered

Marked out of 1.00

Flag question

RTDs are more sensitive than thermistors

Select one:

a. True

b. False

Clear my choice

Question 12

Not yet answered

Marked out of 1.00

Flag question

The spring joint caliper is one of the direct measuring devices

Select one:

a. True

b. False

Question 13

Question 2:

Describe the working principle of the Clinometer **6 points** 6

Clinometer, It's device using for angular measurement & show to face aligned from each other, put the clinometer on one face check the reading of Bubbles equel zero if not you have to move knope and rotate until the bubbles give zero reading. Clinometer consist of two scale main scale in degree, vernier scale in minutes [illegible] by reverse work piece get the reading in second after that add all reading to get the measure of aligned measure of angle

Question 3: **14 points**

A surface was tested for straightness using an autocollimator and a reflector. the readings are shown in the following table. if one second of arc increase in angle observed corresponds to a rise of 0.25 micron of the front end of the reflector relative to its rear end

A. Construct a profile graph of the surface relative to the initial points (0- 50). (4 points)

B. Calculate the maximum deviation of the profile from the straight line using the least square method. (10 points)

	Position	Autocollimator reading	Difference from first reading	Rise or fall over 50 mm	Cumulative rise or fall	x	[illegible]	Xm ($x-\bar{x}$)	Ym ($y-\bar{y}$)	Xm Ym	y/s
	Mm	Sec	sec	micron	micron			-250	-3.7	925	-0.37
	0	2	0	0	0	0		-200	-3.7	740	-1.22
1	0-50	22	0	0	0	1	1	-150	-4.2	630	-3.07
2	50-100	20	-2	-0.5	-0.5	2	1.5	-100	-5.2	520	-2.92
3	100-150	18	-4	-1	-1.5	3	1.5	-50	-7.7	385	-3.77
4	150-200	12	-10	-2.5	-4	4	-0.5	0	-9.2	0	-4.62
5	200-250	16	-6	-1.5	-5.5	5	1.5	50	-8.2	-410	-5.47
6	250-300	26	4	1	-4.5	6	-3	100	-7.7	-770	-6.32
7	300-350	24	2	0.5	-4	7	3.5	150	-8.2	-1230	-7.17
8	350-400	20	-2	-0.5	-4.5	8	-2	200	-10.7	-2140	-8.2
9	400-450	12	-10	-2.5	-7	9	0	250	-13.7	-3425	
10	450-500	10	-12	-3	-10	10					

250

$\bar{y} = -3.77$

error → 4.18, -4.07, -2.98, -3.13, -4.78, -5.43, -3.58, -2.23, -1.88, -3.5

$$m = \frac{\sum Y_m X_m}{\sum X_m^2} = \frac{-4275}{275000} = -0.017$$

$$y = -0.017x + 0.48$$

$$c = \bar{y} - m\bar{x}$$

$$c = -3.77 - (-0.017 \times 250)$$

$$c = 0.48$$

Straightness = $-1.88 - -5.5 = 1.62$ μm

peak − value

Clear my choice

Question **14**

Not yet answered

Marked out of 4.00

Flag question

A bench micrometer was used to measure the minor diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder using a prism was 30.3218 mm, the micrometer reading over the thread using a prism was 25.7424 mm, then the minor diameter of the thread is equal to ----------

Select one:

- a. 15.4206 mm
- b. 24.5794 mm
- c. 36.0642 mm
- d. None of the above is correct

Clear my choice

9- the most common thermometers in real life Applications:
ALL "Thermocouples, RTDs, Thermistors"

10- which of the following are manufactured using sensing element: RTDs

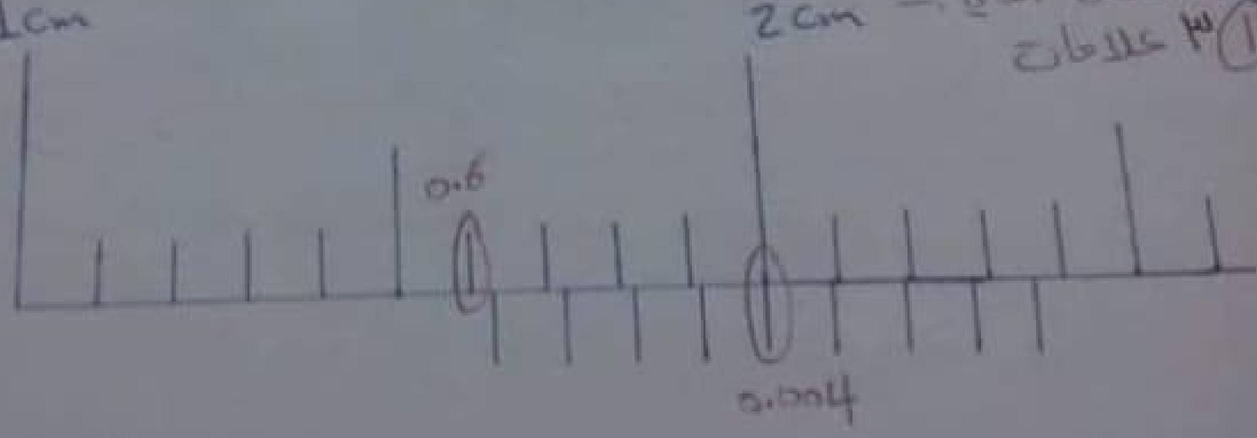
11- which of the following are more common: [illegible]
RTDs - Thermistor - Thermometer - Thermocouple

12- specification of Applications in thermometers: [illegible] السؤال

13- In thermocouple a small open-Circuit voltage are produce which the ~~the~~ voltage value equal: الله أعلم بالحل ، بالخيارات

14- !! أشي عن الـ Sensor للـ strain gauge !!

فرع السؤال الثاني :- (1) ٣ علامات



⇒ 1.64 Cm

2

Question **16**

Not yet answered

Marked out of 2.00

Flag question

The strain gauge resistance varies with:

Select one:

- a. Heating
- b. Cooling
- c. Bending
- d. Both A and B are correct

Question **17**

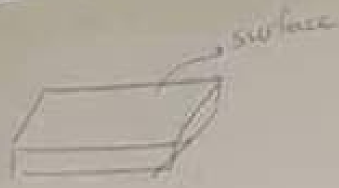
Not yet answered

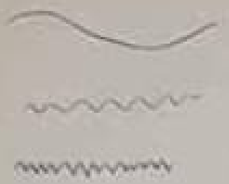
Marked out of

Both the vernier caliper and the inside micrometer can be used to measure

Select one:

- a. True





Error of the form.

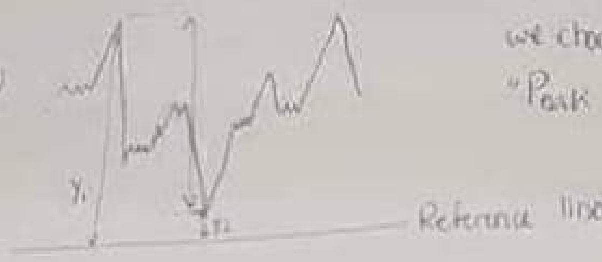
Secondary texture

primary texture

As $\frac{f}{?}$ increases, the roughness increases.

Note: it doesn't matter where we choose the reference line "Peak to valley"

① Peak to valley



$$R_a = \frac{y_1 - y_2}{VMF}$$

Drawback: we only considered two points to calculate roughness → inaccurate.

② 10 points height of irregularities:

5 peaks and 5 valleys

peaks ○ فردي

valleys ○ زوجي

$$R_{10\,points} = \frac{(Y_1 + Y_3 + Y_5 + Y_7 + Y_9) - (Y_2 + Y_4 + Y_6 + Y_8 + Y_{10})}{5 \times VMF}$$

③ h_{RMS} (Root Mean Square) value:

Area above CL = Area below it

$$\sqrt{\frac{\Sigma h^2}{n}} \times \frac{1}{VMF}$$

عدد النقاط

④ CLA method.

Question 2
Not yet answered
Marked out of 2.00
Flag question

The prominent part of a thread, whether internal or external is called ----------

Select one:

- a. The major diameter
- b. The crest of the thread
- c. The root of the thread
- d. The minor diameter

Clear my choice

Question 3
Not yet answered
Marked out of 2.00
Flag question

Which of the following is considered as manufacturing configuration of the RTD

Select one:

- a. Wire-wound RTD
- b. thin-film RTD
- c. Both A and B are correct

Clear my choice

Question 1

Not yet answered

Marked out of 2.00

Flag question

In order to measure the effective diameter of the external thread using a bench micrometer, it is required to measure the and the minor diameter of the thread.

Select one:

- a. True
- b. False

Clear my choice

Question 2

Not yet answered

Marked out of 2.00

Flag question

RTD stands for

Select one:

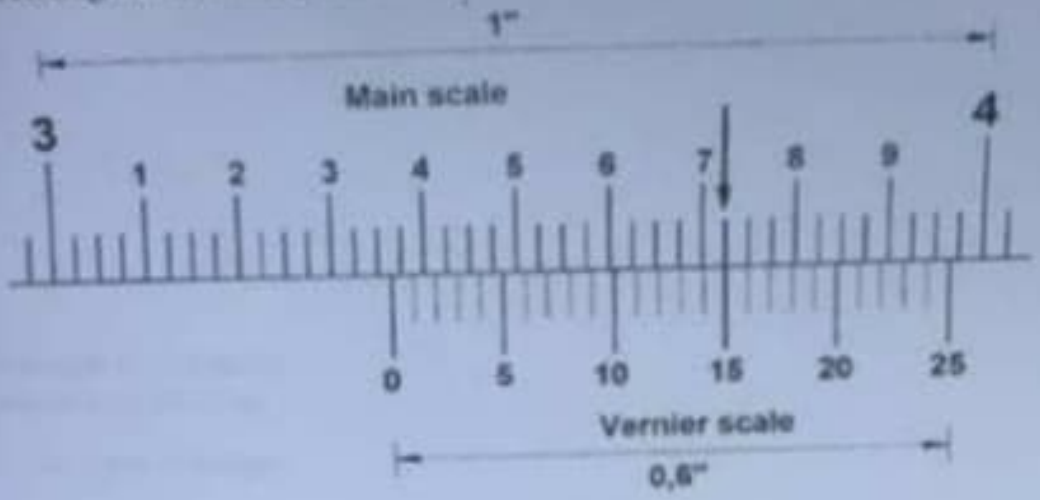
- a. Relative Thermal Devices
- b. Radioactive Thermonuclear Dipoles
- c. Resistance Temperature Detectors
- d. Resistive Temperature Devices

Clear my choice

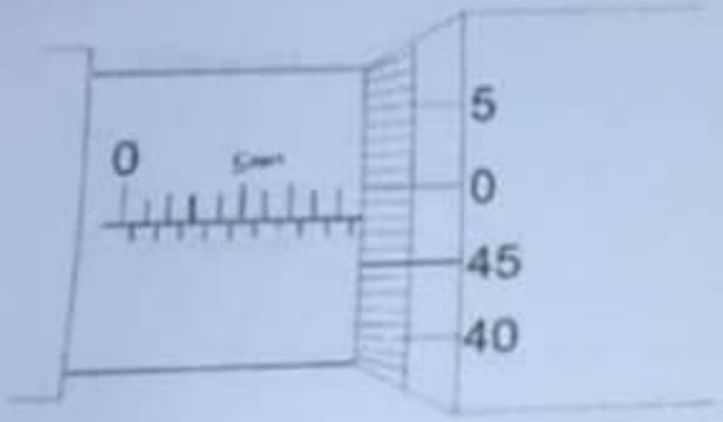
Question 2: (12 points)

Fill in the space:

A. The reading of the following vernier caliper is ----------, and the accuracy is ----------



B. The reading of the following micrometer is ----------, and the accuracy is ----------



C. The reading of the following vernier bevel protractor is ----------, and the accuracy is ----------

The block gauges can be used to check the accuracy of the micrometer

Select one:

- a. True
- b. False

Clear my choice

4

In order to measure the effective diameter of the external thread using a bench micrometer, it is required to measure the major diame and the minor diameter of the thread.

Select one:

- a. True
- b. False

Clear my choice

5

The strain gauge resistance varies with:

Select one:

uestion 4

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.00

Flag question

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344, the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to ----------

Select one:

- a. 19.8002 mm
- b. 20.1998 mm
- c. 22.0686 mm
- d. None of the above is correct

on 6

et

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ed out of

ag question

The prominent part of a thread, whether internal or external is called ----------

Select one:

- a. The major diameter
- b. The crest of the thread
- c. The root of the thread
- d. The minor diameter

Clear my choice

The pitch diameter of the thread is another name for the effective diameter

Select one:

- a. True
- b. False

Question 3: (4 points)

Using the following set of gauge blocks, list the minimum number of blocks to produce an overall dimension of 100.995 mm. (show your calculations)

Metric (103) pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01 to 1.49) mm	0.01
49 pieces (0.5 to 24.5) mm	0.5
4 pieces (25- 100) mm	25

100.995
1 .005
99.99
1.49
98.5
24.5
74.00
24.00
50.00
50.00
0 0

3/4

B. Why do we always choose the minimum number of blocks combinaton?

because accuracy Reading end standard meusurmento & calibration

6/6

Question 4: (6 points)

Describe the working principle of the clinometer

Colominitor ids device using for angular measurmento you face aligned for each other put the colominar on face check the reading of Bubble equal zero if not you have more knap and reverstal untill the Bubble gives zero reading colominator consist of two Scale main scale in degree vernier Scale The reading in second by reverse work pices after that add all resa to set the movement of all alligned measure angle

14 points

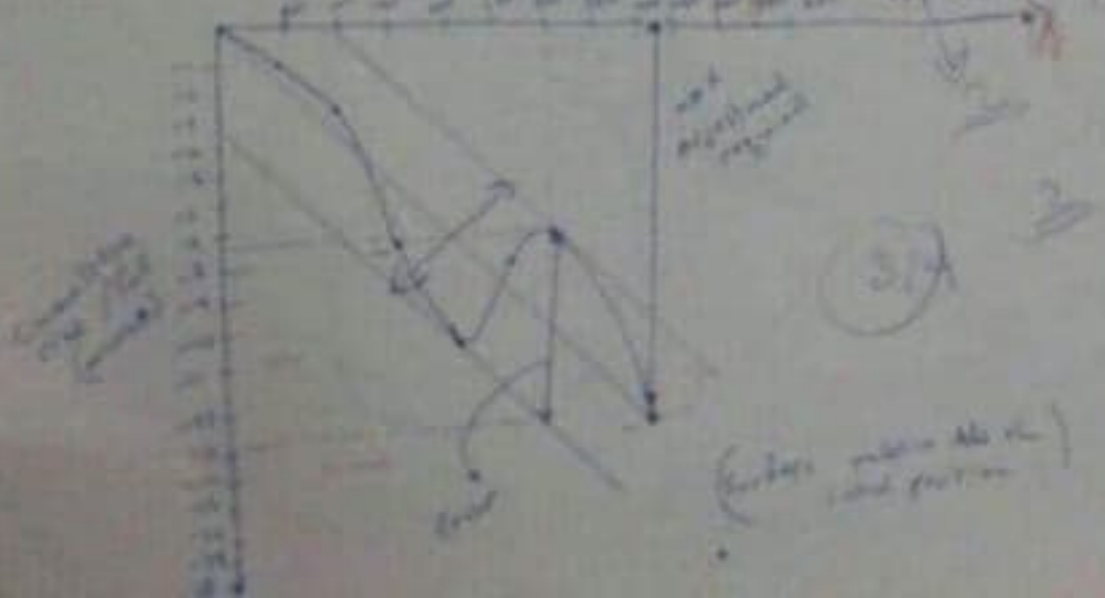
Question 2:

A surface was tested for straightness using an autocollimator and a reflector, the readings are shown in the following table, if one second of arc increase in angle observed corresponds to a rise of 0.2 microns of the front end of the reflector relative to its rear end.

A. Construct a profile graph of the surface relative to the initial points (6 marks) (4 points)

B. Calculate the maximum deviation of the profile from the straight line using the end points method. (10 points)

Position	Autocollimator reading	Difference from first reading	Rise or fall over 50 mm	Cumulative rise or fall	Adjustment required	Angle	x	y	x^2	xy	y^2
mm	Sec	sec	Microns	microns							
0		0									
0-50	40	0	0	0							
50-100	34	-6	-1	-1							
100-150	32	-8	-1.6	-2.6							
150-200	28	-12	-2.4	-5							
200-250	28	-12	-2.4	-7.4							
250-300	48	8	1.6	-5.8							
300-350	44	4	0.8	-5							
350-400	36	-4	-0.8	-5.8							
400-450	28	-12	-2.4	-8.2							
450-500	16	-24	-4.8	-13							



Question 1

Not yet answered

Marked out of 2.00

Flag question

The spring joint caliper is one of the direct measuring devices

Select one:

- a. True
- b. False

Clear my choice

Question 2

Not yet answered

Marked out of 4.00

Flag question

A bench micrometer was used to measure the minor diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm, the micrometer reading over the standard cylinder using a prism was 30.3218 mm, the micrometer reading over the thread using a prism was 25.7424 mm, then the minor diameter of the thread is equal to ----------

Select one:

- a. 15.4206 mm
- b. 24.5794 mm
- c. 36.0642 mm
- d. None of the above is correct

Clear my choice

Question 3

Not yet answered

Marked out of 2.00

The block gauges can be used to check the accuracy of the micrometer

Select one:

- a. True

21

In order to measure the effective diameter of the external thread using a bench micrometer, it is required to measure the major diameter and the minor diameter of the thread.

Select one:

- a. True
- b. False

Finish attempt ...

Jump to...

Question 10

Not yet answered

Marked out of 2.00

Flag question

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is divided into 10 divisions, then the accuracy of the device is

Select one:

- a. 0.01 mm
- b. 0.1 mm
- c. 0.05 mm
- d. 1 mm

Clear my choice

Question 11

Not yet answered

Marked out of 2.00

Flag question

The accuracy of the vernier bevel protractor is

Select one:

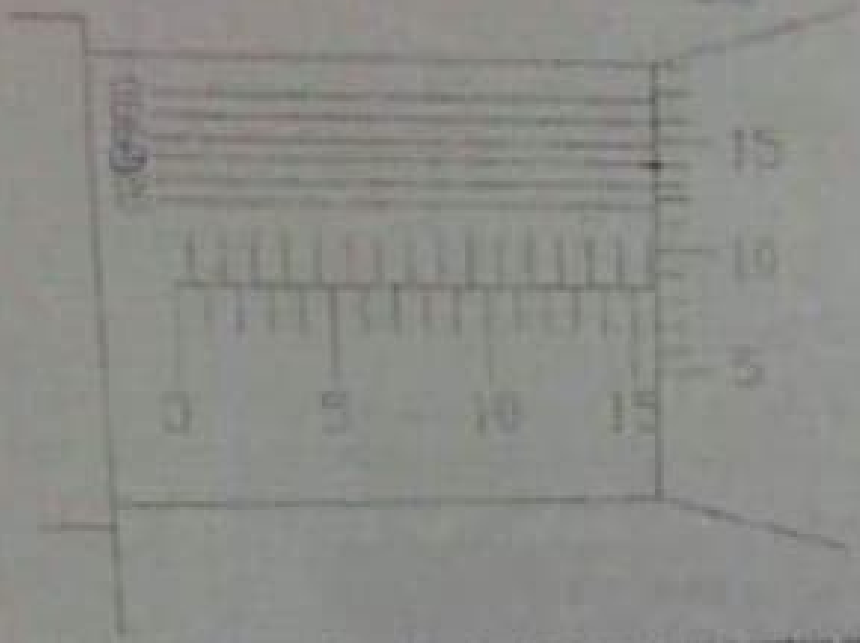
- a. 1 min
- b. 2.5 min
- c. 5 min
- d. 1 degree

Clear my choice

15 Points

A student used a vernier micrometer to measure a certain dimension. The diagram shows an enlargement of the micrometer scales. What reading was recorded?

Note: the dimensions on the sleeve are in mm.



16.34 mm ≠ 1634 mm

15.50 +
0.80
0.04
16.34

3. A student used a vernier bevel protractor to measure a certain angle. The diagram below shows the reading of the angle. What reading was recorded?

28° 15'

The reading of the angle is

METROLOGY & ENG.MEASURMENTS

Question 1

Not yet answered

Marked out of 2.00

Flag question

The prominent part of a thread, whether internal or external is called ----------

Select one:

- a. The major diameter
- b. The crest of the thread
- c. The root of the thread
- d. The minor diameter

Clear my choice

Question 2

Not yet answered

Marked out of 2.00

Which of the following is correct

Select one:

a. All thermistors are classif...

Clear my choice

Question 19

Not yet answered

Marked out of 2.00

Flag question

We can use ---------- to measure wires, spheres, shafts, and blocks.

Select one:

- a. External micrometer
- b. Internal micrometer
- c. Depth micrometer
- d. Gauge blocks
- e. None of the above is correct

Clear my choice

Question 20

Not yet answered

Marked out of 2.00

Flag question

Both the vernier caliper and the inside micrometer can be used to measure the depth of a specimen

Select one:

- a. True
- b. False

Clear my choice

Type here to search

Question 2: (14 points)

A. Describe with a simple sketch the working principle of the autocollimator. (4 points)

B) Describe the working principle of the clinometer (4 points)

C. Does the external micrometer obeys to the Abbe's Principle? Explain. (4 points)

Question 3: (4 points)

A. Using the following set of gauge blocks, list the minimum number of blocks to produce an overall dimension of 76.177 mm (show your calculations)

Metric (103) pieces	
	Increment
1 piece (1.005) mm	
49 pieces (1.01 to 1.49) mm	0.01
49 pieces (0.5 to 24.5) mm	0.5
4 pieces (25 -100) mm	25

B. Write two applications of block gauges.

i)

ii)

The accuracy of the vernier bevel protractor is

Select one:

- a. 1 min
- b. 2.5 min
- c. 5 min
- d. 1 degree

Which of the following is not an angular measuring device / instrument

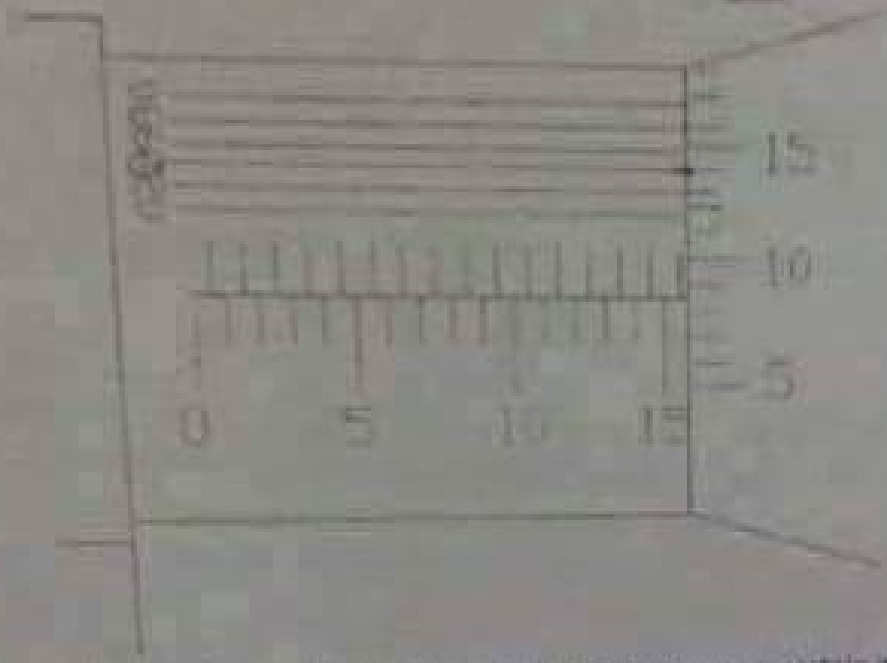
Select one:

- a. Vernier bevel protractor
- b. Sine bar
- c. Clinometer

16 Points

A student used a vernier micrometer to measure a certain dimension. The diagram shows an enlargement of the micrometer scales. What reading was recorded?

Note: the dimensions on the sleeve are in mm



16.34 mm = 1634 mm

15.50 +
0.80
0.04
16.34

B. A student used a vernier bevel protractor to measure a certain angle. The diagram below shows the reading of the angle. What reading was recorded?

28° 15'

The reading of the angle is

Marked out of 2.00

Flag question

Select one:

- a. All thermistors are classified as a PTC devices
- b. All thermistors are classified as a NTC devices
- c. Thermistors have either a NTC or a PTC , but the first is more common.

Question 21

Not yet answered

Marked out of 2.00

Flag question

The block gauges can be used to check the accuracy of the micrometer

Select one:

- a. True
- b. False

Clear my choice

Student name:----------**Student number:**---------- **section** ------

Question 1: (8 points)

A surface was tested for straightness using an autocollimator and reflector; the readings are shown in the following table, if one second of arc increase in angle observed corresponds to a rise of 0.5 micron of the front end of the reflector relative to its rear end.

1. Construct a profile graph of the surface relative to the initial points (0-100 mm). (5 points)
2. Using the end points method to calculate the max deviation of the profile from the straight line. (3 points)

position	Autocollimator reading	Difference from first reading	Rise or fall over 100 mm	Cumulative rise or fall	Adjustment required	error
mm	Sec	Sec	micrometer	Micrometer		
0						
0 -100	30					
100-200	38					
200-300	70					
300-400	86					
400-500	94					
500-600	54					
600-700	38					
700-800	62					
800-900	70					
900-1000	78					

Flag question

b. False

Clear my choice

Search | Copy | Send to My Flow

Question 13

Not yet answered

Marked out of 2.00

Flag question

Which of the following is considered as manufacturing configuration of the RTD

Select one:

a. Wire-wound RTD

b. thin-film RTD

c. Both A and B are correct

Question 14

Not yet answered

Which of the following is not an angular measuring device / instrument

Select one:

a. Heating

b. Cooling

c. Bending

d. Both A and B are correct

Clear my choice

The spring joint caliper is one of the direct measuring devices

Select one:

a. True

b. False

Clear my choice

A bench micrometer was used to measure the major diameter of an exter
the standard cylinder is 20.0000 mm, the micrometer reading over the sta
micrometer reading over the thread was 21.1342 mm, then the major diam

Select one:

Q4

السؤال الرابع

$$\varepsilon = \frac{1}{2.05} * (-0.069 * 10^{-3})$$

$$\varepsilon = -3.36 \times 10^{-5}$$

Question 6

Not yet answered

Marked out of 2.00

Flag question

Which of the following is not an angular measuring device / instrument

Select one:

- a. Vernier bevel protractor
- b. Sine bar
- c. Clinometer
- d. Mechanical comparator

Clear my choice

Question 7

Not yet answered

Marked out of 2.00

Flag question

The block gauges can be used to check the accuracy of the micrometer

Select one:

- a. True
- b. False

Clear my choice

Question 8

The spring joint caliper is one of the direct measuring devices

c. The root of the thread

d. The minor diameter

Clear my choice

10

Which of the following is considered as manufacturing confi

Select one:

a. Wire-wound RTD

b. thin-film RTD

c. Both A and B are correct

11

The firm joint calipers are examples of

ype here to search

area above

$= \frac{1}{2} * [1.2 * 4 + 1.4 * 3.5 + 2.2 * 7 + 1.8 * 6 + 1.4 * 4.5 + 1.1 * 4]$

$= 23.3\ cm^2$

Area below

$= \frac{1}{2} [1.8 * 5.5 + 0.9 * 2.5 + 1.1 * 4 + 0.7 * 2 + 1.7 * 5 + 0.7 * 2.1$

$= 14.1\ cm^2$

$$\frac{\text{area above} - \text{area below}}{\text{length}} = \frac{23.3 - 14.1}{16} = 0.577 cm$$

the new line should be at (0.577 cm) above the estimated one.

area above

$= \frac{1}{2} [0.9 * 3.4 + 1.2 * 2.9 + 1.7 * 6.4 + 1.6 * 5.4 + 1.2 * 3.9 + 0.7 * 1.9]$

$= 17.54\ cm^2$

area below =

$= \frac{1}{2} [2 * 6.1 + 1.1 * 8.1 + 1.4 * 4.6 + 0.9 * 2.6 + 1.9 * 5.6 + 1 * 2.1]$

$= 17.21\ cm^2$

$$h_{CLA} = \frac{\text{area above} + \text{area below}}{\text{length}}$$

$$= \frac{[17.54 + 17.21] * 100 * 1000}{8} * \frac{100\,000}{20}\ \mu m$$

$= 0.2178\ \mu m$

8

d

out of

question

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier scale is divided into 10 divisions, then the accuracy of the device is

Select one:

- a. 0.01 mm
- b. 0.1 mm
- c. 0.05 mm
- d. 1 mm

Clear my choice

Question 2:

Describe the working principle of the Clinometer **6 points**

6

Clinometer : It's device using for angular measurement . how to face [illegible] from each other , put the clinometer on one face check the reading of Bubbles equal zero if not you have to move knope and [illegible] until the Bubbles give zero reading clinometer consist of two scale main scale in degree , verneer scale in minute get the reading in second by reverse work piece get the reading in second after that add all reading to get the [illegible] of aligned measure of angle

Question 3: **14 points**

A surface was tested for straightness using an autocollimator and a reflector, the readings are shown in the following table, if one second of arc increase in angle observed corresponds to a rise of 0.25 micron of the front end of the reflector relative to its rear end

A. Construct a profile graph of the surface relative to the initial points (0-50). (4 points)

B. Calculate the maximum deviation of the profile from the straight line using the least square method. (10 points)

Position	Autocollimator reading	Difference from first reading	Rise of fall over 50 mm	Cumulative rise or fall	[illegible]	[illegible]	Xm (X−X̄)	ym (y−ȳ)	Xm.ym	y15
Mm	Sec	sec	micron	micron						
0	0	0	0	0	0		-250	-3.7	925	[illegible]
1 0-50	22	0	0	0	1	1	-200	-3.7	740	-1.22
2 50-100	20	-2	-0.5	-0.5	2	1.5	-150	-4.2	630	-2.07
3 100-150	18	-4	-1	-1.5	3	1.5	-100	-5.2	520	-2.92
4 150-200	12	-10	-2.5	-4	4	0	-50	-7.7	385	-3.77
5 200-250	16	-6	-1.5	-5.5	5	-0.5	0	-9.2	0	-4.62
6 250-300	26	4	1	-4.5	6	1.5	50	-8.2	-400	-5.17
7 300-350	24	2	0.5	-4	7	-3	100	-7.7	-770	-6.32
8 350-400	20	-2	-0.5	-4.5	8	3.5	150	-8.2	-1230	-7.17
9 400-450	12	-10	-2.5	-7	9	-2	200	-10.7	-2140	-8.2
10 450-500	10	-12	-3	-10	10	0	250	-13.7	-3425	

250

graphical method ȳ = -3.77

error → 4.18, -4.87, -2.98, -3.13, -4.78, -5.93, -3.58, -2.23, -1.88, -3.5

$m = \frac{\sum y_m x_m}{x_m^2} = \frac{-4475}{275000} = -0.017$

$y = -0.017x + 0.48$

$c = \bar{y} - m\bar{x}$

$c = -3.77 - (-0.017 \times 250)$

$c = 0.48$

Straight error = $-1.88 - -5.5 = 3.62$ mm

peak - value

The spring joint caliper is one of the direct measuring devices

Select one:

- a. True
- b. False

Question 1

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nswered

larked out of
.00

Flag question

The block gauges are examples of end standard

Select one:

- a. True
- b. False

Clear my choice

uestion 2

ot yet
nswered

if the smallest division of the main scale of the vernier caliper is 1 mm, and its vernier sca
divisions, then the accuracy of the device is

Question 3

Not yet answered

Marked out of 2.00

Flag question

The external micrometer is one of the indirect measuring instruments

Select one:

a. True

b. False

Question 4

Not yet answered

Marked out of 2.00

Flag question

We can use ---------- to measure wires, spheres, shafts, and blocks.

Select one:

a. External micrometer

Clear my choice

15

Which of the following is considered as manufacturing configuration of the RTD

Select one:

a. Wire-wound RTD

b. thin-film RTD

c. Both A and B are correct

Clear my choice

16

Question 1: (11 points)

A. The reading of the following vernier caliper is _____ and the accuracy is _____

B. The reading of the following micrometer is _____ and the accuracy is _____

C. The reading of the following vernier bevel protractor is _____ and the accuracy is _____

Clear my choice

5

ed

out of

question

Both the vernier caliper and the inside micrometer can be used to measure the depth of a specimen

Select one:

a. True

b. False

Clear my choice

6

ed

out of

question

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344, the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to -------

Select one:

The external micrometer is one of the indirect measuring instruments

Select one:

- a. True
- b. False

emitted beam and the reflected beam because the Auto collimator uses light to measure angles ~~in~~ it never comes into contact with the test surface.

السؤال الرابع :- ١٥ علامة

* study the profile in the figure then answer the following questions:

a. Find the center line

b. Calculate the surface roughness using:

1. Maximum peak to valley height method
2. ten points height method
3. Root mean square method

where the actual length of the specimen is equal to 10 mm and the vertical magnification is equal to 500 000.

نفس الرسمة إلي أخذناها باللاب

بتكون موجودة بالسؤال

We can use ---------- to measure wires, spheres, shafts, and blocks.

Select one:

- a. External micrometer
- b. Internal micrometer
- c. Depth micrometer
- d. Gauge blocks
- e. None of the above is correct

9. In the RTD experiment , the relationship between the Resistance and temperature is linear:
A. True
B. False

10. Thermi stors are
A. Less sensitive than RTDs
B. More sensitive than RTDs

11. With all co mmon types of RTD, the resistance increases as Temperature increases.
A. True
B. False

12. RTDs t ypically have much higher nominal resistance values than thermistors.
A. True
B. False

13. - _____ refers to the predominant direction of the surface texture.
A. Form
B. Lay
C. Profile
D. Center line

14. The inside micrometer is one of the indirect measuring instruments
A. True
B. False

Question 2:

Define the following Terminology from the Surface Texture Experiment. **9 Points**

A. Roughness

B. Waviness

C. Lay

D. Profile

E. Center line

F. Form

c. Resistance Temperature Detectors

d. Resistive Temperature Devices

Clear my choice

Question **10**

Not yet answered

Marked out of 2.00

Flag question

Which of the following is not an angular measuring device / instrument

Select one:

a. Vernier bevel protractor

b. Sine bar

c. Clinometer

d. Mechanical comparator

Clear my choice

Question **11**

Not yet answered

Marked out of

RTDs are more sensitive than thermistors

Select one:

a. True

Type here to search

Final exam
Measurement lab (0906442)

Eng. Lamees Al-Durgham
may, 8,2018

Student name: ---------- Student no: ---------- Section :---------

Question 1: 15 Points

Select the best answer for each of the following paragraph:

1. What device is similar to an RTD but has a negative temperature coefficient?
A. Strain gauge
B. Thermistor
C. Negative-type RTD
D. Thermocouple

2. Temperature sensing can be achieved by the use of
A. Thermocouples
B. RTDs
C. Thermistors
D. All of the above

3. The output voltage of a typical thermocouple is
A. less than 100 mV
B. greater than 1 V
C. Thermocouples vary resistance, not voltage
D. None of the above

4. The connections to a thermocouple:
A. can produce an unwanted thermocouple effect, which must be compensated for
B. produce an extra desirable thermocouple effect
C. must be protected, since high voltages are present
D. both B and C are correct

5. The purpose of compensation for a thermocouple is:
A. to cancel unwanted voltage output of a thermocouple
B. to decrease temperature sensitivity
C. to increase voltage output
D. used for high-temperature circuits

6. The strain gauge resistance varies with:
A. Vibration
B. Heat
C. Weight
D. Bending

7. RTD stands for
A. Relative Thermal Devices
B. Radioactive Thermonuclear Dipoles
C. Resistance Temperature Detectors
D. Resistive Temperature Devices

8. The decrease of resistance with the temperature increase is a property of:
A. Thermocouple
B. bimetallic thermometer
C. Thermistor
D. RTD

RTD stands for

Select one:

- a. Relative Thermal Devices
- b. Radioactive Thermonuclear Dipoles
- c. Resistance Temperature Detectors
- d. Resistive Temperature Devices

Clear my choice

9- the most common thermometers in real life Applications:
All "Thermocouples, RTDs, Thermistors"

10- Which of the following are manufactured using sensing element: RTDs

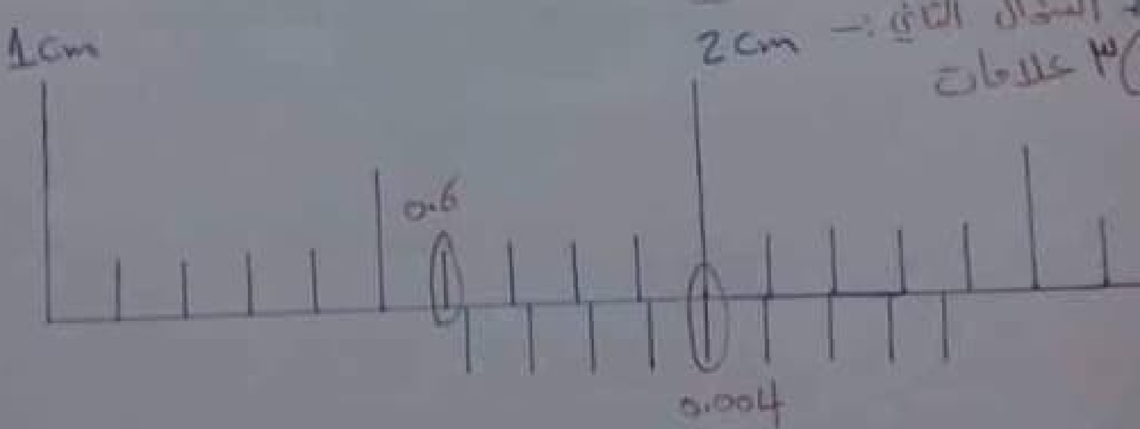
11- Which of the following are more common: ⇐ ما بعرف بصراحة ... انا كان
RTDs - Thermistor - Thermometers - Thermocouple

12- Specification of Applications in thermometers: بس هاد متذكر من السؤال

13- In thermocouple a small open-circuit voltage are produce which the Voltage value equal: الله أعلم بالسؤال . باعتذر

14- !!انسى عن ال sensor بال strain gage!!

السؤال الثاني ← (٣ علامات)



⟹ 1.64 cm

2

Clear my choice

bench micrometer was used to measure the minor diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm, the micrometer reading over the standard cylinder using a prism was 30.3218 mm, the micrometer reading over the thread using a prism was 25.7424 mm, then the minor diameter of the thread is equal to ----------

Select one:

a. 15.4206 mm

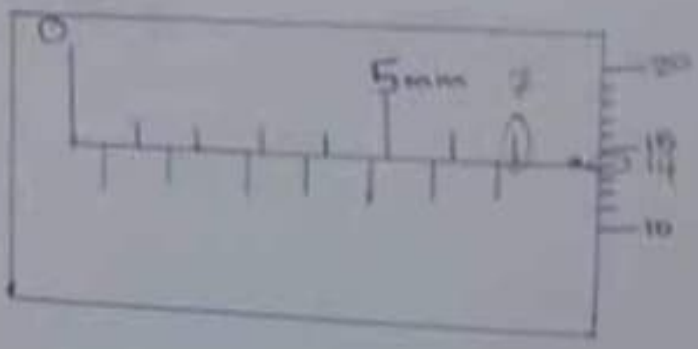
b. 24.5794 mm

c. 36.0642 mm

d. None of the above is correct

Clear my choice

21 Which of the following is considered as manufacturing configuration of the RTO



$\Rightarrow$ 7.14 mm

What size is the gauge block build-up used with a 10 inches sine bar to set the work piece at an angle of 4° 30′? Show your calculations

$\sin\theta = \frac{h}{L} \Rightarrow \boxed{h = \sin\theta * L}$

Describe the working principle of the Auto Collimator?

The Auto Collimator is an optical device used to measure small angles with very high sensitivity. The Auto Collimator projects a beam of collimated light. An external reflector reflects all or part of the beam back into the instrument where the beam is focused and detected by a photodetector [3]

the Auto Collimator measures the deviation between the

The strain gauge resistance varies with:

Select one:

- a. Heating
- b. Cooling
- c. Bending
- d. Both A and B are correct

Clear my choice

RTDs are more sensitive than thermistors

Select one:

- a. True
- b. False

Clear my choice

A bench micrometer was used to measure the major diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder was 20.9344 , the micrometer reading over the thread was 21.1342 mm, then the major diameter of the thread is equal to ---------

19.8002

20.1998

22.0686

None

A bench micrometer was used to measure the minor diameter of an external thread, given that the diameter of the standard cylinder is 20.0000 mm. the micrometer reading over the standard cylinder using a prism was 30.3218 mm , the micrometer reading over the thread using a prism was 25.7424 mm, then the minor diameter of the thread is equal to ---------

15.4206

24.5794

36.0642

None

Which of the following is considered as manufacturing configuration of the RTD

Wire-wound RTD

Thin-film RTD

Both are correct

The spring joint caliper is one of the direct measuring devices

True

False

In order to measure the effective diameter of the external thread using a bench micrometer, it is required to measure the major diameter and the minor diameter of the thread.

True

False

RTD stands for

Relative thermal devices

Radioactive thermonuclear dipoles

Resistance temperature detectors

Resistive temperature devices

We can use ---------- to measure wires, spheres, shafts, and blocks.

External micrometer

Internal micrometer

Depth micrometer

Gauge blocks

None

If the smallest division of the main scale of the vernier caliper is 1 mm , and its vernier scale is divided into 10 divisions , then the accuracy of the device is

0.01 mm

0.1 mm

0.05 mm

1 mm

Which of the following is not an angular measuring device / instrument

Vernier bevel protractor

Sine bar

Clinometer

Mechanical comparator

The external micrometer is one of the indirect measuring instruments

True

False

The accuracy of the vernier bevel protractor is

1 min

2.5 min

5 min

1 degree

The prominent part of the thread, whether internal or external is called --------

The major diameter

The crest of the thread

The root of the thread

The minor diameter

The bottom of the groove between the two flanking surfaces of the thread whether internal or external

The major diameter

The crest of the thread

The root of the thread

The minor diameter

RTDs are more sensitive than thermistors

True

False

The strain gauge resistance varies with:

Heating

Cooling

Bending

A and b

The firm joint calipers are examples of

Direct measuring devices

Indirect measuring devices

Line standard measuring devices

none

both the vernier caliper and the inside micrometer can be used to measure the depth of a specimen

True

False

The block gauges can be used to check the accuracy of the micrometer

True

False

…….

All thermistors are classified as a PTC device

All thermistors are classified as a NTC device

Thermistors have either a NTC or a PTC , but the first is more common.

The block gauges are examples of end standard

True

False

The pitch diameter of the thread is another name for the effective diameter

True

False