



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 14.07.2017

From
Dr. Senthil Kumar,
Professor and Head,
Department of Physiology,
SIJMS
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
SIJMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Recent advances in autonomic function test & its applications

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled "Recent advances in autonomic function test & its applications" on August 21/07 - October, 2017. We solicit your kind permission for the same.

Kind Regards

Dr. Senthil Kumar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi.

The HOD: Dr. Senthil Kumar

The Expert: Dr. B. Deivanayagam.

The committee has discussed about the course and is approved.

Dean

(Sign & Seal)
D.F. 14/7

Subject Expert
(Sign & Seal)

(Sign & Seal)

(Sign & Seal)

சென்னை மருத்துவ கல்லூரி
சென்னை மருத்துவ கல்லூரி
சென்னை மருத்துவ கல்லூரி

*00163308 & 407
DEPARTMENT OF PHYSIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
CHENNAI - 600 032

Circular

18.07.2017

Subj: Organising Value-added Course: reg Recent advances in autonomic function test & its applications

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, Bharath Institute of Higher Education and Research, is organising “_Recent advances in autonomic function test & its applications” . The course content and registration form is enclosed herewith.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach in or before July28. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

ಶ್ರೀ ಲಕ್ಷ್ಮಿ ನಾರಾಯಣ
ವೈದ್ಯಕೀಯ ವಿಜ್ಞಾನಗಳ ಸಂಶೋಧನಾ ಮತ್ತು
ವಿಶ್ವವಿದ್ಯಾಲಯ
ಬಹಾರತ್ ಹೈದರ್ ಅಬಾದ್
ಬಹಾರತ್

Course Proposal

Course title: Recent advances in autonomic function test & its applications

Course Objective: 1. To diagnose limited autonomic neuropathy
2. To evaluate the severity and distribution of autonomic function

Course Outcome: Perform autonomic testing proficiently and efficiently
Recognize technical errors/pitfalls Identify patients requiring additional studies Identify most common autonomic abnormalities on testing

Course Audience: medical undergraduates

Course Coordinator: Dr. B. Deivanayagam

Course Faculties with Qualification and Designation:

1. Dr. senhil Kumar
2. Dr. B. Deivanayagam
3. Dr. Vijayakumar

Course Curriculum/Topics with schedule (Min of 30 hours)

SINs	Date	Topic	Time	Hours
1	11.08.2017	introduction	2-4pm	2hrs
2	14.08.2017	Development of autonomic nervous system	1-4pm	4hrs
3	19.08.2017	symptoms of autonomic dysfunction	1-4pm	4hrs
4	25.09.2017	classification of autonomic function tests	1-3pm	3hrs
5	28.09.2017	Indications for autonomic function testing.	1-3pm	3hrs
6	1.10.2017	Parasympathetic function tests	1-3pm	1hrs
7	08.10.2017	Sympathetic function tests	1-3pm	3hrs
8	11.10.2017	practical	1-3pm	3hrs
9	14.10.2017	Methodological Information	1-3pm	3hrs
10	14.10.2017	Recent advances in autonomic function tests	1-3pm	3hrs
Total Hours				30

REFERENCE BOOKS: (Minimum 2) 1. G.K. Pal and Pravathy Pal, "Autonomic function tests", In: Text book of practical physiology, India: Orient longman, 2009, Ch 40: 296-304

2. William F Ganong, The Autonomic nervous system, In: Review of medical physiology, 23rd ed. India: MCGraw-Hill Company 2010; Ch 17: 261-271

VALUE ADDED COURSE

1. Name of the programme & Code

Recent advances in autonomic function test & its applications and PHYC04

2. Duration & Period

30 hrs & August 2017 - October 2017

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure - I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

8. Year of discontinuation: 2017

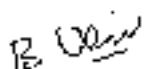
9. Summary report of each program year-wise

Value Added Course- September 2016 - August 2017					
Sl. No	Course Code	Course Name	Resource Persons	Target Students	Strength & Year
1	AFT 01	Recent advances in autonomic function test & its applications and AFT01	Dr. B.Deivanayugame	1 st MBBS	20 (Aug 17- oct 17)


10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON


COORDINATOR

annexure 1



Recent advances in autonomic function test & its applications and
AFT01

PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Recent advances in autonomic function test & its applications
Course Code	AFT01
Objective	<ol style="list-style-type: none"> 1. introduction 2. Development of autonomic nervous system 3. symptoms of autonomic dysfunction 4. classification of autonomic function tests 5. Indications for autonomic function testing 6. Methodological Information 7. Recent advances in autonomic function tests
Further Learning opportunities	Heart rate variability
Key Competencies	On successful completion of the course the students will have skill in doing autonomic function testing
Target Student	1st MBBS Students
Duration	30hrs Every September 2016– January 2017 & February – August 2017
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

Introduction: The innervation of all tissues other than muscle is by way of autonomic nervous system. It regulates the activity of smooth muscles like heart, glands of GI, sweat glands, adrenal gland and of certain endocrine organs

Its main aim is to maintain the optimal internal environment of body. It governs the body functions which are normally carried out without conscious control. This is why ANS is also called vegetative or efferent visceral or involuntary nervous system

The ANS is divided into two divisions sympathetic and parasympathetic functionally the two divisions of the ANS are essentially antagonistic and mutual interaction between the two tends to maintain the homeostasis in the dynamics of the body

The individual with the disturbances of the ANS shows complex clinical abnormalities. The diagnosis of autonomic neuropathy is often difficult to establish, since clinical symptoms generally appear late in the course of the disease and may be nonspecific

In progressive autonomic failure, there is the degeneration of both preganglionic and post ganglionic neurons, leading to inability to maintain the blood pressure in the erect position (orthostatic or postural hypotension) constipation, incontinence of urine, impotence, paralysis of accommodation, pupillary areflexia, disturbances of sweating and loss of lacrimation

Some of the common causes of autonomic neuropathy are

i) Diabetic neuropathy, where post ganglionic fibres of both divisions of ANS get involved

ii) Uremic neuropathy

ii) Alcoholic neuropathy

DEVELOPMENT OF AUTONOMIC NERVOUS SYSTEM SYMPATHETIC

NEURONS The sympathetic pathway consists of two neurons i.e., a preganglionic and a postganglionic neuron. The preganglionic neurons develop in the mantle layer of the Thoraco-lumbar region of the spinal cord (segments T1 to L2 or L3) these cells are located near the sulcus limitans and form the lateral horn of the cord. The axons growing out from them are myelinated. They pass into the ventral nerve roots to enter the spinal nerves. After a very short course through the spinal nerves they leave them and grow towards the postganglionic neurons. The postganglionic neurons are derived from cells of the neural crest. These neurons form the various ganglia of the sympathetic trunk. Some postganglionic neurons come to lie near the viscera and form visceral sympathetic ganglia. The preganglionic fibers meant for them do not relay in the sympathetic trunk but pass through branches of the trunk to reach the visceral ganglia. The axons of the postganglionic neurons grow towards the various viscera of the body to innervate them. Some of them enter the spinal nerves and are distributed through them to the blood vessels and sweat glands, sympathetic ganglia. The preganglionic fibers meant for them do not relay in the sympathetic trunk but pass through branches of the trunk to reach the visceral ganglia. The axons of the postganglionic neurons grow towards the various viscera of the body to innervate them. Some of them enter the spinal nerves and are sympathetic ganglia. The preganglionic fibers meant for them do not relay in the sympathetic trunk but pass through branches of the trunk to reach the visceral ganglia. The axons of the postganglionic neurons grow towards the various viscera of the body to innervate them. Some of them enter the spinal nerves and are

PARASYMPATHETIC NEURONS The preganglionic neurons of the parasympathetic system are formed in two distinct situations. Some of them are

formed in relation to the general visceral efferent nuclear column of the brain stem. They give rise to the Edinger-Westphal nucleus, salivatory and lacrimatory nuclei and the dorsal nucleus of the vagus. Their axons constitute the cranial parasympathetic outflow. Other preganglionic neurons are formed in the mantle layer of the sacral part of the spinal cord. These cells lie near the sulcus limitans. Their axons constitute the sacral parasympathetic outflow. There is considerable doubt regarding the origin of the postganglionic parasympathetic neurons.

PARASYMPATHETIC NEURONS sacral part of the spinal cord. These cells lie near the sulcus limitans. Their axons constitute the sacral parasympathetic outflow. There is considerable doubt regarding the origin of the postganglionic parasympathetic neurons. They are generally believed to be sympathetic neurons. They are generally believed

Autonomic dysfunction: Definition :Autonomic dysfunction develops when the nerves of the ANS are damaged. This condition is called autonomic neuropathy or dysautonomia. Autonomic dysfunction can range from mild to life-threatening. It can affect part of the ANS or the entire ANS. Sometimes the conditions that cause problems are temporary and reversible. Others are chronic, or long term, and may continue to worsen over time

classification of the different types of autonomic dysfunction. adapted from Freeman (2005)⁵ and Macdougall and McLeod (1996),⁶ can be made as follows:

- Diabetic autonomic neuropathy
- Amyloid neuropathy
- Immune-mediated neuropathy Protocol Autonomic Nervous System Testing Last Review Date: 01/20 Page 5 of 8 o Rheumatoid arthritis o Systemic lupus erythematosus o Sjögren syndrome
- Paraneoplastic neuropathy
- Inflammatory neuropathy o Guillain-Barré syndrome o Chronic inflammatory demyelinating polyneuropathy o Crohn disease o Ulcerative colitis
- Hereditary autonomic neuropathies
- Autonomic neuropathy secondary to infectious disease o HIV disease o Lyme disease o Chagas disease o Diphtheria o Leprosy
- Acute and subacute idiopathic autonomic neuropathy
 - Toxic neuropathies. Other chronic diseases may involve an ANS imbalance, without outright dysfunction of the nerves themselves. Approximately 40% of individuals with essential hypertension will show evidence of excess sympathetic activity.⁷ Sympathetic overactivity is also a prominent feature of generalized

anxiety, panic disorder, and some types of depression, as well as certain cardiac disorders such as chronic heart failure. These types of ANS imbalances are not usually classified as ANS disorders.

Autonomic function tests:The assessment of autonomic functions is an important part of the evaluation of peripheral and central nervous system .the diagnosis of autonomic neuropathy is indirect ,often being based on the measurement of physiological variables which are controlled by ANS.These tests are reliable,repeatable,simple,quick to carry out and all non invasive.In these test, emphasis is placed on the measurement of heart rate from a continuously running electrocardiographic ECG record and recording of systemic arterial blood pressure.some of the commonly employed clinical tests for the early detection of autonomic dysfunctions are classified into parasympathetic and sympathetic function tests

Parasympathetic function test

- 1.standing to lying ratio(S/L ratio)
- 2.immediate heart rate response to standing (30:15 R-R ratio)
- 3.valsalva ratio
- 4.tachycardia ratio
- 5.heart rate variation with respiration :sinus arrhythmia

Sympathetic function tests

1. QT/QT2 ratio\sympathetic skin response
2. Hand grip test :blood pressure response to isometric exercise
3. Cold pressor response

Miscellaneous tests:

1. Tests of pupillary function

2. Tests for lacrimation

Parasympathetic function test

Deep breathing test: This test is used to assess the parasympathetic activity. Principle: Heart rate increases during inspiration due to decreased cardiac vagal activity and decreases during expiration due to increased vagal activity. This is detected by recording lead-II E.C.G continuously when the subject is breathing deeply.

Apparatus: 1. Cardiowinsystem:

2. ECG Jelly

Method 1. Subject was instructed to maintain deep breathing at a rate of six breaths per minute. 2. Subject was made to lie down comfortably in supine position with head elevated to 30° 3. ECG electrodes were connected for recording Lead II ECG continuously in Audacity software and the R-R interval was measured using the beat finder tool in the software. 4. While subject was breathing deeply at a rate of 6 breaths per minute (allowing 5 seconds each for inspiration and expiration) maximum and minimum heart rates were recorded with each respiratory cycle. 5. Expiration to inspiration ratio was determined by using the formula

1. Normal Values of R: I ratio in different age groups (34) 16 – 20 years → > 1.23 21 – 25 years → > 1.20 26 – 30 years → > 1.18 31 – 35 years → > 1.16 36 – 40 years → > 1.14 41 – 45 years → > 1.12 46 – 50 years → > 1.11 51 – 55 years → > 1.09 56 – 60 years → > 1.08 61 – 65 years → > 1.07 66 – 70 years → > 1.06 in R-R interval during deep expiration I: I ratio – Minimum R-R interval during deep inspiration

Valsalva Manoeuvre:

The Valsalva ratio is a measure of parasympathetic and sympathetic functions. For the response to occur in Valsalva manoeuvre parasympathetic acts as afferent and efferent and sympathetic acts as a part of the efferent pathway. Therefore the Valsalva ratio assesses more of parasympathetic function.

Principle

The Valsalva ratio is a measure of the change of heart rate that takes place during a brief period of forced expiration against closed glottis or mouth piece (Valsalva manoeuvre). During and after the Valsalva manoeuvre there will be change in cardiac vagal efferent and sympathetic vasomotor activity, resulting from stimulation of carotid sinus, aortic arch baroreceptors and other intrathoracic stretch receptors.

Apparatus :

1. Cardiowin system :
2. ECG Jelly
3. Sphygmomanometer (Diamond)
4. Mouth Piece
5. Automatic Method

1. Subject was made to lie down in a semi recumbent or sitting position.
2. Nostrils were closed manually.
3. Mouth piece was put into the mouth of the subject and the Mercury manometer was connected to the mouth piece.

4. ECG machine was switched on for continuous recording.
5. Subject was asked to exhale forcefully into the mercury manometer and asked to maintain the expiratory pressure at 40 mm of Hg for 10 – 15 seconds.
6. ECG changes were recorded throughout the procedure, 30 seconds before and after the procedure, i.e. the ratio of the longest R-R interval (which comes shortly after the release) to the shortest R-R interval which occurs during maneuver.
7. Valsalva ratio was calculated by using the formula

$$\text{Valsalva} = \frac{\text{Longest R-R interval after the manoeuver (Phase-IV)}}{\text{Shortest R-R interval during the manoeuver (Phase-II)}}$$

Valsalva ratio more than 1.45 is considered to be normal. When it is 1.2 – 1.45, it is border line and if it is less than 1.2, it is regarded as abnormal.

IV. Heart rate response to standing :

On changing the posture from supine to standing heart rate increases immediately by 10-20 beats per minute. This response is detected by recording ECG in supine and standing postures. Lead II ECG is recorded continuously in Audacity software.

Principle : Immediately on standing from supine posture, heart rate increases by 10-20 beats.

1. Subject was made to lie down in supine posture.
2. ECG electrodes were connected from the subject to the cardiowin system.
3. Subject was asked to relax completely for a minimum period of 10 minutes.

4. Basal heart rate was recorded by using cardiowin system.
5. Subject was asked to stand up immediately and change in heart rate was noted from the cardiowin monitoring screen.
6. Heart rate response to standing was determined by using the formula

$$\text{Heart rate in standing position} - \text{Heart rate in supine position. III.}$$

Sympathetic function test: Cold Pressor test (cold pressure test)

The afferent limb of the reflex pathway in cold pressor test is somatic fibers where as the efferent limb is sympathetic fibers. (11,12,14)

Principle : Submerging the limbs in cold water results in an increase in systolic and diastolic blood pressures, which is detected by sphygmomanometer

Apparatus :

1. Beaker containing Ice cold water
2. Sphygmomanometer (Diamond)
3. Stethoscope (Littmann)

Method :

1. Subject was instructed regarding the test.
2. Blood pressure was recorded under basal conditions.
3. Cold water was taken in a container.
4. Subject was asked to submerge one of his hand to his wrist in cold water .

5. Blood pressure was recorded from the other hand at 30 seconds interval for a period of 2 minutes using automatic BP Monitor (omron HEM780) .

Submersion of the limb in ice cold water increases systolic blood pressure by about 10-20 mm of Hg and diastolic blood pressure by about 10 mm of Hg. V.

Hand Grip Test :

In the hand grip test, there is a rise in heart rate and blood pressure. The blood pressure rise is due to increased sympathetic activity and heart rate rise is due to decreased parasympathetic activity^(1,3)

Principle : Sustained hand grip against resistance causes an increase in heart rate and blood pressure. These responses are detected by using ECG and blood pressure monitors using electronic automatic B.P apparatus(omron brand)

Apparatus :

1. Cardiowin system :
2. ECG Jelly
3. Sphygmomanometer (Diamond)
4. Stethoscope (Littmann)
5. Hand Grip Dynamometer
6. Automatic BP monitor(omron HEM 780)

Method -

1. Subject was instructed regarding the test
2. Subject was made to lie down in semi recumbent position.

3. ECG electrodes were connected for lead II recording of ECG and sphygmomanometer for blood pressure measurement.
4. Basal heart rate and blood pressure were recorded.
5. Subject was asked to maintain a pressure of 30% of the maximum voluntary contraction in the hand grip dynamometer for about 5 minutes with the dominant hand
6. Heart rate and change in SBP, DBP were recorded every minute using Automatic BP monitor (omron HEM 780) for measurement of Blood pressure. The normal response is rise in DBP by $> 10-15$ mm of Hg and rise in heart rate by about 30% of the pre test value

Recent advances in autonomic function tests: various new autonomic function tests includes

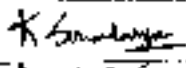
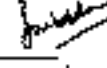

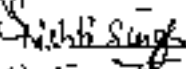
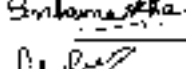
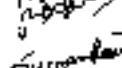

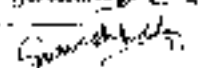
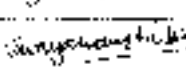
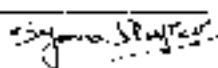
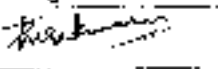
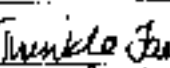
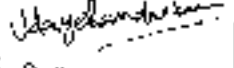
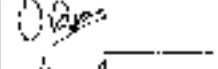
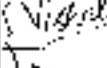

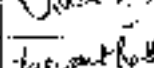
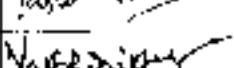


1. Initial heart rate response to postural change
2. Monitoring of cerebral circulation by near infrared spectroscopy
3. Sympathetic skin test
4. pressure flow test
5. videourodynamics

Annexure 2

Bharathi Institute of Higher Education and Research (SIHMS)

LIST OF STUDENTS ENROLLED

Participant list of Value added course Recent advances in autonomic function test & its applications

Sl.No	Reg.No	Name of the candidate	Signature
1	U17MB300	SONINDHARYA K	
2	U17MB381	SOLRAH DAS	
3	U17MB382	SRIKAVYA G	
4	U17MB383	SRIHIT SINGH	
5	U17MB384	SRIYAMA SAINA	
6	U17MB385	SUBHASHREE ADHIPSA GRI	
7	U17MB386	SUMAN KUMAR SAHOO	
8	U17MB397	SURVE BHUSHAN SUNIL	
9	U17MB388	SURVESH POKHAR	
10	U17MB389	SURYAWANSHI SIDDIHANT AJAY	
11	U17MB390	SYAMA SHAJEEV	
12	U17MB391	TILIRUKKUMARAN JT	
13	U17MB392	TWINKLE JAISWAL	
14	U17MB393	UDAY CHANDRA KARUMANCHI	
15	U17MB394	VIDHYA V	
16	U17MB395	VISHAL S	
17	U17MB396	VISHNU K	
18	U17MB397	VIVEK AMAN SINGH	
19	U17MB398	YASHWANT BATHORE	
20	U17MB399	YAZHINI MURUGAN	



Annexure 3

Recent advances in autonomic function test & its applications

MULTIPLE CHOICE QUESTIONS

Course Code: PHYC04

1. ANSWER ALL THE QUESTIONS

1. The sympathetic nervous system is:

- a. activated by exposure to cold weather
- b. inhibited by exposure to hot weather
- c. concerned/involvement in erection of external genital organs & with initiation of Micturition

2. The vagus nerve:

- a. When stimulated has little direct effect on the strength of ventricular contraction.
- b. Contains afferent nerve fibres only
- c. Exerts at rest a tonic effect on the heart which becomes more marked
- d. with regular long distance running
- e. Contains parasympathetic postganglionic fibre

3. which of the following is not a sympathetic function test?

- a. cold pressor test
- b. isometric handgrip test
- c. deep breathing difference
- d. galvanic skin response

4. which of the following is not a test for sudomotor function

- a. Sympathetic skin response
- b. Thermoregulatory sweat test
- c. QSAR test
- d. Adrenaline test

5. **Parasympathetic tone is mostly responsible for:**

- a. Decreasing the blood flow to the gut (SIF or alimentary canal).
- b. Maintenance of the systemic arterial blood pressure constant.
- c. Keeping the fasting blood glucose level constant.
- d. Maintaining resting heart rate within normal
- e. Causing bronchodilatation

6. **Sympathetic tone serves the following autonomic functions:**

- a. Maintenance of basal cardiac rhythm.
- b. Maintenance of basal gastrointestinal motility.
- c. Maintenance of normal arterial blood pressure
- d. Maintenance of basal sleep rhythm

7. **which of the following is more accurate sympathetic reactivity test**

- a. Tachycardia ratio
- b. Norepinephrine spillage technique
- c. HRV analysis
- d. Isometric handgrip test

8. **which of the following ratio is not a parasympathetic function test**

- a. E/I ratio
- b. tachycardia ratio of valsalva maneuver
- c. 30:15 ratio
- d. standing to lying ratio

9. **which of the following is more accurate parasympathetic reactivity test?**

- a. 30:15 ratio
- b. heart rate response to deep breathing
- c. Bradycardia ratio
- d. 4:6:10 and TP of HRV Analysis

10. **which of the following is used as a measure of orthostatic hypotension on standing from**

Lying to standing posture

- a. sustained fall in SBP > 20 mm Hg, DBP > 10 mm Hg
- b. sustained fall in SBP > 10 mm Hg, DBP > 5 mm Hg
- c. sustained fall in SBP > 40 mm Hg, DBP > 20 mm Hg
- d. sustained fall in SBP > 50 mm Hg, DBP > 25 mm Hg

Annexure 4

Dr. J. Datta, Director, Government Medical College, Kanchi, has been appointed as the Resource Person for the course on "Advanced Studies in the Management of Medical Emergencies" to be conducted at Government Medical College, Kanchi, from 27.05.2019 to 31.05.2019.

Dr. J. Datta, Director
Resource Person

Dr. S. P. K. J. S. R.
Coordinator

ANNEXURE 5

Course/Training Feedback Form

Course: Recent admission in Neuroscience (understand test & its applications)
Date:
Name: Seemabegs
Reg NO. 11100380
Department: physiology

Q 1: Please rate your overall satisfaction with the format of the course:

- a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

- a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned:

- a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand:

- a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

- a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

OPTIONAL Section: Name Seemabegs
Signature _____ Date _____

