Foundations of Technology

SEMESTER B

Student Review Sheets

Montgomery County Public Schools
February 2010
Test Description
Length: 2 hours
Points: 50 Selected Responses (50 Points)  2 Brief Constructed Responses (8 Points)
Total = 58 Points

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Some Vocabulary for the Examination
The vocabulary includes words that students may encounter when reading examination items.

- **Apply Design Process**
  - ability
  - apply
  - batches
  - brainstorming
  - charts
  - communicate
  - complex models
  - concept generation
  - conceptual model
  - constraints
- creative thinking
- criterion
- decision-making
- design
- design problem
- design process
- deductive thinking
- development
- diagrams
- discarded
- disposability
- economic analysis
- engineering drawings
- experiment
- evaluation
- factors
- final results
- final solutions
- fiscal matters
- functional analysis
- generating ideas
Student Review
Foundations of Technology  Semester B 2010

graphic communication  volume production  technological
graphic models  wire frame model  technological system
human factors analysis  three-view drawing
information gathering  time charts
investigate  tools
limitations  troubleshoot
market analysis  two-view drawing
marketing  word processing
mathematical model  working environment
mock-ups  World Wide Web
modeling  written techniques
models  modifications
modifications  modify
modify  observations
observations  optimization
physical model  plan
plan  preference
preference  problem solving
problem solving  product
product  production
production  proposed
proposed  prototypes
prototypes  production
production  quality
quality  quality control
quality control  quantitative
quantitative  real world
real world  refine
refine  research
research  resources
resources  simulation
simulation  single quantity
single quantity  solid model
solid model  solution
solution  specification analysis
specification analysis  surface models
surface models  system
system  tolerances
tolerances  trade-off
trade-off  three dimensional
two dimensional  synthesize
synthesize  verbal communication
verbal communication  virtual
virtual  Use and Maintain

Technological Systems
accident-free  analyze
architectural drawings  assembly drawings
CAD  calculator
computer  computer-aided design
conversion  detailed drawings
diagnose  diagnostic tools
digital meter  documentation
directions  drawings
energy  engineering drawings
flow charts  forecasting
function  graphs
graphics  internet
machines  malfunction
maintain  maintenance
materials  one-view drawing
oral techniques  orthographic projection
power  procedures
repair  safe
software  spreadsheets
symbols  systems
systems drawings

Impacts of Products and Systems
Altering  assessment
assessment techniques  compare
consequences  contrast
cultural impact  dangerous
data  decision-making
deductive thinking  design forecasting
economic impacts  effects of technology
environmental impacts  evaluate
evaluation techniques  forecasting
forecasting techniques  humanities information
impacts  information
investigation  iterative steps
knowledge  natural systems
political impacts  quality
relevancy  risk management
scientific information  societal impacts
synthesize data
synthesis techniques
synthesizing
technological development
technological information
technological systems
testing
trend analysis	
trends

**Medical Technologies**
- absorption
- anti-pathogenic
- biochemistry
- capabilities
- chemotherapy
- clinical pharmacology
diagnosing
disabled
diseases
disease predisposition
disease state
distribution
DNA
drug composition
drug rehabilitation
enviropig
ethics
excretion
forensic medicine
genetic engineering
genetic information
- genetic material
- genetically modified crops
GMC
incidence of testing
informatics
interactions
mandates
medical applications
medical care
medical technologies
metabolism
molecular biology
neurology
organic material
patient condition
parameter
paraplegic
penicillin
pharmaceuticals
pharmacology
physical medicine
physical rehabilitation
physical therapy
polio vaccine
PRDV
prevention
primary prevention
Primary Remote
Diagnostic Visits
psychopharmacology
rehabilitation
recombinant DNA
remission
screening
secondary prevention
super rice
surgical procedures
telemedicine
tertiary prevention
test results
therapy
toxicology
transgenic engineering
treatment
vaccines
video conferencing

catalyst
conservation
crops
crop production
distribution
drought
ecosystem
environment
environmental resources
erosion
fauna
fermentation
fertilizers
fiber
flora
food
genetically modified
generic engineering
gene splicing
grains
growth processes
hydroponics
hydroponics station
infestations
- land management
- livestock
marketing
microbial applications
natural disasters
organisms
pests
pesticides
ph
- physical technologies
plants
precipitation
produce
purification techniques
- recombinant
regulations
run-off
sediment
seeds
- separation techniques
- soil
water quality

**Agriculture and Biotechnologies**
- adverse effects
- agribusiness
- agriculture
- agricultural practices
- agriscience
- altering
- artificial
- bacteria
- beverages
- bioreactors
- bio-products
- biotechnology
## Energy and Power Technologies

- air conditioning
- alternate
- biofuels
- biogas
- biomass
- biomass resources
- chemical
- chemical energy
- closed system
- coal
- combustion
- condition
- conservation of energy
- conversion
- cooling system
- create
- degradation
- destroyed
- efficiency
- electrical
- electrical energy
- energy
- entropy
- fission
- force
- fossil fuels
- fuel
- fusion
generator
- generation plant
- heating system
- isolated system
- kinetic energy
- Law of Conservation of Energy
- Law of Conservation of Matter
- Law of Thermodynamics
- loads
- mechanical
- mechanical energy
- methane
- natural gas
- nonrenewable
- nuclear
- nuclear energy
- open system
- peat
- perpetual motion
- petroleum
- pollution
- potential energy
- power
- power systems
- process
- radiant
- radiant energy
- renewable
- resistance
- solar
- solar panel
- sources
- sustainable
- thermal
- thermal dynamics
- thermal energy
- transfer
- transmitting
- transporting
- uranium
- cultural value
- data
- data processing
- design
- development
- digital
- electronic communications
- emerging technologies
- entertainment
- facsimile
- feedback
- gigabyte
- graphic communications
- hard drive
- icon
- information
- information processing
- information systems
- input
- interactive
- interference
- international
- interruption
- internet
- keyboard
- machine to machine
- machine to person
- measurement
- memory
- message
- multi-media
- output
- person to machine
- person to person
- photochemical
- photochemistry
- printing
- process
- production
- radio
- receiver
- receiving
- relevance
- sender
- sending
- signal
stimuli
storage devices
symbols
systems
telegraph
telephone
television
transmitter
truth
visual messages

**Transportation Technologies**
- air lanes
- air transportation
- aerospace
- aviation
- control systems
- escalator
elevator
energy
environments
environmental factors
fixed route
goods
guidance systems
heavier than air
inland
inland waterways
intelligent systems
intelligent transportation
interconnected
intermodal
intermodalism
interstate
lighter-than air
manned
marine transportation
materials
modes
non-intelligent systems
oceans
pedestrian
people
pipeline
political influence

**Manufacturing Technologies**
- acoustical properties
- advertising
- altering
- assembly
- assembly line
- automation
- batch manufacturing
- chemical technologies
- CIM
- Computer Integrated Manufacturing
- consumables
- continuous manufacturing
- continuous production
- corporations
- custom-made
- custom manufacturing
- diagnosing
- direct sales
- distribution
- durable
- efficiency
- fabric
- firms

flexible manufacturing
franchised business
goods
installing
interchangeable
interchangeable parts
intermittent manufacturing
international
international standards
magnetic properties
maintenance
manufacturing
marketing
marketing process
market research
mass production
material properties
material science
mechanical properties
mixed materials
natural
non-durable
obsolesce
optical properties
physical properties
primary process
production
processing plant
quality control
recalling
repairing
retrofitting
robots
robotics
sales
secondary processing
servicing
standards
synthetic
textiles
thermal properties
troubleshooting
upgrading

**Construction Technologies**
- alteration
Upon successful completion of Semester B, the student should be able to:

**Design Process**
- read and interpret technical information.
- recognize safe laboratory procedures.
- identify meaningful, answerable, technological questions.
- identify appropriate methods for conducting a design solution.
- identify the hypothesis of an experiment.
- identify the control in an experiment.
- distinguish between an engineering and technological design problem.
- identify the appropriate instruments and materials needed to conduct an experiment.
- research, investigate, and generate ideas for the design.
- defend brainstorming as an excellent technique for generating ideas and encouraging creative thinking.
- synthesize research and development and specify the goals of a design.
- identify criteria and constraints and determine how these will affect the design process.
- use deductive thinking processes to limit the possible solutions to a few good ones.
- consider concept generation, development, production, marketing, fiscal matters, use, and disposability of a product or system.
- test, experiment with, select, and use a variety of resources to optimize the development of the design.
- illustrate a two-dimensional and three dimensional drawing.
- use computer-aided design software.
- make a model and prototype.
- defend the need for verifiable data.
- organize data using appropriate techniques.
- identify technological trend trends revealed by data.
- analyze data to form conclusions.
apply the technological design process
use analyzed data to confirm, modify or reject a design solution.
defend when sufficient resources are not available how existing resources could be modified or new ones could be identified.
identify and consider trade-offs among the proposed solutions.
plan and select the best possible solution that takes into account the constraints and criteria obtained from research and personal preference.
synthesize various factors, including the constraints, criteria, and information gathered by research.
refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
evaluate proposed or existing designs in the real world.
modify a design solution so that it more effectively solves a given problem by taking into account the design constraints in order to consider the next step.
evaluate a design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.
explain why design solutions are measured against criteria and constraints and why this is central to the evaluation process.
assess previously ignored solutions, perhaps with modifications, as possible choices.
explain when previously favored design solutions are discarded, they may still be appropriate for consideration later in the design process.
develop and produce a product or system using a design process.
describe the process where items can be produced in single quantity, while others can be made in batches or volume production.
explain the role of quality control and tools they use.
evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.
defend that the final results should be compared to the original goals, criteria, and constraints.

**Use and Maintain Technological Systems**

demonstrate basic knowledge in how to use and maintain technological systems.
document processes and procedures and communicate them to different audience
use appropriate oral and written techniques.
describe communication techniques that include flow charts, drawings, graphics, symbols, spreadsheets, graphs, time charts, and World Wide Web pages.
diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
demonstrate proper use of diagnostic tools in the maintenance of a system.
troubleshoot, analyze, and maintain given technological systems to ensure safe and proper function and precision.
monitoring the operation, adjusting the parts, cleaning, and oiling of a given system.
explain examples of how a given product or system can be properly maintained.
operate pre-determined systems so that they function in the way they were designed.

describe safety procedures and how following directions is key to ensuring an accident-free working environment.

use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.

**Impacts of Products and Systems**

- assess the impact of products and systems.
- collect information and evaluate its quality.
- use methods comparing and contrasting sources, examining relevancy, and investigating the background of experts to determine accuracy of information.
- synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.
- exercise deductive thinking and synthesis techniques.
- explain how historical events, global trends, and economic factors are used to evaluate and consider how to manage the risks incurred by technological development.
- use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.
- use assessment techniques to evaluate involving iterative steps and procedures that requires analyzing trade-offs, estimating risks, and choosing a best course of action.
- defend the assessment of a product or system which can prove that it is dangerous, but it cannot prove that it is safe.
- demonstrate forecasting techniques to evaluate the results of altering natural systems.

**Medical Technologies**

- understand and be able to properly select and use medical technologies.
- explain medical technologies to include prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained.
- defend the development of vaccines and drugs has helped to eradicate or cause remission of many serious illnesses.
- explain how the development of diagnostic tools, such as the x-ray machine, computerized tomography (CT) scan, and lasers, allows for less invasive interior views of the body than surgery.
- explain how the use of specially designed equipment can help provide rehabilitation to disabled persons.
- describe where the use of a wheelchair and other specially designed equipment, a paraplegic person can play basketball; dialysis maintains health for those with no kidneys; and laser eye shaping helps eliminate the need for glasses or contact lenses.
- explain how many technologies designed for health, medicine, and safety are specialized and can be expensive to maintain.
illustrate that telemedicine reflects the convergence of technological advances in a number of fields, including medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology.

describe telemedicine is designed for emergency situations, rural health care, forensic medicine, and monitoring chronic conditions.

explain how telemedicine represents a significant change in the delivery of medical care by increasing the number of doctors who can diagnose illness and offer treatment in unsafe and remote area via computer or videoconference.

explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures.

express how recombinant DNA technology, in the form of applied molecular research, has resulted in methods for screening and diagnosis of disease states and disease predisposition (molecular diagnostics).

defend the potential for misuse of recombinant DNA information.

Agriculture and Biotechnologies

understand and be able to properly select and use agricultural and biotechnologies.

explain that agriculture includes a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.

identify who regulates the marketing and safety of agriculture products and systems.

describe biotechnology and its applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering.

describe how biological processes used in combination with physical technologies to alter or modify materials, products, and organisms.

identify key examples of biotechnology applications like fermentation, bio-products, microbial applications, separation and purification techniques, and monitoring growth processes.

defend the selection of genetically modified seeds, application of modified organisms, and uses of algal fertilizers generated from photo bioreactors are good examples of extending agricultural practices through biotechnology applications.

define conservation as the process of controlling soil erosion, reducing sediment in waterways, conserving water, and improving water quality.

check graphs to determine that they do not misrepresent results.

illustrate how landscape design techniques are used in gardens or on farmland to prevent erosion and control heavy rains.

defend the engineering design and management of agricultural systems which require knowledge of artificial ecosystems and the effects of technological development on flora and fauna.

compare two management techniques of agriculture such as the amount, orientation, and distribution of crops and other plants; the effects of pests, and the management of land and animals to reduce adverse effects on plant growth, crop production, and environmental resources.
• understand and be able to properly select and use energy and power technologies.
• learn that energy cannot be created nor destroyed; however, it can be converted from one form to another.
• defend the Law of Conservation of Energy.
• describe scientific concepts and laws concerning energy.
• classify energy as either kinetic or potential.
• explain why energy cannot be transported easily.
• explain energy efficiency.
• explain the Second Law of Thermodynamics.
• identify energy resources as renewable or nonrenewable.
• identify alternate and sustainable energy resources.
• check graphs to determine that they do not misrepresent results.
• differentiate why power systems should be designed to conserve energy and to provide maximum efficiency with minimal environmental degradation.

Information and Communications Technologies
• understand and be able to properly select information and communication technologies.
• use information and communication technologies.
• explain that information and communication technologies include the inputs, processes, and outputs associated with sending and receiving information.
• describe information and communication systems that allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
• apply information and communication systems to inform, persuade, entertain, control, manage, and educate.
• give details of systems that include the Internet, telephones, televisions, radios, computers, and fax machines.
• put in plain words how information and communication systems are widely used in commercial endeavors to assist in decision-making and problem solving.
• check graphs to determine that they do not misrepresent results.
• make clears how entertainment has been enhanced through technology by providing pleasure and enjoyment for people in their free time.
• rationalize the overall usefulness of information as dependent upon such factors as its relevance, timeliness, truth, completeness, and cultural value.
• justify the factors that help shape the meaning of the information, which has become a valued commodity in today’s society.
• detail communication systems which are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
• compare and contrast the many ways to communicate information, such as graphic and electronic means.
• identify examples of graphic systems.
• use symbols, measurement, conventions, icon, graphic images, and languages to incorporate a variety of visual, auditory, and tactile stimuli.
• expound on the development of the computer which has spurred new terminology.
Transportation Technologies
- understand and properly select transportation technologies.
- use transportation technologies.
- make clear that the transportation plays a vital role in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.
- describe transportation systems to include subsystems of aviation, rail transportation, water transportation, pedestrian walkways, and roadways.
- detail transportation subsystems that use a wide array of devices, vehicles, and systems in order to move people, materials, and goods.
- define transportation.
- check graphs to determine that they do not misrepresent results.
- explain intermodalism.
- explain the impacts of transportation services and methods on the global population.
- compare and contrast intelligent and non-intelligent transportation systems.
- detail the development of intelligent transportation systems.
- describe non-intelligent transportation systems.
- illustrate innovative designs that capitalize on natural settings and provide convenience.

Manufacturing Technologies
- understand and be able to select and use manufacturing technologies.
- defend servicing to keep products in good operating condition.
- define servicing processes include installing, diagnosing and troubleshooting, recalling, maintaining, repairing, altering and upgrading, and retrofitting.
- explain why some products are designed for eventual obsolescence.
- account for product obsolescence.
- give reasons why materials have different qualities.
- classify materials as natural, synthetic, or mixed.
- group durable goods and non-durable goods.
- classify manufacturing systems such as customized production, batch production, and continuous production.
- check graphs to determine that they do not misrepresent results.
- describe customized production.
- define batch production.
- explain continuous production.
- expound on the interchangeability of parts to increase the effectiveness of manufacturing processes.
- describe chemical technology.
- make clear the role of marketing.
**Construction Technologies**

- define construction technologies.
- classify construction technologies.
- understand and properly select construction technologies.
- use construction technologies.
- check graphs to determine that they do not misrepresent results.
- explain infrastructure.
- explain how structures are constructed using a variety of processes and procedures.
- evaluate the appropriateness of construction procedures.
- clarify requirements in the design of structures.
- identify common construction design constraints.
- explain the importance of constraints to include appearance, strength, longevity, maintenance, and available utilities.
- expound on the regulation of design and construction of structures by laws, codes, and professional standards.
- detail why structures require maintenance, alteration, or renovation periodically to improve them or to alter their intended use.
- explain why contractors use prefabricated materials.

**Useful Websites:**

This review can be found online at:

The format of the MCPS semester examination mirrors the Public Release Version (PRV) of the Biology High School Assessment. The PRV items can be viewed at: