

Foundations of Technology

S E M E S T E R B

Student Review Sheets

**Montgomery County Public Schools
March 2009**

Student Review Foundations of Technology Semester B 2009

Test Description

Length: 2 hours

Points: 50 Selected Responses (100 Points) 0 Brief Constructed Responses (0 Points)

Total = 100 Points

Topic	Approximate Number of Selected Response Items	Approximate Number of Constructed Response Items
Apply Design Process	6	0
Use and Maintain Technological Systems	5	0
Impacts of Products and Systems	4	0
Medical Technologies	3	0
Agriculture and Biotechnologies	4	0
Energy and Power Technologies	6	0
Information and Communication Technologies	6	0
Transportation Technologies	4	0
Manufacturing Technologies	7	0
Construction Technologies	5	0
Totals	50	0

Some Vocabulary for the Examination

The vocabulary includes words that students may encounter when reading examination items.

Design Process

ability	criticism	experiment
apply	decision-making	evaluation
batches	design	factors
brainstorming	design problem	final results
charts	design process	final solutions
communicate	deductive thinking	fiscal matters
complex models	development	functional analysis
concept generation	diagrams	generating ideas
conceptual model	discarded	graphic communication
constraints	disposability	graphic models
creative thinking	economic analysis	human factors analysis
	engineering drawings	

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information gathering
investigate
limitations
market analysis
marketing
mathematical model
mock-ups
modeling
models
modifications
modify
observations
optimization
physical model
plan
preference
problem solving
product
production
proposed
prototypes
production
quality
quality control
quantitative
real world
refine
research
resources
simulation
single quantity
solid model
solution
specification analysis
surface models
system
tolerances
trade-off
three dimensional
two dimensional
synthesize
verbal communication
virtual
volume production
wire frame model

Use and Maintain
Technological Systemst
accident-free
analyze
architectural drawings
assembly drawings
CAD
calculator
computer
computer-aided design
conversion
detailed drawings
diagnose
diagnostic tools
digital meter
directions
documentation
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
technological
technological system
three-view drawing

time charts
tools
troubleshoot
two-view drawing
word processing
working environment
World Wide Web
written techniques

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

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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

Agriculture and Biotechnologies

averse effects
 agribusiness
 agriculture
 agricultural practices
 agriscience
 altering
 artificial
 bacteria
 beverages
 bioreactors
 bio-products
 biotechnology
 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

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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

Information and

Communications

Technologies

accuracy
 analog
 binary
 binary code
 capacity
 chip
 communication
 communication systems
 communication-technology
 completeness
 complex systems
 computer
 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

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systems	roadways	installing
telegraph	seas	interchangeable
telephone	sea-lanes	interchangeable parts
television	service	intermittent manufacturing
transmitter	shipping lanes	international
truth	space transportation	international standards
visual messages	structural systems	magnetic properties
	subsystems	maintenance
<u>Transportation</u>	support systems	manufacturing
<u>Technologies</u>	suspension system	marketing
air lanes	systems	marketing process
air transportation	technical systems	market research
aerospace	terrestrial transportation	mass production
aviation	transcontinental	material properties
control systems	transoceanic	material science
escalator	transportation	mechanical properties
elevator	unmanned	mixed materials
energy		natural
environments	<u>Manufacturing Technologies</u>	non-durable
environmental factors	acoustical properties	obsolesce
fixed route	advertising	optical properties
goods	altering	physical properties
guidance systems	assembly	primary process
heavier than air	assembly line	production
inland	automation	processing plant
inland waterways	batch manufacturing	quality control
intelligent systems	chemical technologies	recalling
intelligent transportation	CIM	repairing
interconnected	Computer Integrated	retrofitting
intermodal	Manufacturing	robots
intermodalism	consumables	robotics
interstate	continuous manufacturing	sales
lighter-than air	continuous production	secondary processing
manned	corporations	servicing
marine transportation	custom-made	standards
materials	custom manufacturing	synthetic
modes	diagnosing	textiles
non-intelligent systems	direct sales	thermal properties
oceans	distribution	troubleshooting
pedestrian	durable	upgrading
people	efficiency	
pipeline	fabric	<u>Construction Technologies</u>
political influence	firms	alteration
power	flexible manufacturing	architecture
propulsion system	franchised business	architect
ransom route	goods	blue prints

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buildings	HVAC	modular
CAD	fasteners	overruns
codes	framework	permits
communication system	framing	prefabricated
computer aided design	foundations	production
construction	infrastructure	regulations
cooling system	inspections	renovation
design	installations	requirements
design constraints	intelligent buildings	residential
engineers	intended use	shelter
green construction	LEED	structures
heating system	maintenance	systems
heavy construction	materials	

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

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- 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.

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- 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.

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- 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.

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Energy and Power Technologies

- 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 clear 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.

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- 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 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.

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- 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.