



Agricultural Technology and Mechanical Systems

Purpose

Technological advances in America continue to influence the way students must prepare for their futures.

Students entering the workforce need a strong knowledge base and the ability to comprehend the interaction of complex systems. Employers want productive workers and managers that can access and use a broad range of information. The most sought after employees are those who communicate effectively, continue to stay current with modern technology and work successfully and effectively as individuals and as team members. Students with these skills and abilities are more competitive in the job market, receive financial rewards and are selected for advancement.

Agricultural technology and mechanical systems is comprised of strong technical content and complimented by the development of practical, hands-on skills. The subject matter areas and skill development practices have been grouped into five 'systems' areas, so named because of the complex interaction and synergistic processes common to agriculture. The term 'system' is used to emphasize the interactive relationship between each area of agricultural technology and mechanical systems. These five systems areas are described, and examples appear on the pages that follow.

Each agricultural technology and mechanical systems activity is in response to a problem or need encountered in the workplace. The solving of such problems is dependent upon how each decision or solution, imposed on one component, will influence the other system components. Solving one component of a problem without using a 'systems approach' can, and often does, result in additional problems. An example of where this has occurred is observed in the many obstacles that agricultural producers currently face regarding environmental pollution, ground water contamination and stricter governmental regulations. Decisions and solutions made in the past 100 years have impacted the environment negatively and resulted in a new set of problems.

The New Jersey FFA Agricultural Technology and Mechanical Systems Career Development Event recognizes students with agricultural technology and mechanical systems competencies important to the modern workplace. The technical content and required skills continue to include all traditional areas of agricultural technology and mechanical systems. Additionally, the operation of modern equipment, the application of new management strategies and the mastering of advanced technologies are increasingly emphasized.

This career development event selects and awards those students and teams that demonstrate

- Mastery of the subject matter and skills common to the systems areas.
- Effective communication skills.
- Superior problem-solving techniques.
- An understanding of modern technology.
- The ability to function as individuals and as team members working together.

Event Rules and Format

The complete rules, policies and procedures relevant to all New Jersey FFA Career and Leadership Development Events may be found in the CDE & LDE Event Participation Policy: https://nj.gov/agriculture/ag_ed/ffa/activity/CDE_LDE_Policy.pdf

- Teams will consist of four members, and all four scores will count toward the team score.
- The team score is comprised of the combined scores of each individual and the team activity in which all team members will participate.
- Each individual shall furnish and wear appropriate clothing such as long pants and long-sleeved cotton shirt, coveralls, etc., for this event. Clothing must be in good repair and fit properly. Oversized or loose-fitting clothing is dangerous around agricultural equipment and is not allowed. Long-sleeves must be worn when welding or oxy-fuel cutting. No open-toed or mesh-top footwear shall be worn during the event. **DO NOT WEAR OFFICIAL FFA DRESS.**
- The event will be conducted regardless of weather.
- Students Must Provide Safety Materials. Each event participant must adhere to the appropriate safe practices and work habits when performing required activities. Participants are responsible for and must provide all personal safety equipment.
- Any communication between participants during the event will be sufficient cause to eliminate the team from the event.
- Any participant caught cheating during the event will be expelled from the event.
- Participants are NOT allowed to use (or have visible) electronic devices during the event, unless for medical reasons or a portion of the event requires usage. This includes cell phones, tablets, etc. Participants will be allowed to use calculators, if specified for that event; however, cell phone calculators and graphing calculators are not permitted! Failure to adhere to these rules will result in disqualification.
- All individuals participating will judge in a cooperative manner following the rules set forth by the event coordinator.
- No school/chapter will use Rutgers University or Delaware Valley University facilities or locations for the training of teams. Contact with University faculty and staff is permissible. **Penalty will be disqualification.**
- This event will be scored using "Scan-tron" sheets. It is important for students to listen to directions and fill out the sheets correctly in order to receive credit. Sample scan-tron sheets are available for practice on the State Activity Guide. This event uses the Ag Sales/FB Mgt/Ag Mech (#105481) scan-tron sheet.
- There will be no separate alternate teams.
- A student may not compete in more than one event during the New Jersey FFA Spring Career Development Events.
- The State level competition fee of \$11 per contestant will be paid by the competing school. If a chapter is at least blue affiliated, registration to state FFA career development events is waived.

Event Format

EQUIPMENT

Each participant must have the following individual items for the competition:

- Clipboard
- Two sharpened No. 2 pencils
- Calculator - Calculators used in this event should be battery-operated and silent. Cell phone calculators or programmable calculators are not permitted.
- Eye Protection
 - Each team member must wear eye protection. Safety glasses must have the Z87+ rating. Individuals with prescription glasses will need either prescription safety glasses or safety glasses that can be worn over prescription glasses. Do not bring tinted safety glasses.
 - **Individuals Must Wear Style B.** Industrial-quality eye protection should be used during the team activity and the skill/problem-solving activities. Safety glasses do not have to be worn while completing the written exam. Those with prescription eyewear that is not Style B must also wear safety glasses or goggles while participating in this event. Acceptable spectacles or goggles must adhere to the American National Standard Practice for Occupational and Education Eye and Face Protection, Z87.1 – 1979 (or Z87.1 – 1968) and revisions approved by ANSI.
 - **Descriptions of style A, B and C Industrial Quality Eye Protection are as follows:**
 - Style A:** Not acceptable for use in the event. These are safety spectacles without side shields. They are for limited-hazard use requiring only frontal protection. The addition of accessory side shields that are not firmly secured does not upgrade style A to a style B or C.
 - Style B: Acceptable** — These are safety spectacles with wire mesh, perforated plastic or non-perforated side shields. The side shields shall be tapered, with an anatomical periphery extending at least halfway around the circumference of the lens frame. Industrial-quality eye protection for those not wearing prescription glasses shall be style B.
 - Style C:** Not acceptable for use in the event. These are safety spectacles with a semi- or flat-fold shield that must be firmly secured to the frame. Style C glasses do not provide maximum protection from the top and bottom angles.

Necessary equipment such as basic welding helmets or goggles as required for welding, shields, gloves, welding leathers, hearing protection devices, etc., will be provided by the New Jersey FFA Agricultural Technology and Mechanical Systems Career Development Event coordinators.

All other required tools and equipment will be furnished for the event.

If a team member needs modified equipment due to physical size and stature, the student must supply this equipment. The team member or coach must present the student-supplied equipment to the event coordinators prior to the start of the event for approval. Team members who need specialized or modified equipment due to disability as defined by the American Disabilities Act must submit the appropriate special needs request form and documentation at the time of the team's certification.

FLOW OF EVENT

- Written Exam
- Five Practicum Areas – timing will vary based on skills and competencies evaluated.
- Safety – Evaluated during five practicum areas

Event Areas

The New Jersey FFA Agricultural Technology and Mechanical Systems Career Development Event is divided into the following areas. Each area includes competencies common to agriculture. Students will be assessed on their proficiency as individuals. Specific competencies will be identified annually from the following areas:

- **Machinery and Equipment:** Repair and maintenance, materials handling, processing, adjustments, metal fabrication.
- **Electricity:** AC/DC power, electrical safety, electrical standards, sensing devices, electrical wiring, controls, electronics, motors and other electrical loads, operating instructions, and manufacturer's recommendations.
- **Compact Equipment:** Mechanical power, electrical power, hydraulic power, engine operation, maintenance, troubleshooting, repair.
- **Structures:** Structures, storage, concrete, masonry, plumbing, electrical, fabrication, construction, building materials, ventilation, heating, air conditioning.
- **Environment and Natural Resources:** Water quality, sustainable agricultural practices, soil and water conservation, surveying, biological waste handling.

Individual Activities

Students should be prepared to convert decimals to fractions throughout the event.

Five practicum areas

Each student is individually evaluated in each of the five areas. The specific activities occurring in each event are not publicized prior to the event. Each student is allowed 15 minutes to complete each of the five activities.

Written examination

Each student completes an examination that consists of 25 problem solving/multiple-choice questions. There are five questions from each of the five agricultural technology and mechanical systems areas. Each student needs a calculator to complete this examination. Calculators may not be shared between students and cell phone calculator apps cannot be used. Formulas and conversion values are provided. Do not round off intermediate answers when using the calculator to solve these problems. If a diagram, picture, or table from another page is needed to answer a question, the question will refer to the appropriate figure/page. Students will have 15 minutes to respond to 5 questions at each of the practicum stations.

Annual Event Announcements

A narrowed down listing of competencies will be provided to teams at least 1 month prior to the event.

Scoring

Event participants are evaluated as follows:

Activity	Individual Points	Team Points
Written examination	50	200
Individual activities: (5 @ 30 points each) Machinery and Equipment Electricity Compact Equipment Structures Environment & Natural Resources	150	600
Safety (up to 5 points per individual activity)	25	100
TOTAL POSSIBLE SCORE	225	900

Tiebreakers

If ties occur, the following events will be used in order to determine award recipients:

Team

- Written Exam Total
- Individual Activities Total

Individual

- Written Exam
- Total of Individual Activities

Awards

Awards will be presented to individuals and the first place team based on their rankings at the CDE awards ceremony at the New Jersey State FFA Convention. Awards are sponsored by the National FFA Foundation and the New Jersey FFA Association.

Team

- Plaque Sponsored by the National FFA Foundation – 1st place

Individual

- Overall Medals
 - Medals – Top three individuals
- H.O. Sampson Certificates (hands-on sections ONLY)
 - Certificate – Top five individuals

The 1st place team will represent New Jersey at the Big E in September and the National FFA Convention in October.

References and Resources

This list of references is not intended to be all-inclusive. Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. The following list contains references that may prove helpful during event preparation.

The following list contains references that may prove helpful during event preparation. The multiple choice test questions are written to be generic in nature and are selected from a variety of sources. It is the intent of the national event committee to reflect current technological practices common to the agricultural production industry. Refer to the CDE website for additional references and resources. Past CDE materials and other resources are available on [FFA.org](https://www.ffa.org)

Information specific to each annual event is available on the National FFA Agricultural Technology and Mechanical Systems Career Development Event webpage at

<https://schumacher1.mufaculty.umsystem.edu/home/national-ffa-webpage>

- FOS. John Deere
- FMO. John Deere
- Agricultural Power and Machinery. (CD format) CEV Multimedia. LTD
- Agricultural Engineering Technology. (ASABE) Springer Science + Business Media, LLC
- Mechanics in Agriculture. Prentice Hall
- Agricultural Mechanics Fundamentals and Applications. Delmar and Thompson
- Modern Agricultural Mechanics, V3. Prentice Hall
- Developing Shop Safety Skills. American Association for Vocational Instructional Materials
- Power Tool Safety and Operation. Hobar Publications
- Practical Farm Buildings. Prentice Hall
- National Electrical Code (latest edition). NFPA
- Ag Wiring Handbook. Rural Electricity Resource Council
- Mechanical Technology in Agriculture. Prentice Hall
- Agricultural Mechanics and Technology Systems, 2nd Edition, <https://www.g-w.com/agricultural-mechanics-technology-systems-2024>
- Agricultural Technical Systems and Mechanics by Koel, Maur, Moniz & Radcliff, American Technical Publishers (ATP)
- Industry websites
 - [Briggs and Stratton](#)
 - [John Deere](#)
 - [New Holland](#)
 - [Lincoln Electric](#)

Request for Reasonable Accommodations

The New Jersey FFA Association is committed to providing equal access to our events and activities for all people. Use this form to request a reasonable accommodation or assistance at least 3 weeks before any state-level events: <https://form.jotform.com/NJFFA/accommodations-request>. A new form will need to be submitted for each event in which a reasonable accommodation is being requested. This information will be kept confidential and will be used only to process the request. Our staff will review the request upon receipt and contact the requestor with additional information. The association cannot

guarantee accommodations or assistance if a form is received less than 3 weeks before an event. Accommodations being requested that require the assistance of another person (nurse, interpreter, scribe, reader, etc.) is the responsibility of the school/requestor. It is also the school/requestor's responsibility to provide any approved equipment to aide in the accommodation process, if applicable.

Artificial Intelligence (AI) Policy and Guidelines

The standard operative procedures allow FFA members to use AI tools to assist them in their learning. Appropriate uses of AI may include generating ideas for any FFA-related assignment, project, contest and award application; checking facts of a phenomenon; or checking for and correcting grammatical errors in a paper written by a member. Specific guidelines for appropriate use, including examples, is provided in the policy. To ensure clarity, a statement outlining ethical AI utilization will be added to program handbooks. Non-compliance with this policy represents plagiarism and will automatically disqualify a member.

Please visit the State Activity Guide, [Artificial Intelligence \(AI\) Policy 1.007](#) to view the full guidelines and best practices.

Professional Integrity

FFA members participating in New Jersey FFA programs and events understand and agree that all work must result from their own effort and ability, created, and completed alone (except for partner or chapter applications). When outside sources (direct quotes or phrases, specific dates, figures, or other materials) are used for a project, document, or application, the required reference citation must be completed according to the rules specified by the applicable handbook.

While participating in National FFA programs, FFA members are prohibited from:

- Plagiarizing
- Violating copyright
- Cheating
- Falsifying information
- Using another person's results or thoughts as their own, even with this person's permission. This includes work done by a family member or a mentor.
- Using information or data obtained from the internet without proper citation.

Any attempt to gain an unfair advantage will not be tolerated. Non-compliance represents plagiarism and will automatically disqualify a member.

Event-Related Competencies

The following list of statements with specific understandings and performances are provided as examples for the systems areas identified. Examination questions are primarily developed from problem-solving categories.

The skills categories are the basis for performance activities. Problem solving activities are developed from both problem-solving and skills categories. In each systems area, the requirements for effective communication, problem-solving activities and the application of modern technology — specifically computers and computer software — are strongly emphasized. Industry has identified important skills, abilities and competencies needed by new employees. These important attributes are *described following the list of system competencies*.

Machinery/Equipment Systems Competencies

- Identify safe machinery operational practices.
- Identify the recommended service and maintenance operations from the operator's manual.
- Identify and use Nebraska Tractor Test or PAMI results.
- Select lubricants for machinery and equipment.
- Identify functions of machinery components.
- Identify parts and functions of hydraulic systems.
- Identify and compute harvest losses.
- Identify safe adjustment [level] on power equipment.
- Select pipe sizes to meet pressure and flow requirements.
- Identify repair procedures, techniques and materials.
- Match tractors to implement.
- Check and adjust driveline components.
- Adjust equipment hitches and drives.
- Install, adjust and service belt and chain drives.
- Select and use test equipment including meters, tachometers and timing devices to determine proper machine operation.
- Adjust and/or calibrate chemical application, seeding, fertilizing, harvesting, processing and materials handling machinery.
- Install, operate, maintain, adjust and evaluate machine systems for field conditions.
- Inflate tires to proper air pressure (e.g., load inflation tables).
- Join metals with appropriate fasteners.
- Select tools and materials for specific repair jobs.
- Select and use appropriate safety equipment.
- Identify safe machinery operation practices for field and highway conditions.
- Identify the recommended service and maintenance operations from the operator's manual.
- Select fuels, lubricants, hydraulic fluids and coolants for proper operation.
- Operation and interpretation of circuit diagrams and flowcharts for electrical, hydraulic, fuel, oil, cooling, intake and exhaust systems.
- Identify the function and operating principles of clutches, transmissions, control devices and brakes.
- Describe principles of power transmission.
- Identify the parts and functions of electrical, hydraulic, lubrication, cooling, governor and fuel systems.
- Select proper ballast for machinery weighting.
- Conduct a pre-operation inspection of a tractor or implement.
- Start, stop and operate machinery/engines.
- Perform recommended periodic service jobs (as found in operator's manuals).
- Conduct on-board tractor monitor checks as identified in operator's manual.
- Select and use engine overhaul equipment, including valve, cylinder, piston, seal and bearing tools.
- Service and maintain fuel, air intake and exhaust, cooling and lubrication systems.
- Operate engine and adjust or check ignition timing, engine speed and carburetor adjustments.

Electrical Systems Competencies

- Use appropriate standards for agricultural applications, including the National Electrical Code (NEC), Electrical Testing Laboratory (ETL), Factory Mutual, Underwriters Laboratory (UL), Canadian Standard Association (CSA) and/or OSHA standards.
- Identify the characteristics of single and three-phase circuits.
- Plan and evaluate proper grounding systems and ground-fault protection.
- Determine volt, amp and ohm relationships (Ohm's and other application laws).
- Select adequate and appropriate lighting fixtures.
- Select motors based upon type of application.
- Interpret electric motor nameplate data.
- Identify electric motors and motor parts.
- Identify methods of providing electric motor protection.
- Interpret power (horsepower, kilowatt), power factor, torque and other motor selection criteria.
- Calculate heating and cooling loads.
- Identify and describe basic principles of controls including thermostats; humidistat; photoelectric; magnetic relays; programmable controllers; proximity switches and sensors; ultrasonics; timers and other time-delay equipment and pressure, motion, limit, float and sail switches.
- Select controls from supply catalogs/websites.
- Select appropriate wire sizes and protection devices for specific circuit loads and lengths.
- Use low-voltage electrical control equipment.
- Use electrical test instruments such as VOA (volt-ohm-amp) meter, DMM (digital multimeter) and tachometer.
- Read schematics and sketch wiring circuits.
- Install service entrance for single phase 120/240V service or three-phase power.
- Connect and operate electrical motors to power source.
- Change the direction of electric motor rotation.
- Select and mount an electric motor on a machine.

Compact Equipment Systems Competencies

Compact Equipment is defined here as being 30 horsepower or less.

- Interpret horsepower, torque and other power measurement criteria.
- Compare costs of alternative machine uses.
- Describe operating principles of two-stroke and four-stroke spark or compression ignition engines.
- Evaluate engine/electric motor performance under load and no-load operation.
- Determine hydraulic cylinder force and speed.
- Interpret wiring diagrams/schematics.
- Identify and select devices for automated systems.
- Match tractors to implements.
- Select energy efficient equipment and materials.
- Identify energy conservation measures to reduce costs and operation(s).
- Determine energy consumption and cost savings of alternatives.
- Conduct equipment pre-operation inspection.
- Start, stop and operate machinery and engines.
- Perform recommended periodic service jobs (as found in operator's manuals).
- Use measuring tools and test instruments such as micrometer and telescoping gauges, dial

indicator, compression tester, torque wrench, VOA (volt-ohm-amp) meter, DMM (digital multi-meter), timing devices, tachometer and dynamometer for determining test procedures.

- Remove, service and replace electrical components.
- Test and service batteries, charging, lighting, warning and cranking systems.
- Select and use engine overhaul equipment, including valve, cylinder, piston, seal and bearing tools.
- Service and maintain fuel, air intake and exhaust, cooling and lubrication systems.
- Operate engine and adjust or check ignition timing, engine speed and carburetor adjustments.
- Measure energy output or consumption by devices and cost savings of alternatives.

Environmental and Natural Resources Systems Competencies

- Identify environmental problems in livestock and crop handling and processing buildings.
- Read and interpret maps including conservation, land use, soils, topographic, aerial, and remote sensing and geological surveys.
- Describe principles involved in appropriate conservation and/or land-use planning.
- Interpret legal land descriptions and determine land area.
- Conduct land surveying practices
- Select terracing and water diversion options for soil conservation.
- Select strip-cropping principles and practices.
- Select water management techniques including grassed waterways, parallel terrace outlets, tile outlet systems and erosion control structures.
- Determine types of vegetative cover and mulch for erosion stabilization.
- Determine and select appropriate cultural tillage or mechanical practices of equipment for specific soil type and residue management.
- Calculate soil loss using universal equations and determine effects of the components of the equations.
- Determine appropriate types, locations and uses of erosion- and sedimentation-control basins.
- Describe and/or calculate surface and subsurface drainage and irrigation techniques.
- Determine land shaping and grading requirements.
- Select irrigation systems for specific conditions.
- Select irrigation equipment and techniques.
- Determine power requirements and pump size for specific applications.
- Apply water pressure, flow and head concepts.
- Select pumps and power sources and compare efficiencies.
- Interpret pump characteristics' curves.
- Utilize GPS systems and components.
- Lay out grade stakes for cuts/fills.
- Determine soil types and select appropriate structures or practices.
- Use water-testing equipment.
- Lay out and map contour lines.
- Measure crop residue on the land.
- Identify soil limitations and determine the effects on land use.
- Assemble turf irrigation equipment.
- Install drainage systems or components.
- Install components of irrigation systems for specific applications.

Structures Systems Competencies

- Determine the size, specifications, and layout of building.
- Develop a bill of materials.
- Interpret plans and working drawings.
- Select and plan concrete construction.
- Interpret lumber and manufactured wood product grade stamps.
- Determine ventilation air requirements for intake and exhaust fan capacity.
- Select alternative construction styles and components (stud frame, post frame, rigid arch and stressed skin).
- Select arc welding machines and accessories.
- Read drawings and welding symbols.
- Test weld quality.
- Select, assemble and check welding equipment and supplies.
- Operate welding equipment and accessories for metal joining operations.
- Select tools and perform operations for cold-metal working.
- Read metal-working plans and prints.
- Select paint and other finishing materials.
- Use and maintain concrete and masonry tools and equipment.
- Fabricate and install reinforcing steel bar and welded wire mesh.
- Select and apply appropriate roofing, insulation and vapor barrier materials.
- Identify types of metals.
- Recommend metals based on load-bearing strength.
- Fuse and braze weld basic joints on mild steel and cast iron.
- Estimate and calculate welding materials costs.
- Cut metal with plasma cutting unit.
- Operate power tools such as nibblers, drills and saws.
- Operate hand tools such as saws and files.
- Select appropriate metals for projects (strength).
- Cut and assemble plastic pipe.
- Solder copper fittings, tubing and copper wire.

General Cluster Skills

- Demonstrate strong interpersonal communication abilities.
- Demonstrate knowledge combined with leadership qualities and the ability to delegate responsibilities.
- Use people skills to deal with customers, the public and large groups.
- Identify and interpret the correct resources to make an educated decision.
- Understand and apply principles of mathematics, economics, biology and physics.
- Have a high level of common sense, logic and critical thinking skills.
- Think independently and analytically.
- Ability to understand and follow detailed instruction — written and oral.
- Display motivation to learn from various methods of instruction.
- Utilize current technologies — computers, electronics, mechanical systems, etc.
- Calculate cost per units, per hour, per bushel, per acre, etc.
- Estimate value of equipment and recommend future buying decisions.
- Use technology to eliminate waste of time and resources.

- Use computer hardware, software, internet, etc.
- Productively use time, money and people.
- Be knowledgeable of global agriculture — encompassing planning, production, marketing and finance.
- Use cash flow for critical business planning and operation.
- Measure and estimate costs and develop plans for business/ industry improvements.
- Write annual goals with specific objectives and measurement tools for review.
- Demonstrate skills in business operations and management.
- Use a systematic approach to diagnose equipment problems.
- Service and maintain equipment to maintain optimum productivity.
- Use on-board computerized systems that monitor, test, store and report equipment operation.
- Be familiar with computerized recognition of crop productivity and quality, field conditions and pests.
- Understand electrical circuits — amperage, watts, voltage, resistance and transistors.
- Understand hydraulic system operation — flow, resistance and temperature.
- Understand mechanical system operation — mechanical advantage, material specifications and gear design.
- Read schematics and replace components, including control modules.
- Diagnosis electrical, computer, mechanical and hydraulic systems.
- Analyze mechanical system failures.

Safety Rubric

5 POINTS (TO BE SCORED AT EACH INDIVIDUAL STATION FOR A TOTAL OF 25 POINTS)

	Very strong evidence of skill 2 points	Moderate evidence of skill 1 points	Weak evidence of skill 0 points	Points Earned	Total Points
Safety glasses	Safety glasses are worn at all times with one or no reminders.	Safety glasses are worn most of the time with two to three reminders.	Safety glasses are worn rarely with four or more reminders.		
Safety practices	Safety practices used at all times.	Safety practices used most of the time with minor violations.	Moderate to major violations of safety practices observed.		
	Very strong evidence of skill 1 points	Moderate evidence of skill 0 points	Weak evidence of skill 0 points	Points Earned	Total Points
Injuries	No injuries occurred during the activity.	Minor injuries occurred during the activity requiring no medical attention.	Moderate to severe injuries occurred during the activity.		
TOTAL POINTS EARNED OUT OF 5 POSSIBLE					

Written Exam A									
1	A B C D E	21	A B C D E	41	A B C D E	61	A B C D E	81	A B C D E
2	A B C D E	22	A B C D E	42	A B C D E	62	A B C D E	82	A B C D E
3	A B C D E	23	A B C D E	43	A B C D E	63	A B C D E	83	A B C D E
4	A B C D E	24	A B C D E	44	A B C D E	64	A B C D E	84	A B C D E
5	A B C D E	25	A B C D E	45	A B C D E	65	A B C D E	85	A B C D E
6	A B C D E	26	A B C D E	46	A B C D E	66	A B C D E	86	A B C D E
7	A B C D E	27	A B C D E	47	A B C D E	67	A B C D E	87	A B C D E
8	A B C D E	28	A B C D E	48	A B C D E	68	A B C D E	88	A B C D E
9	A B C D E	29	A B C D E	49	A B C D E	69	A B C D E	89	A B C D E
10	A B C D E	30	A B C D E	50	A B C D E	70	A B C D E	90	A B C D E
11	A B C D E	31	A B C D E	51	A B C D E	71	A B C D E	91	A B C D E
12	A B C D E	32	A B C D E	52	A B C D E	72	A B C D E	92	A B C D E
13	A B C D E	33	A B C D E	53	A B C D E	73	A B C D E	93	A B C D E
14	A B C D E	34	A B C D E	54	A B C D E	74	A B C D E	94	A B C D E
15	A B C D E	35	A B C D E	55	A B C D E	75	A B C D E	95	A B C D E
16	A B C D E	36	A B C D E	56	A B C D E	76	A B C D E	96	A B C D E
17	A B C D E	37	A B C D E	57	A B C D E	77	A B C D E	97	A B C D E
18	A B C D E	38	A B C D E	58	A B C D E	78	A B C D E	98	A B C D E
19	A B C D E	39	A B C D E	59	A B C D E	79	A B C D E	99	A B C D E
20	A B C D E	40	A B C D E	60	A B C D E	80	A B C D E	100	A B C D E

Written Exam B									
1	A B C D E	21	A B C D E	41	A B C D E	61	A B C D E	81	A B C D E
2	A B C D E	22	A B C D E	42	A B C D E	62	A B C D E	82	A B C D E
3	A B C D E	23	A B C D E	43	A B C D E	63	A B C D E	83	A B C D E
4	A B C D E	24	A B C D E	44	A B C D E	64	A B C D E	84	A B C D E
5	A B C D E	25	A B C D E	45	A B C D E	65	A B C D E	85	A B C D E
6	A B C D E	26	A B C D E	46	A B C D E	66	A B C D E	86	A B C D E
7	A B C D E	27	A B C D E	47	A B C D E	67	A B C D E	87	A B C D E
8	A B C D E	28	A B C D E	48	A B C D E	68	A B C D E	88	A B C D E
9	A B C D E	29	A B C D E	49	A B C D E	69	A B C D E	89	A B C D E
10	A B C D E	30	A B C D E	50	A B C D E	70	A B C D E	90	A B C D E
11	A B C D E	31	A B C D E	51	A B C D E	71	A B C D E	91	A B C D E
12	A B C D E	32	A B C D E	52	A B C D E	72	A B C D E	92	A B C D E
13	A B C D E	33	A B C D E	53	A B C D E	73	A B C D E	93	A B C D E
14	A B C D E	34	A B C D E	54	A B C D E	74	A B C D E	94	A B C D E
15	A B C D E	35	A B C D E	55	A B C D E	75	A B C D E	95	A B C D E
16	A B C D E	36	A B C D E	56	A B C D E	76	A B C D E	96	A B C D E
17	A B C D E	37	A B C D E	57	A B C D E	77	A B C D E	97	A B C D E
18	A B C D E	38	A B C D E	58	A B C D E	78	A B C D E	98	A B C D E
19	A B C D E	39	A B C D E	59	A B C D E	79	A B C D E	99	A B C D E
20	A B C D E	40	A B C D E	60	A B C D E	80	A B C D E	100	A B C D E

