Cierre de Avalúo
Departamento de Física

Dr. José D. Alemar

Evolution of Physics for Engineers
Department of Physics UPRM

Phys 104: Mechanics, 4cr	Phys 107 1 cr
Phys 105: Heat and Sound, 4cr	Phys 108 1 cr
Phys 204: Electricity and Magnetism, 4cr	Phys 207 1 cr
Phys 205: Optics and Modern Physics, 4cr	Phys 208 1 cr

Up to 69-70

Phys 251 (3011): Mechanics, 3cr	Phys 253 (3013) 1cr
Phys 252 (3012): Electricity and Magnetism, 3cr	Phys 353 (4026) 1cr
Phys 351 (4025): Waves in Classical and Modern Physics, 3cr	

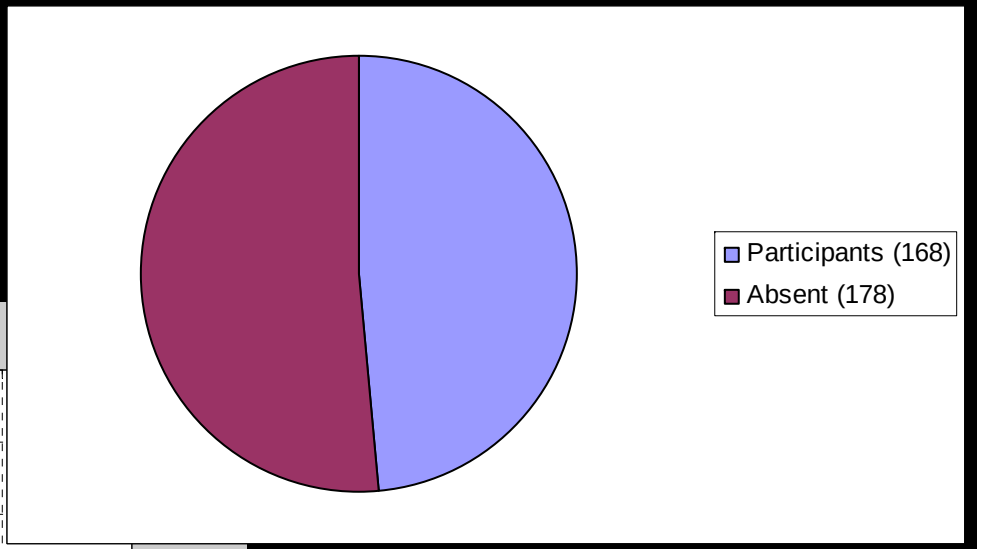
From 70-71 to 82-83

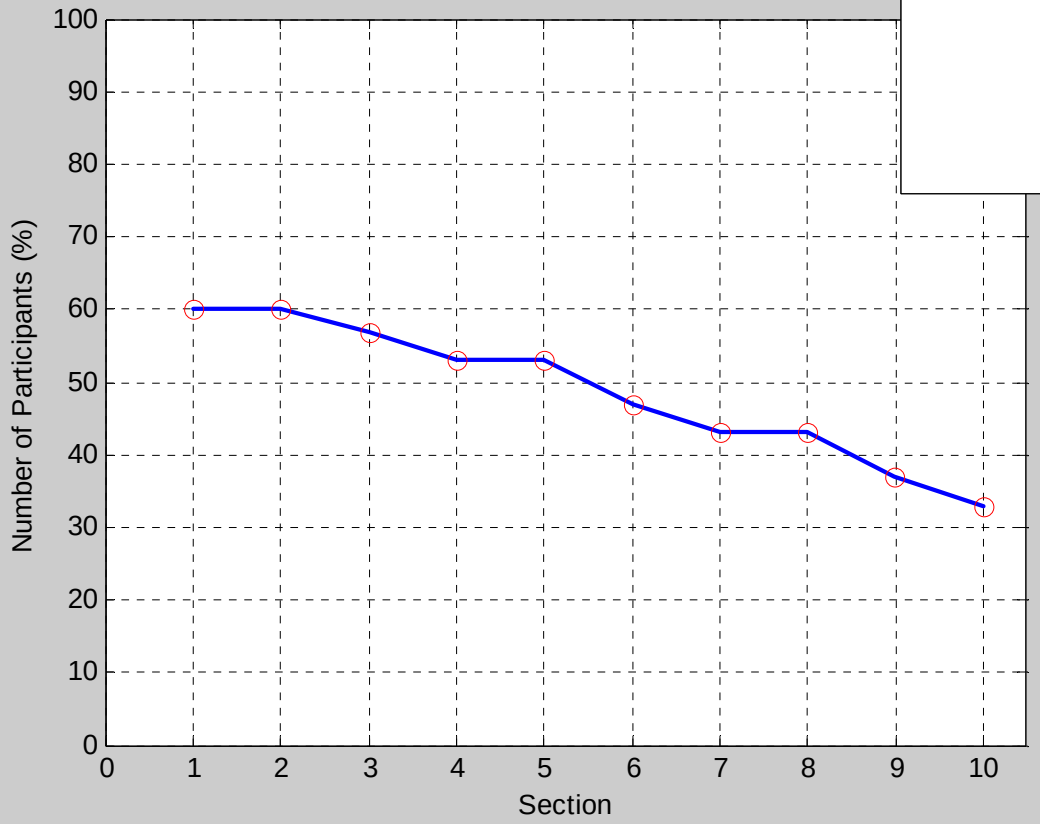
Phys 3171: Physics I, 4cr	Phys 3173 1 cr
Phys 3172: Physics II, 4cr	Phys 3174 1 cr

From 83-84 to now

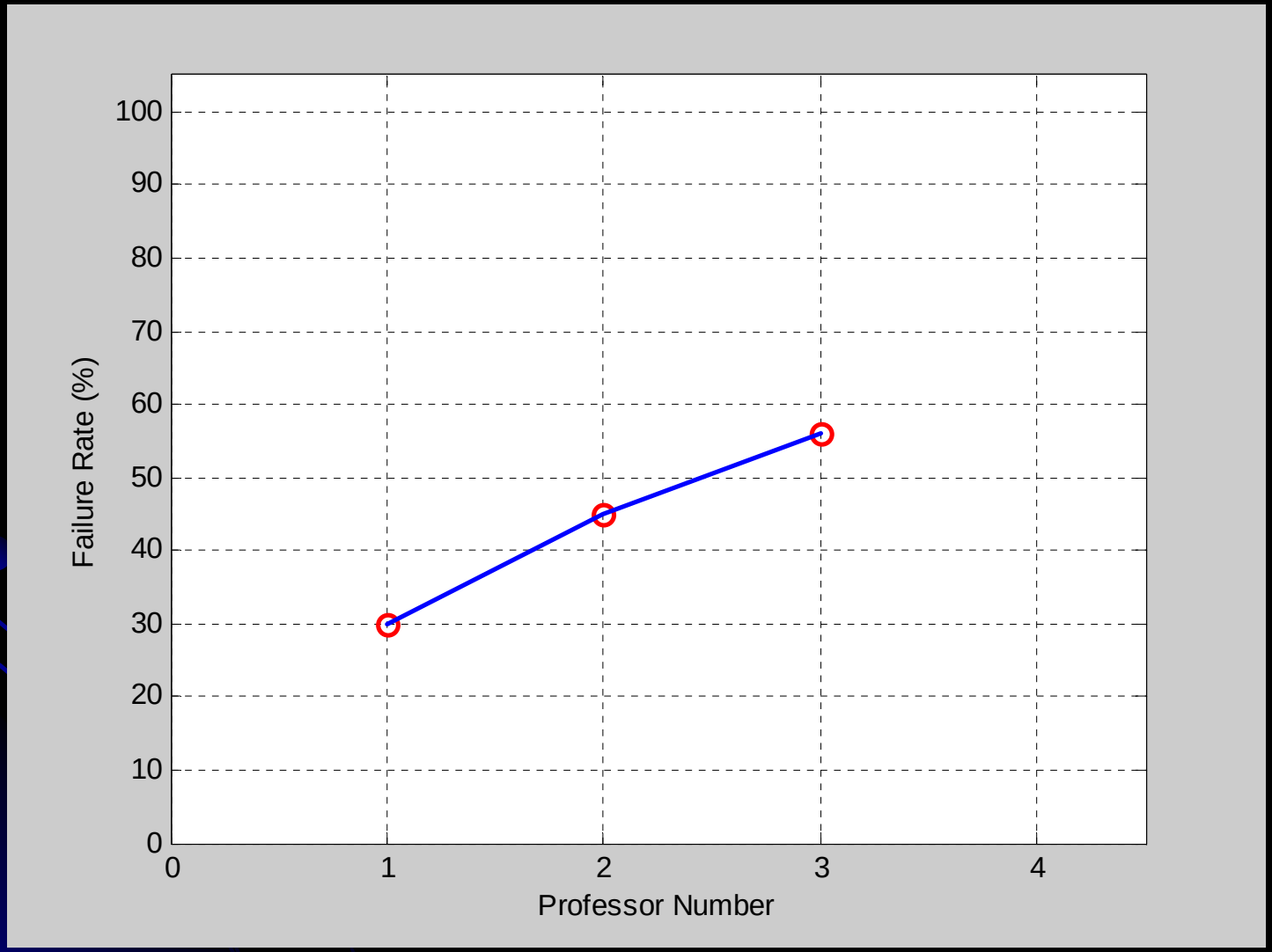
Participation in Questionnaire

Questionnaire given in 10 sections of PHYS 3172 with a total enrollment of 346 students, in a 2 weeks period.



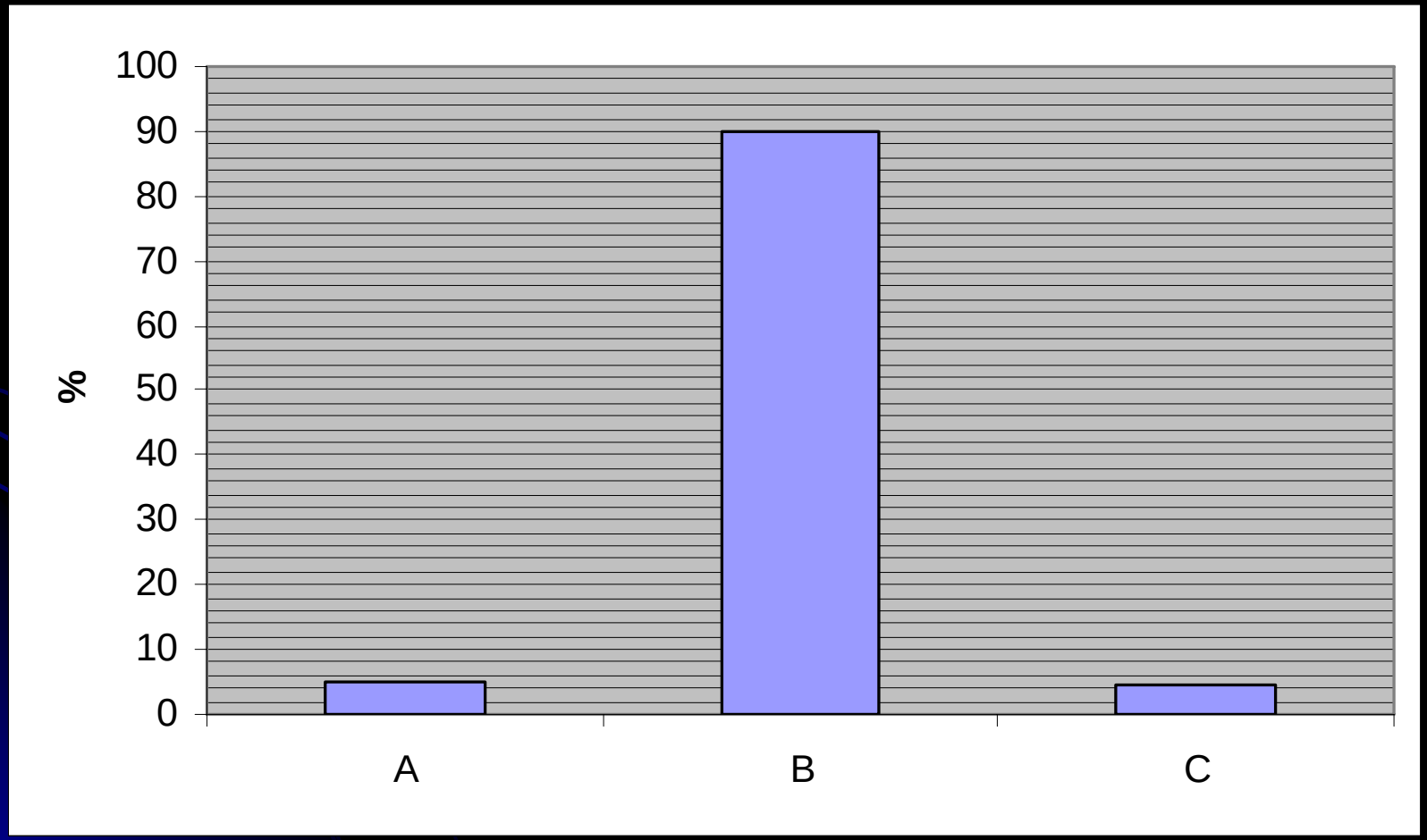


Failures (F&W) in PHYS 3172



1. Soy estudiante de
   a.física
   b.ingeniería
   c.otro departamento/facultad

I am a student from
   a. physics
   b. engineering
   c. another department/faculty



2. Tomé FISI 3171 (3161)

a.el semestre pasado

b.hace 2 semestres

c.hace 3 semestres

d.hace más de 3 semestres

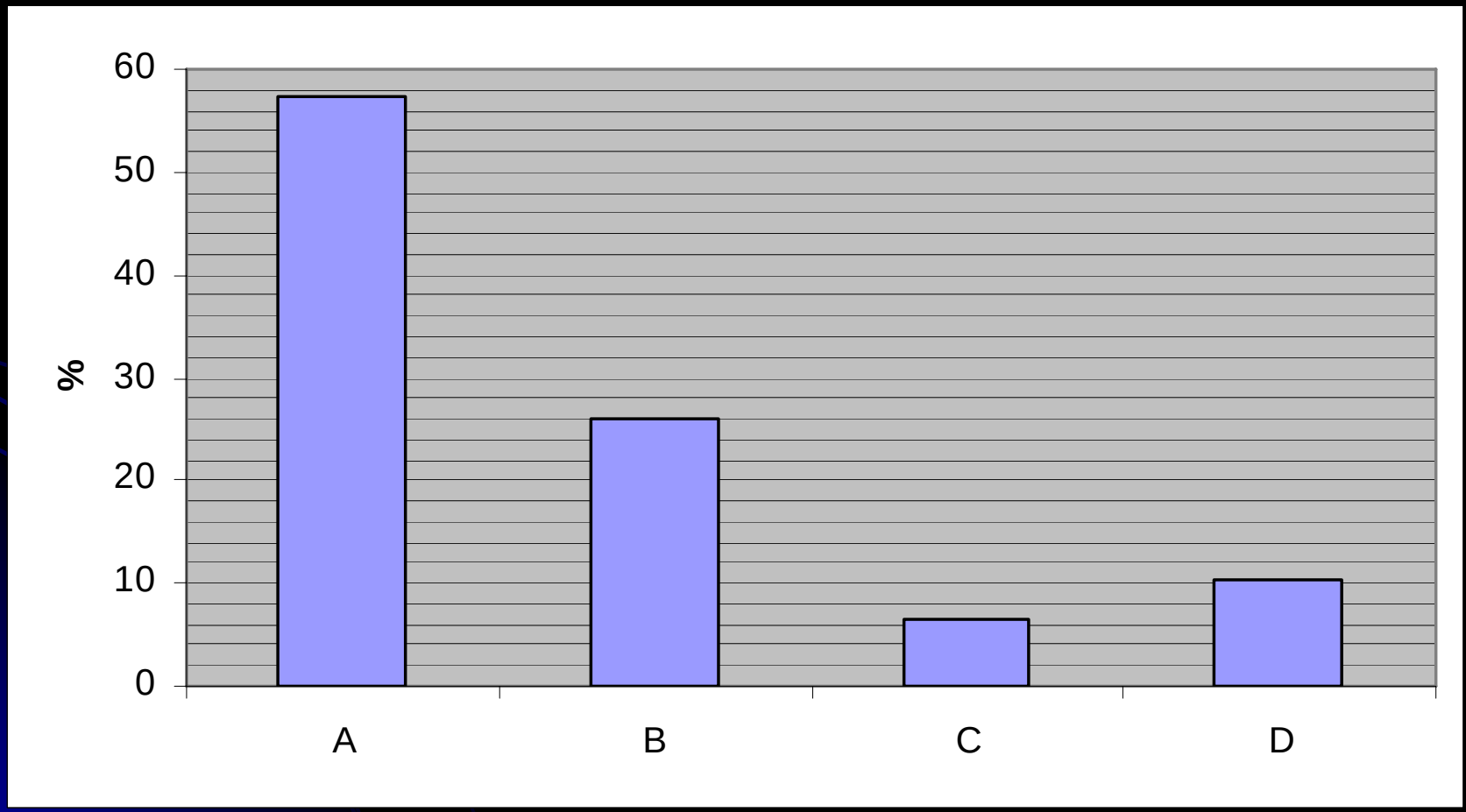
I approved Phys 3171 (3161)

a. last semester

b. two semesters ago

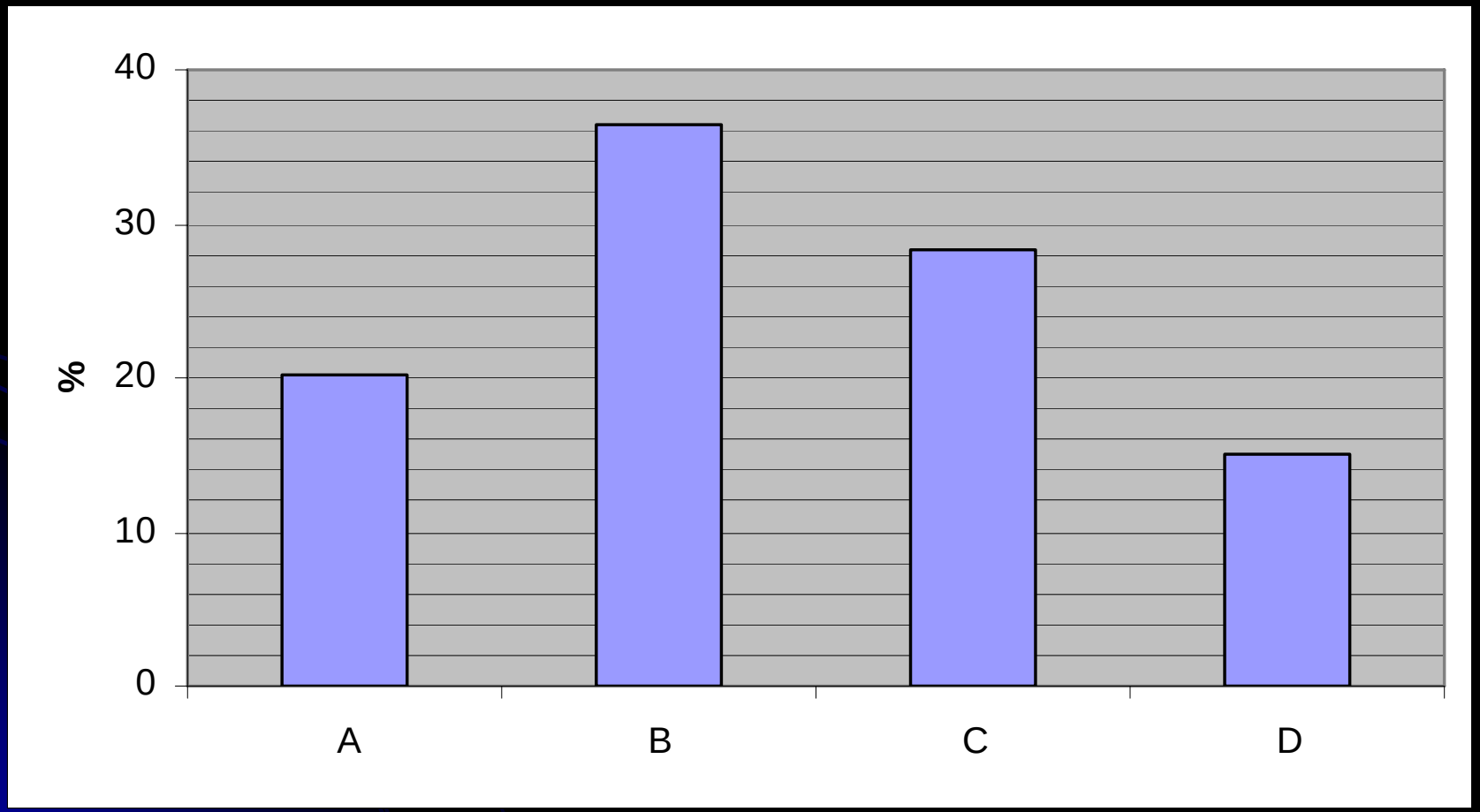
c. three semesters ago

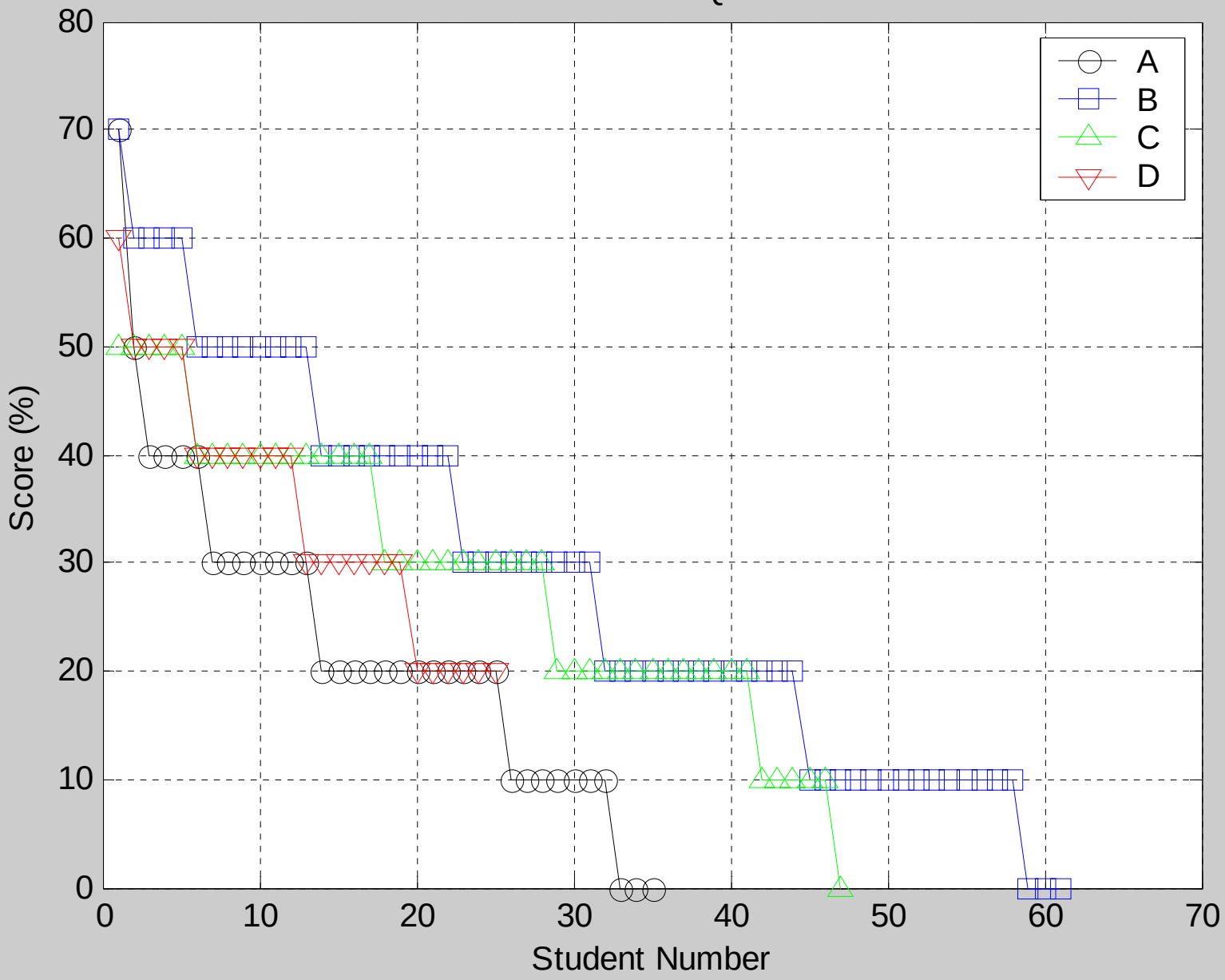
d. more than 3 semesters ago



3. Mi nota en FISI 3171 (3161) fue
a. A
b. B
c. C
d. D

My grade in PHYS 3171 (3161) was:
a. A
b. B
c. C
d. D

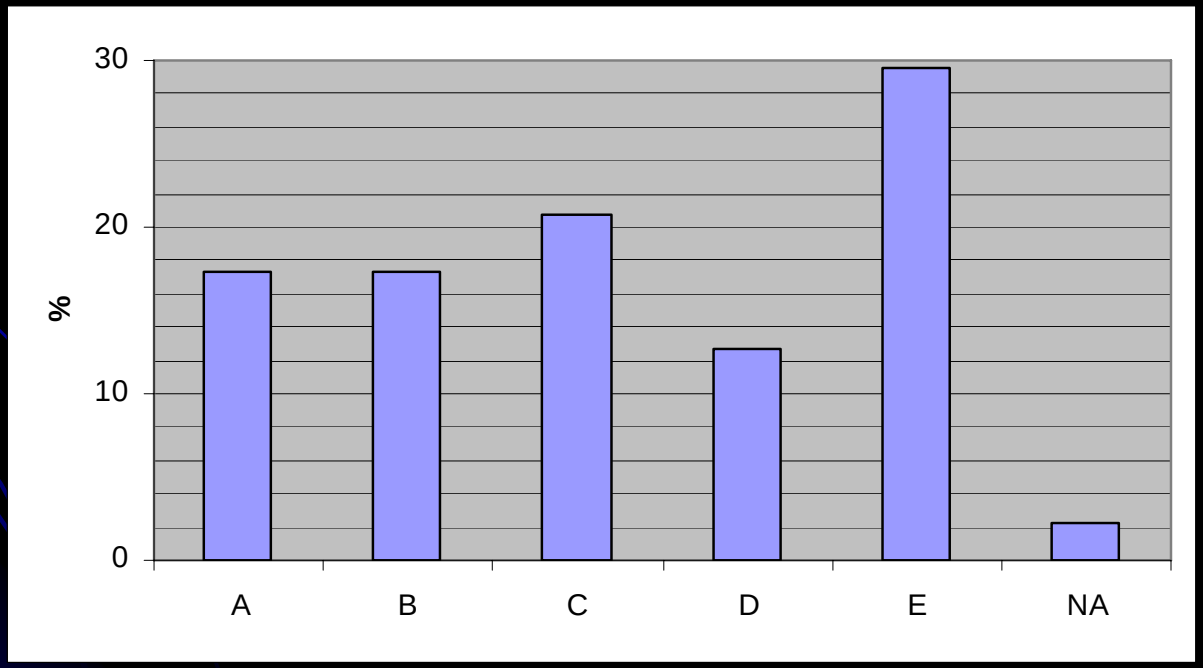


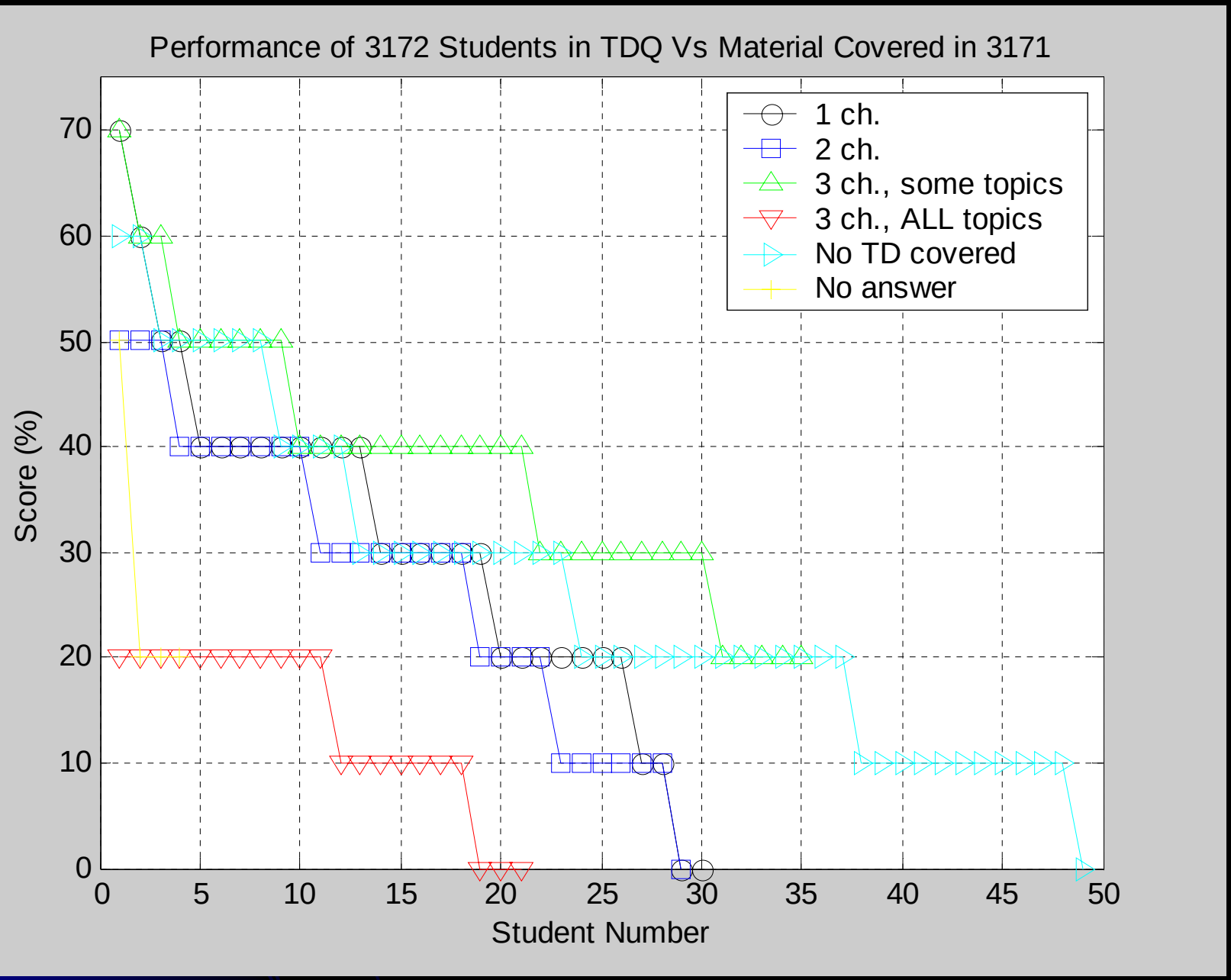

Performance of 3172 Students in TDQ Vs Grade Obtained in 3171
Score (%)
Student Number
A
B
C
D
0
10
20
30
40
50
60
70
80

4. En el prontuario de FISI 3171 hay tres capítulos de termodinámica. Mi profesor cubrió más o menos
    a. 1 capítulo
    b. 2 capítulos
    c. 3 capítulos, omitiendo algunos temas en el prontuario
    d. 3 capítulos (todos los temas del prontuario)
    e. no discutimos termodinámica

In the PHYS 3171 syllabus there are three chapters about thermodynamics. My professor discussed, more or less,

a. 1 chapter
b. 2 chapters
c. 3 chapters, omitting certain topics
d. 3 chapters (all topics in the syllabus)
e. thermodynamics was not discussed

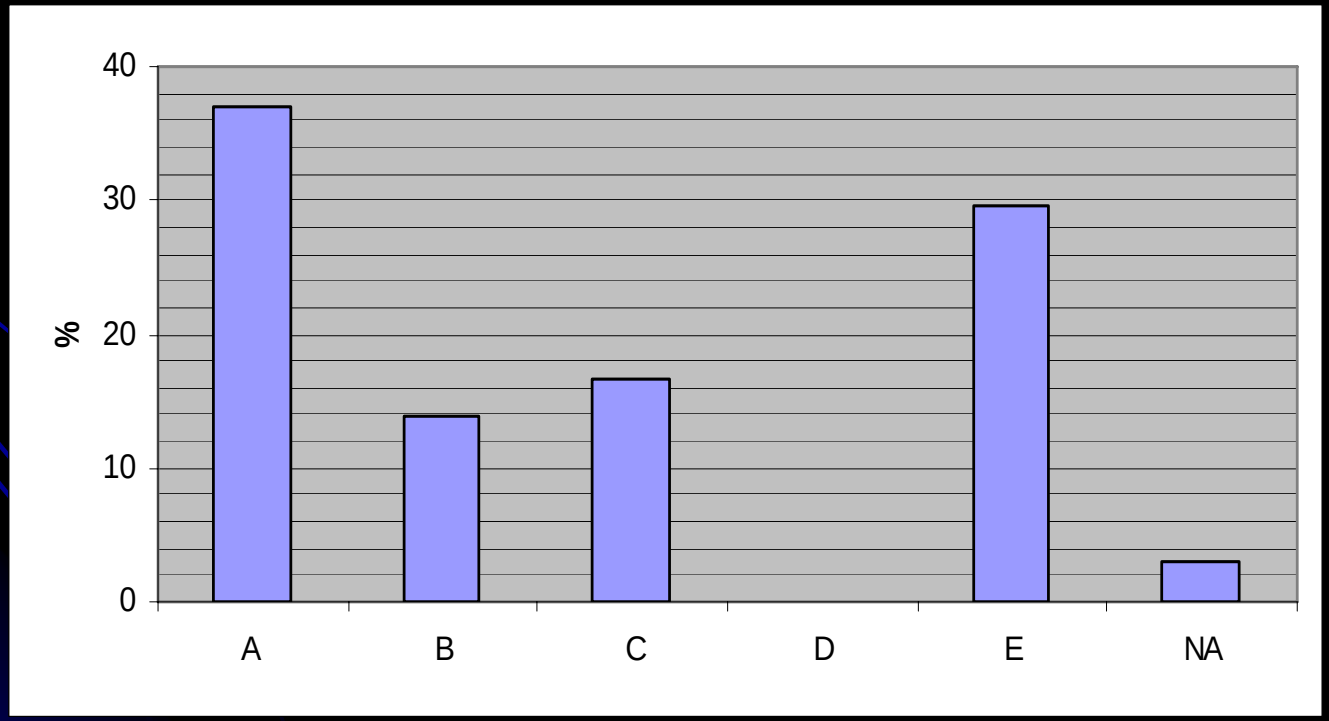



Performance of 3172 Students in TDQ Vs Material Covered in 3171
Score (%)
Student Number
0
10
20
30
40
50
60
70
0
5
10
15
20
25
30
35
40
45
50
1 ch.
2 ch.
3 ch., some topics
3 ch., ALL topics
No TD covered
No answer

5. La temperatura absoluta de un gas es una medida de
    a. la energía cinética total de las moléculas
    b. la energía potencial de las moléculas
    c. la energía cinética de traslación de las moléculas ←
    d. el tamaño de las moléculas
    e. la energía total de las moléculas

The temperature of a gas is most closely related to:

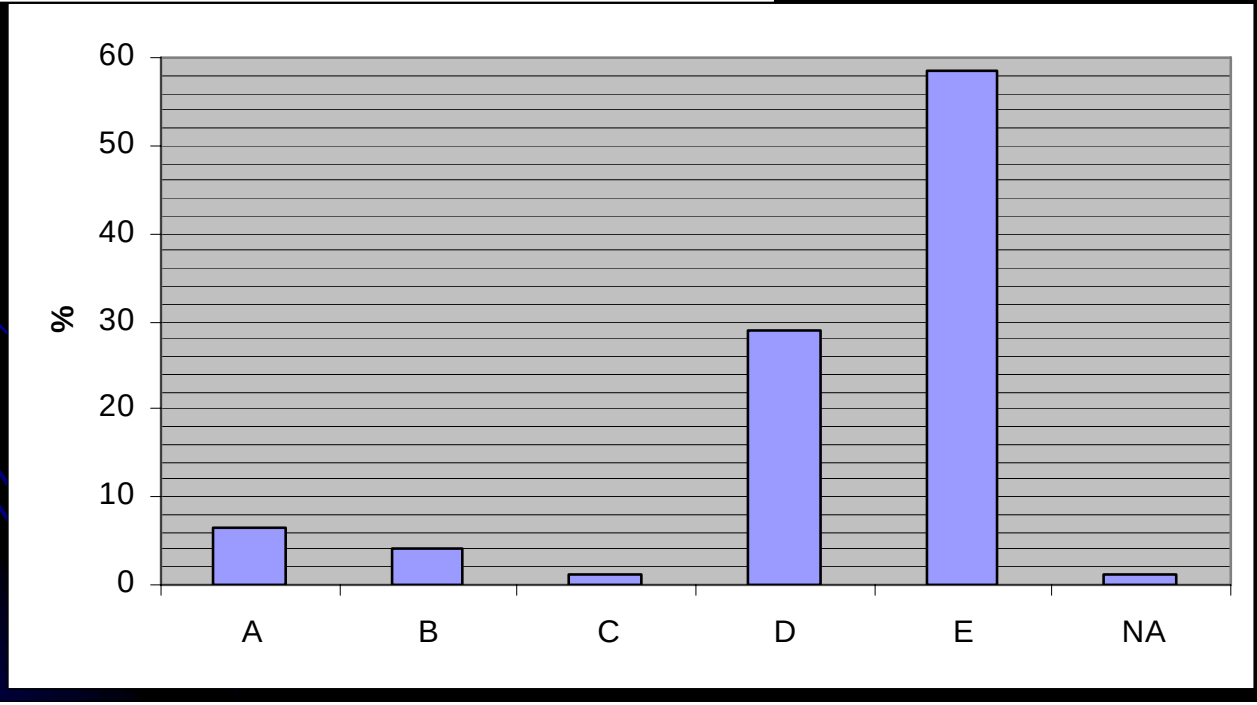
A. its total molecular kinetic energy
B. the potential energy of its molecules
C. the kinetic energy of translation of its molecules
D. the sizes of its molecules
E. the total energy of its molecules



6. La energía interna de un gas ideal depende de
    a. la temperatura solamente ←
    b. la presión solamente
    c. el volumen solamente
    d. la presión y la temperatura solamente
    e. temperatura, presión y volumen

The internal energy of an ideal gas depends on:

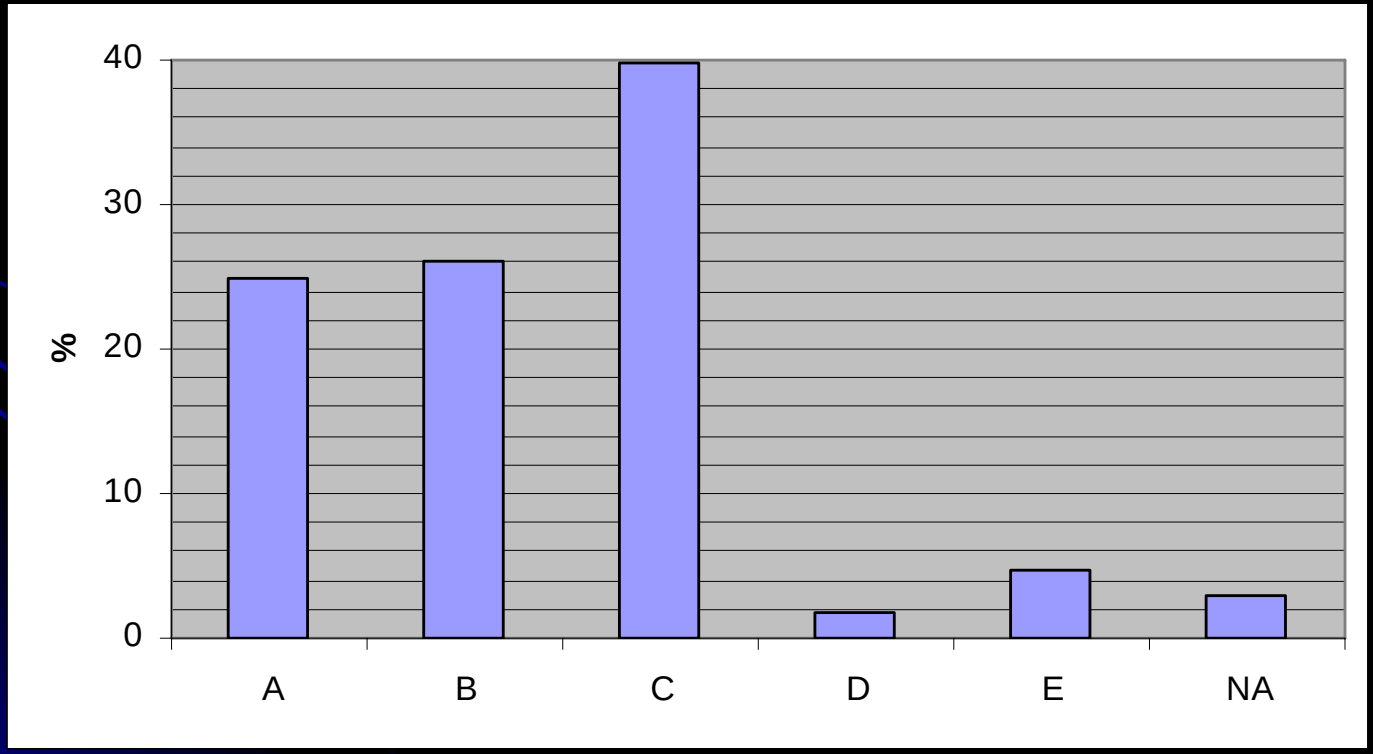
a. the temperature only
b. the pressure only
c. the volume only
d. the temperature and pressure only
e. temperature, pressure, and volume



7. Un cuerpo C está en equilibrio térmico con un cuerpo A y otro cuerpo B. La ley cero de termodinámica dice
    a. que C siempre estará en equilibrio térmico con A y B
    b. que C debe transferir energía a ambos cuerpos A y B
    c. que A y B están en equilibrio térmico ←
    d. que A no puede estar en equilibrio térmico con B
    e. nada sobre la relación de A y B

Suppose object C is in thermal equilibrium with object A and with object B. The zeroth law of thermodynamics states:

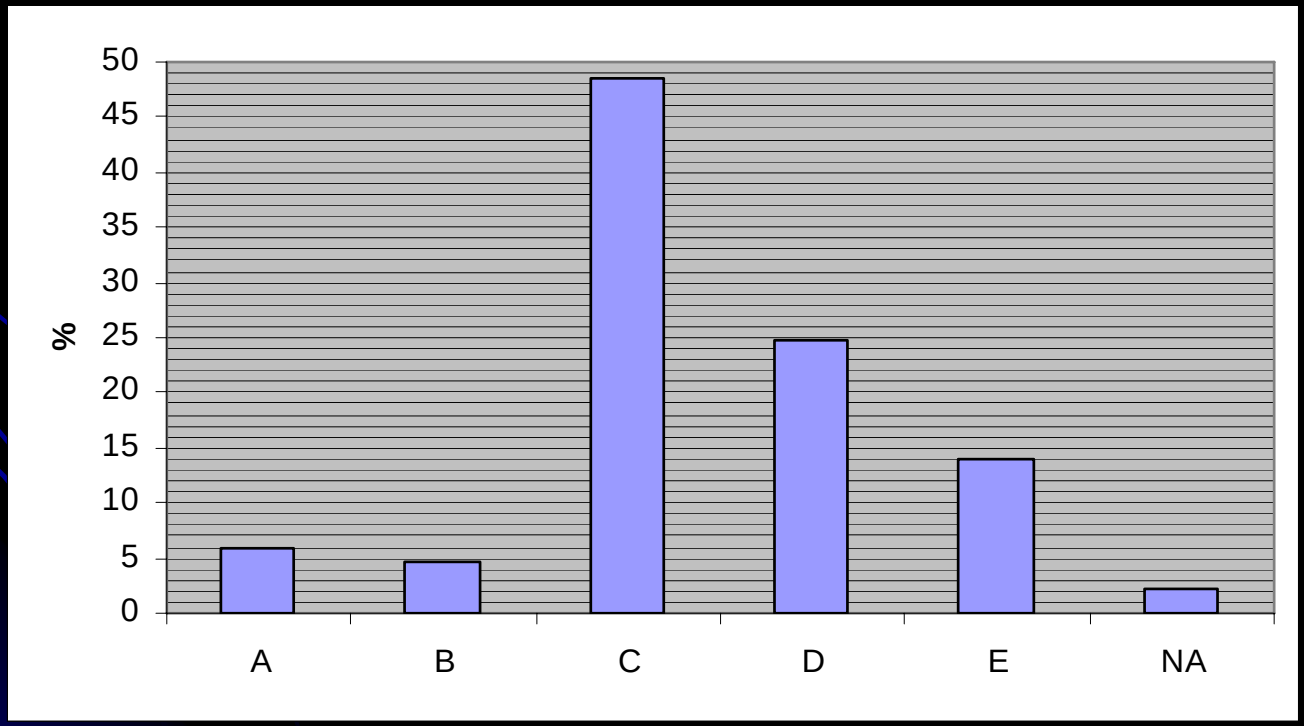
a. that C will always be in thermal equilibrium with both A and B
b. that C must transfer energy to both A and B
c. that A is in thermal equilibrium with B
d. that A cannot be in thermal equilibrium with B
e. nothing about the relationship between A and B



8. La ley cero de termodinámica nos permite definir
    a. trabajo
    b. presión
    c. energía interna
    d. calor
    e. temperatura ←

The zeroth law of thermodynamics allows us to define:

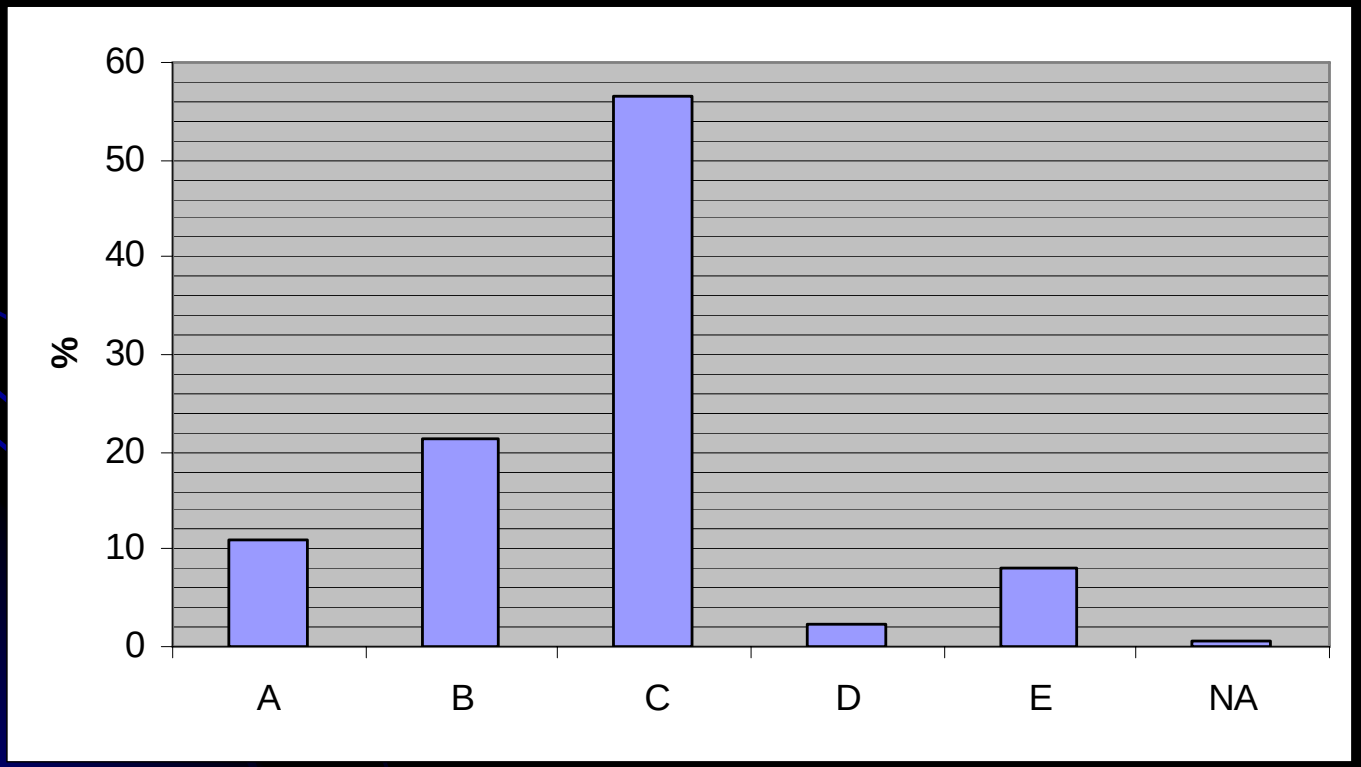
a. work
b. pressure
c. internal energy
d. heat
e. temperature



9. Calor es
    a. una propiedad que tienen los cuerpos debido a su temperatura
    b. el contenido energético de un objeto
    c. la energía transferida debido a una diferencia en temperatura ←
    d. igual a una diferencia en temperatura
    e. energía transferida usando trabajo macroscópico

Heat is:

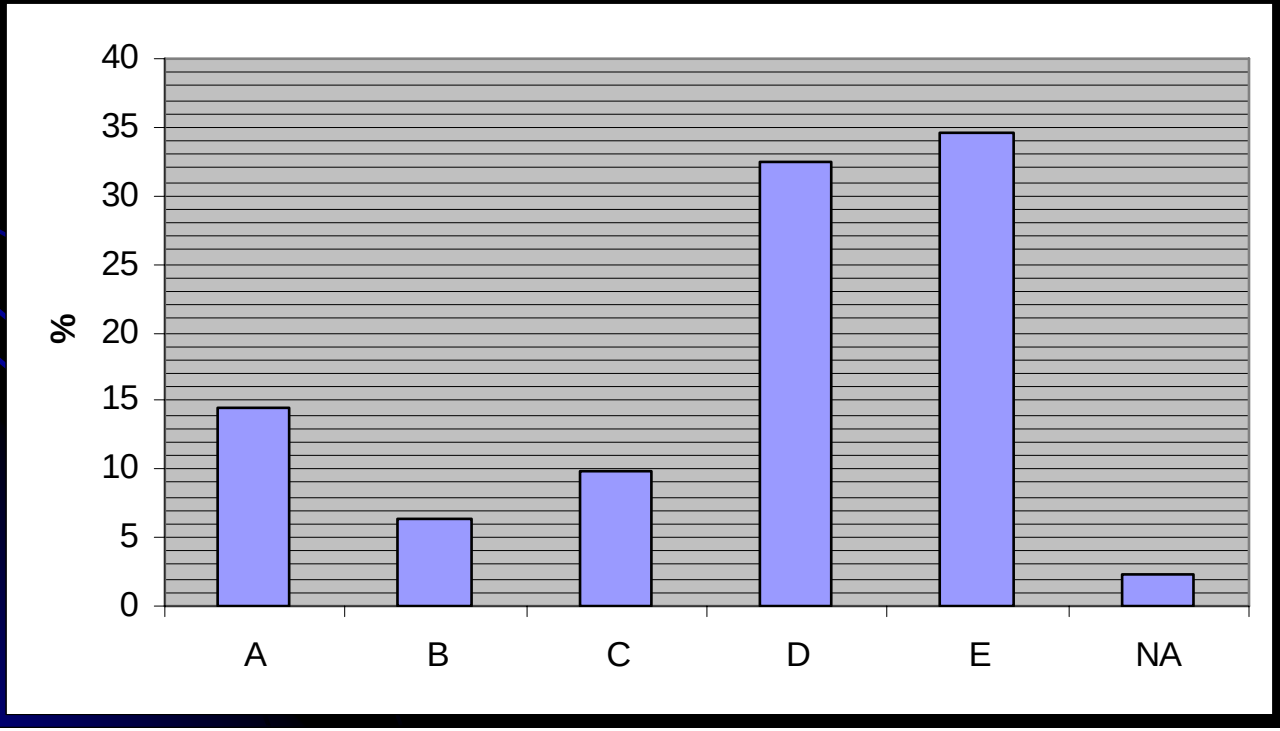
a. a property objects have by virtue of their temperatures
b. energy content of an object
c. energy transferred by virtue of a temperature difference
d. a temperature difference
e. energy transferred by macroscopic work



10. Dos objetos de diferente material tienen igual masa y temperatura. Al añadirles igual cantidad de calor, la temperatura final de cada uno puede ser diferente ya que tienen diferente
    a. densidad
    b. volumen
    c. coeficiente de expansión
    d. calor específico ←
    e. conductividad térmica

Two different samples have the same mass and temperature. Equal quantities of energy are absorbed as heat by each. Their final temperatures may be different because the samples have different:

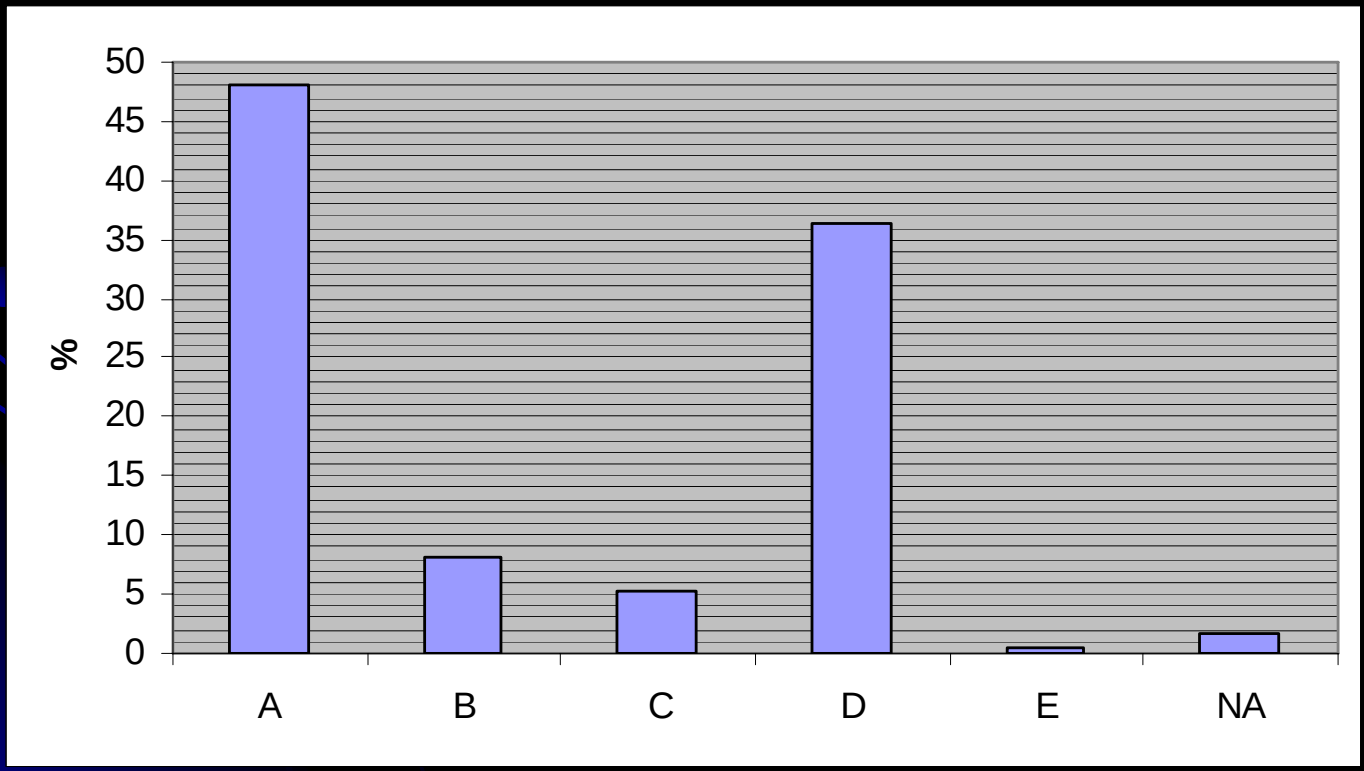
a. densities
b. volumes
c. coefficients of expansion
d. specific heat
e. thermal conductivities



11. La formación de hielo a partir de agua envuelve
   a. una reducción en temperatura
   b. la absorción de energía en forma de calor
   c. una reducción en volumen
   d. la liberación de energía en forma de calor ←
   e. un aumento en temperatura

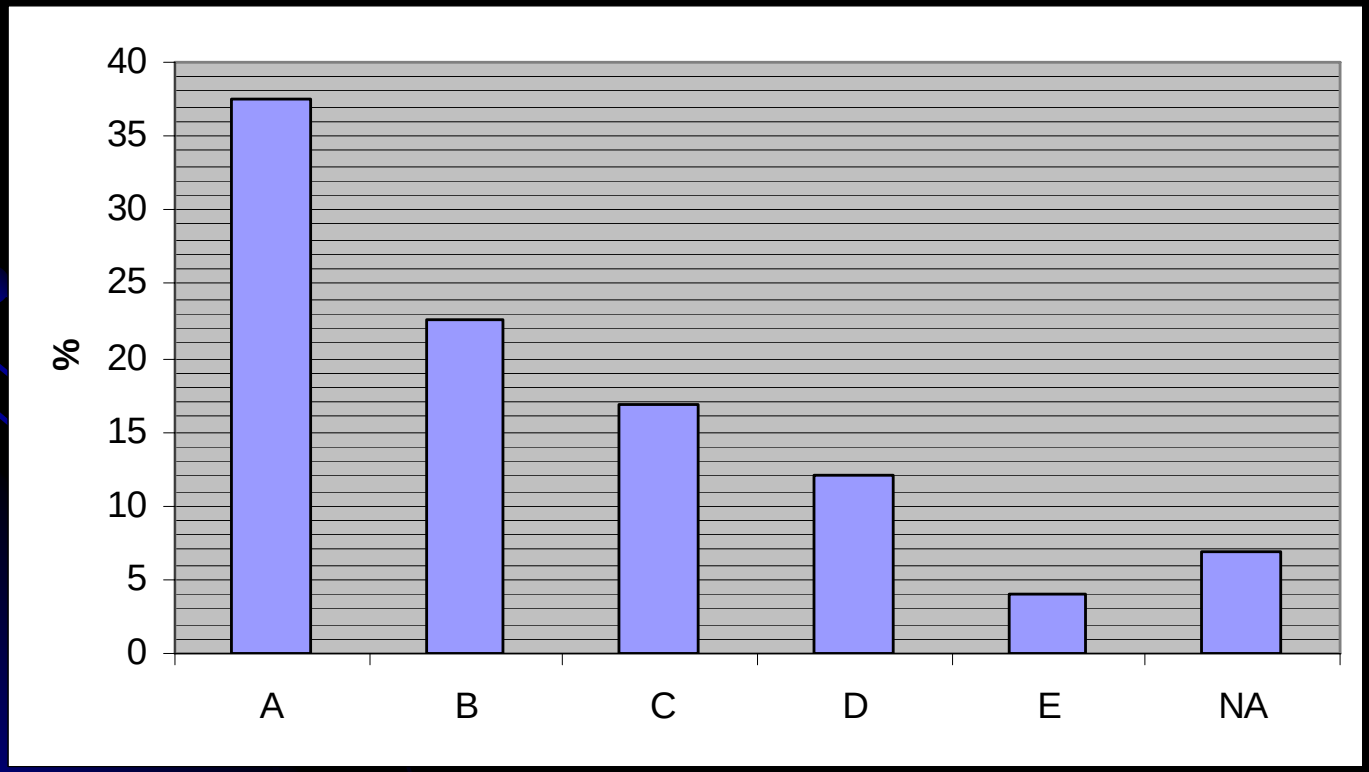
The formation of ice from water is accompanied by:

A. temperature decrease
B. absorption of energy as heat
C. decrease in volume
D. release of energy as heat
E. temperature increase



12. En un proceso adiabático de un gas ideal
   a. no hay intercambio de calor ←
   b. la temperatura es constante
   c. la presión es constante
   d. hay intercambio de calor
   e. el volumen es constante

During an adiabatic process of a gas:
   a. no energy enters or leaves as heat
   b. the temperature is constant
   c. the pressure remains constant
   d. energy is added/removed as heat
   e. the volume is constant

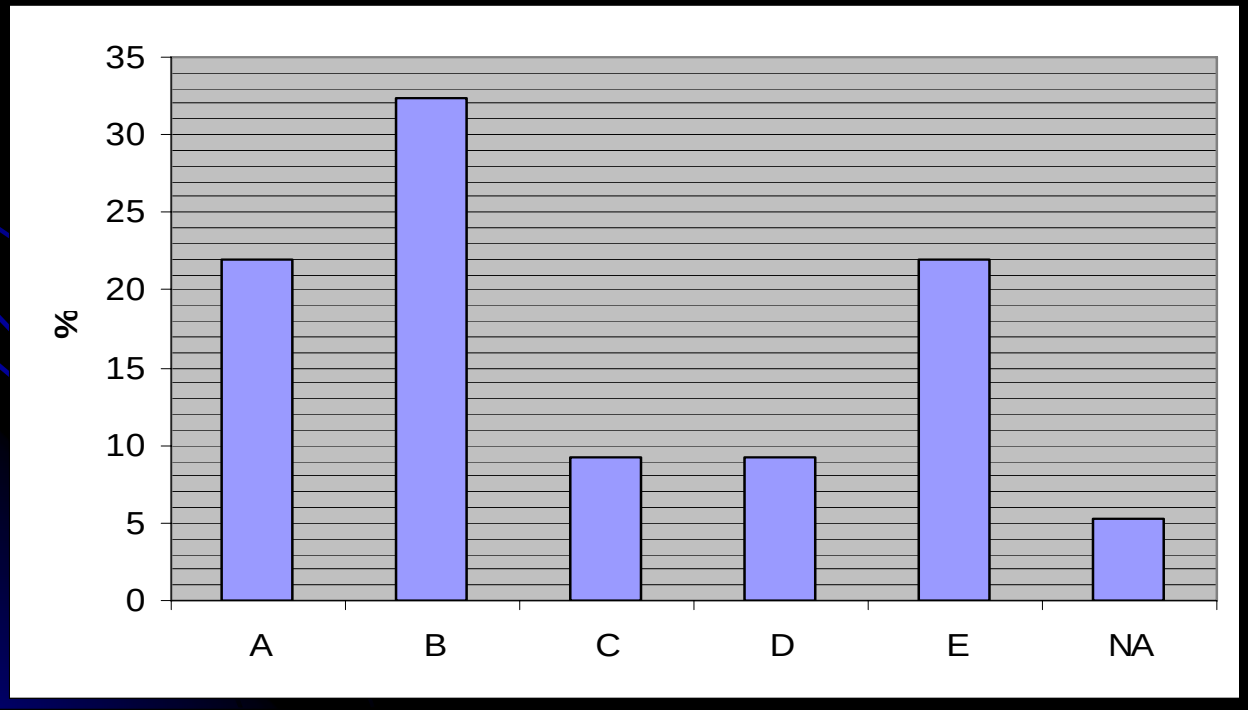


13. De acuerdo a la segunda ley de termodinámica
    a. el calor no se puede convertir completamente en trabajo
    b. el trabajo no se puede convertir completamente en calor
    c. todos los motores de calor tienen la misma eficiencia
    d. es imposible transmitir calor de un foco frío a uno caliente
    e. es imposible construir un motor de calor que sea 100% eficiente ←

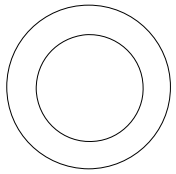
According to the second law of thermodynamics:

a. heat energy cannot be completely converted to work
b. work cannot be completely converted to heat energy
c. all heat engines have the same efficiency (~~for all cyclic processes we have $dQ/T < 0$~~)
d. is not possible to transfer heat from a colder object to a hot object (~~the reason all heat engine efficiencies are less than 100% is friction, which is unavoidable~~)
e. is impossible to construct a heat engine that has 100% efficiency (~~all of the above are true~~)

ans: E (answer given in Solution Manual was A)

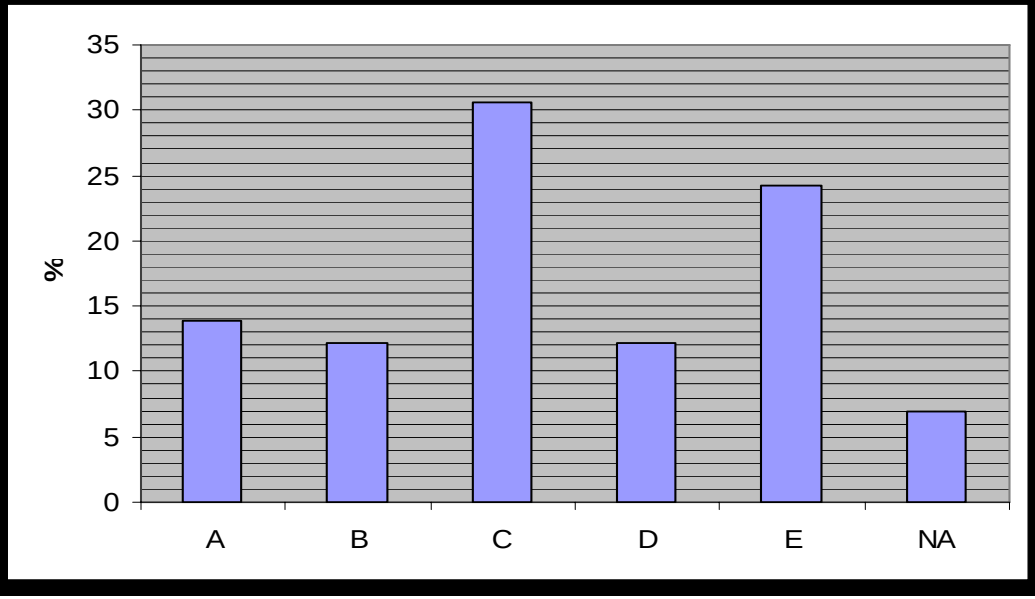


14. Añadimos calor a un anillo de aluminio.
    a. el aluminio se expande hacia afuera, pero el hueco se queda igual
    b. el hueco disminuye en diámetro
    c. el área del hueco se expande en igual por ciento que cualquier área del aluminio ←
    d. el área del hueco se expande en mayor proporción que cualquier área del aluminio
    e. la expansión lineal hace que el anillo adquiera forma un poco elíptica

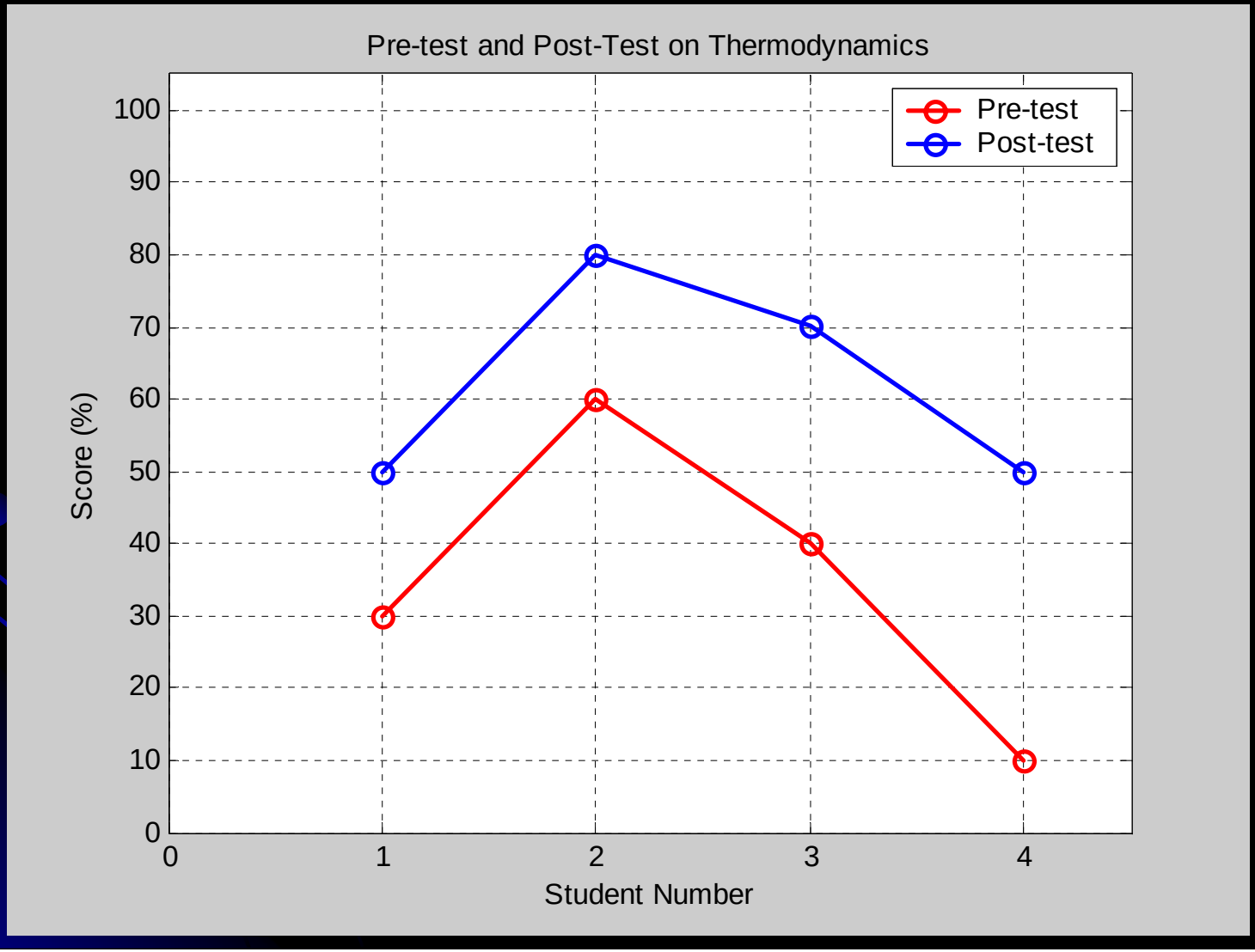


An annular ring of aluminum is cut from an aluminum sheet as shown. When this ring is heated:

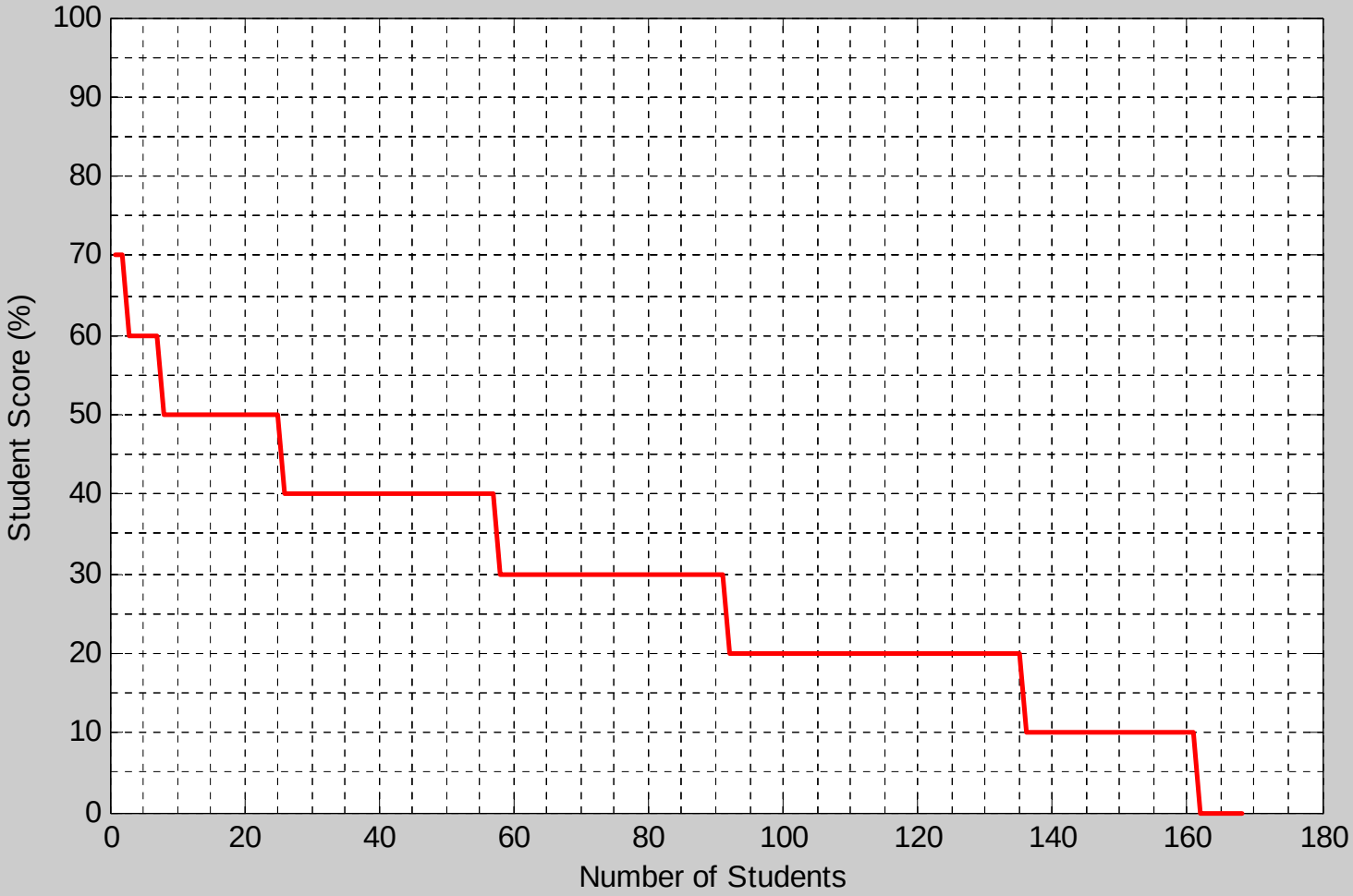
a. the aluminum expands outward and the hole remains the same in size
b. the hole decreases in diameter
c. the area of the hole expands the same percent as any area of the aluminum
d. the area of the hole expands a greater percent than any area of the aluminum
e. linear expansion forces the shape of the hole to be slightly elliptical



Performance of Seminar Students in Thermodynamics (TD) Survey



3172 Students Performance in TD Survey



Results

- More than 40% of students taking 3172 last semester, had taken 3171 2 or more semesters earlier. They either waited one or more semesters between courses or are repeaters.
- Only 13% of students were exposed to ALL TD topics in the syllabus. They got the lowest score in TD survey. Almost 30% got not coverage. On the positive side, about 70% got some TD coverage.
- More than 50% of participants in the questionnaire obtained either A or B in Physics 3171. This is not reflected in the low student performance a few months later. ARE WE INFLATING GRADES?

Conclusions, Recommendations

- We urgently need a set of standards clearly indicating what should be covered (course extent) and in what detail (course depth).
- Common exams…here we go again. Should be implemented, with the participation of all professors teaching the course. Exam preparation should be done by consensus, not by imposition…like we used to.
- Exam reviews and similar activities that tend to cater pandering should be avoided.
- The curve used for the grades should be decided between all professors teaching the course in one or several meetings…like we used to.
- We have gone from order to disorder (As predicted by Second Law of TD?). We can go from disorder to order with work…and love.