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ABSTRACT

This is one form of three performance checks booklets (A, B, and C) for two texts of Level III of the Intermediate Science Curriculum Study (ISCS). These two texts are Why You're You (WYY), and Investigating Variation (IV). The 12 performance checks booklets for Level III are considered one of four major subdivisions of a set of individualized evaluation materials for Level III of the ISCS. This booklet (form A), developed to assess the students' achievement of the objectives of the WYY and IV texts of Level III, contains a set of performance checks which are equivalent to the performance checks of the other two forms (B and C). Each performance check has its own code number which indicates the unit number and identifies whether it is based on core material or excursions. Directions for students' use of performance checks are also included. (HM)

INTERMEDIATE SCIENCE CURRICULUM STUDY

ISCS

INDIVIDUALIZED TESTING SYSTEM

Performance Checks

ISCS LEVEL III

WYY-IV

FORM A

SILVER BURDETT
GENERAL LEARNING CORPORATION
Morristown, New Jersey · Park Ridge, Ill. · Palo Alto · Dallas · Atlanta

INDIVIDUALIZED TESTING SYSTEM

ALL LEVELS	**Individualizing Objective Testing** (an ITP module) **Evaluating and Reporting Progress** (an ITP module)
LEVEL I	**Performance Objectives**, ISCS Level I **Performance Checks**, ISCS Level I, Forms A, B, and C **Performance Assessment Resources**, ISCS Level I, Parts 1 and 2
LEVEL II	**Performance Objectives**, ISCS Level II **Performance Checks**, ISCS Level II, Forms A, B, and C **Performance Assessment Resources**, ISCS Level II, Parts 1 and 2
LEVEL III	**Performance Objectives**, ISCS Level III **Performance Checks**, ISCS Level III, ES-WB, Forms A, B, and C WYY-IV, Forms A, B, and C IO-WU, Forms A, B, and C WW-CP, Forms A, B, and C **Performance Assessment Resources**, ISCS Level III, ES-WB WYY-IV IO-WU WW-CP

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FOREWORD

To implement an educational approach successfully, one must match the philosophy of evaluation with that of instruction. This is particularly true when individualization is the key element in the educational approach. Yet, as important as it is to achieve this match, the task is by no means simple for the teacher. In fact, without specific resource materials to help him, he is apt to find the task overwhelming. For this reason, ISCS has developed a set of individualized evaluation materials as part of its Individualized Teacher Preparation (ITP) program. These materials are designed to assist teachers in their transition to individualized instruction and to help them tailor their assessment of students' progress to the needs of all their students.

The two modules concerned with evaluation, *Individualizing Objective Testing* and *Evaluating and Reporting Progress*, can be used by small groups of teachers in in-service settings or by individual teachers in a local school environment. Hopefully, they will do more than give each teacher an overview of individualized evaluation. These ITP modules suggest key strategies for achieving both subjective and objective evaluation of each student's progress. And to make it easier for teachers to put such strategies into practice, ISCS has produced the associated booklets entitled *Performance Objectives, Performance Assessment Resources*, and *Performance Checks*. Using these materials, the teacher can objectively assess the student's mastery of the processes, skills, and subject matter of the ISCS program. And the teacher can obtain, at the moment when they are needed, specific suggestions for remedying the student's identified deficiencies.

If you are an ISCS teacher, selective use of these materials will guide you in developing an individualized evaluation program best suited to your own settings and thus further enhance the individualized character of your ISCS program.

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A certain species of insect has nine features that show variation. They are eye color, eye shape, body color, body shape, length of antenna, size of wing, shape of wing, pattern of veins in the wing, and length of bristles. According to the two-bit model, what is the total number of bits that this insect received for all of these nine features?

WYY 03-Core-1A

A type of fly receives information for eye color, eye shape, wing shape, body color, and body shape. The possible variations of these features are shown below.

WYY 03-Core-2A

KEY				
FEATURE	BIT	VARIATION	BIT	VARIATION
Eye color	R	red	r	brown
Eye shape	s	round	S	slit shaped
Wing shape	L	long	l	short
Body color	B	brown	b	yellow
Body shape	F	fat	f	skinny

Use the two-bit model and the key above to determine the appearance of the fly that inherited the bits shown in the table below. List the feature number, and after the number state the variation of the feature that the fly will show. (Example: 1. red)

FEATURE NUMBER	FEATURE	BIT 1	BIT 2
1	eye color	R	R
2	eye shape	s	s
3	wing shape	l	L
4	body color	B	b
5	body shape	f	f

Suppose you did an experiment with fruit flies and found that your results did not agree with what the two-bit model predicts.

1. What should you do to establish the value of your results?
2. How can your results affect the model?

WYY 03-Core-3A

Several people investigated patterns of inheritance before Mendel did. However, they were not successful in explaining the patterns they saw. State two reasons why Mendel was successful in understanding patterns of inheritance.

WYY 03-Exc 6-1-1A

Several people unsuccessfully investigated inheritance before Mendel did. Mendel used the systems approach, mathematics, and a model. Explain the importance of each of these to scientific problems.

WYY 03-Exc 6-1-2A

WYY 03-Exc 6-2-1A

In sweet peas, the bit for purple flowers (P) is dominant over the bit for white flowers (p). The bit for wrinkled seeds (W) is dominant over the bit for smooth seeds (w). Suppose you had a sweet pea that was pure strain for purple flowers (PP) and for smooth seeds (ww). You crossed this plant with one that was pure strain for white flowers (pp) and wrinkled seeds (WW). Predict the appearance of the first-generation offspring of this cross.

WYY 03-Exc 6-2-2A

You may refer to Excursion 6-2 to help you answer this check. In sweet peas, the bit for purple flowers (P) is dominant over the bit for white flowers (p). The bit for wrinkled seeds (W) is dominant over the bit for smooth seeds (w). Suppose you had a sweet pea that was pure strain for purple flowers (PP) and for smooth seeds (ww). You crossed that plant with one that was pure strain for white flowers (pp) and for wrinkled seeds (WW). Predict the ratio of the feature variations you would find in the second-generation offspring of this cross.

WYY 03-Exc 7-1-1A

When a white cow (WW) and a red bull (RR) are mated, the offspring are neither red nor white but a light red color called *roan* (RW). The genetic bits for color do not seem to mask each other completely. Copy the charts below. Then predict the appearance of the offspring of the two separate crosses.

Chart 1.

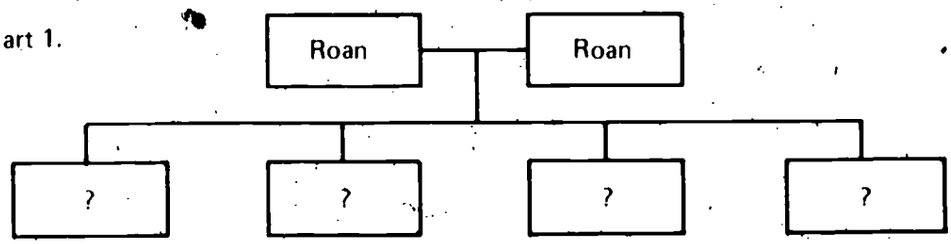
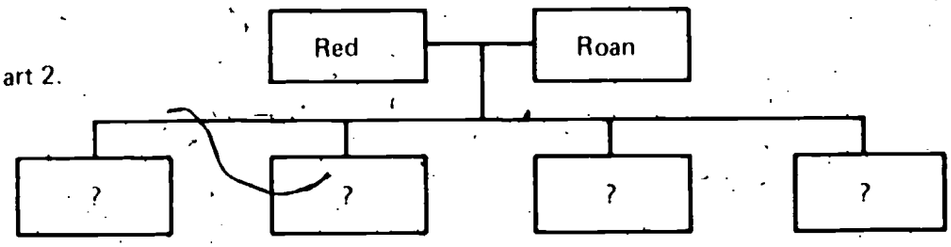
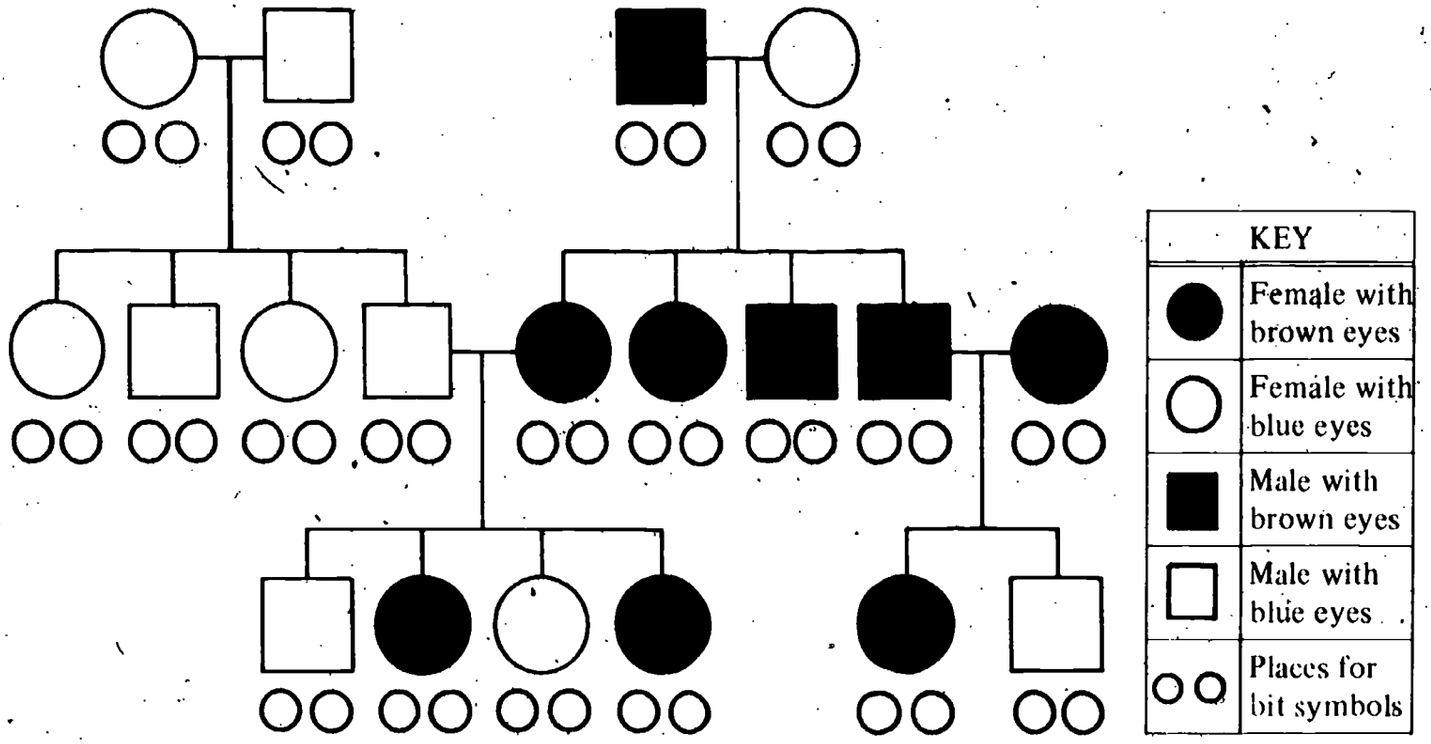


Chart 2.



A large family was studied to find the pattern of inheritance of blue eyes and brown eyes. Brown eyes were found to be dominant over blue eyes. **WYY 02-Core-22A**

Ask your teacher for a copy of the chart below or paper to trace it. State a possible pair of bits of information that each person shown in the chart could have by writing the bit symbols in the small circles under each large symbol on your chart. Use B to represent the bit for brown eyes and b to represent the bit for blue eyes.



You have learned that the bit for tasting PTC is dominant over the bit for not tasting it. Suppose a man can taste PTC and his wife cannot. Nothing is known about their parents' ability to taste PTC. **WYY 02-Core-23A**

1. Will their first child be a taster?
2. Explain your answer.

Construct an inheritance chart for the inheritance of the ability to taste PTC for the families described below. Use squares and circles and shading and nonshading. Near each square or circle, write the person's name and a possible pair of bits which that person may have. Use T for taster and t for nontaster. **WYY 02-Core-24A**

Grandfather James Jackson is a taster, but Grandmother Rose Jackson is a nontaster. Their children, George and Betty, are tasters.

Grandfather Andy Hill is a nontaster, but Grandmother Sue Hill is a taster. Two of their children, Bob and Susan, are tasters. Their other child, Lois, is a nontaster.

Betty Jackson marries Bob Hill. Their boy, Henry, is a taster, but their other child, Isabel, is a nontaster.

WYY
02-Exc 4-1-1A

The bit for black hair (B) is dominant over the bit for white hair (b) in guinea pigs. Suppose you crossed a black-haired guinea pig (Bb) with a white-haired guinea pig (bb).

1. Use a chart like that shown below to determine the possible combinations of bits that the offspring could have.
2. What is the ratio of black-haired offspring to white-haired offspring?

Suppose that a scientist crossed two plants and found that the offspring were not explained by the two-bit model. He repeated the cross several times and got the same results. Select the answer that best describes what he should do next.

WYY 02-Core-12A

a. Ignore the results of his experiment because they do not agree with the two-bit model.
b. Devise a new model that explains only the new results.
c. Publish a paper giving his data and stating that the two-bit model is wrong and must be thrown out.
d. Try to change the two-bit model so that it explains both his new data and the old data.
e. Change his data to agree with the two-bit model.

Susan wanted to find out if a tall pea plant she had was pure strain. She knew that the bit for tallness would mask the bit for dwarfness in peas. She crossed her unknown plant with one that she knew was pure strain for tallness. All the first-generation offspring of this cross were tall.

WYY 02-Core-13A

1. Was the unknown plant pure strain for tallness?
2. Explain your answer.

Roland wants to determine if a tall wheat plant is pure strain for height. He knows that the bit for tallness will mask the bit for dwarfness. He test-crosses the unknown tall wheat plant with a pure-strain dwarf wheat plant. Half of the first-generation offspring of this cross are tall and half are dwarf.

WYY 02-Core-14A

1. Is the unknown tall wheat plant pure strain for height?
2. Explain your answer. You may wish to include a diagram in your explanation.

Matt wants to find out if a tall bean plant is pure strain for tallness. He knows that the bit for tallness masks the bit for dwarfness in beans. He test-crosses the unknown tall plant with a pure-strain dwarf bean plant. The first-generation offspring of this cross are all tall.

WYY 02-Core-15A

1. Is the unknown tall bean plant pure strain for tallness?
2. Explain your answer.

A pure-strain plant with purple flowers is crossed with a plant that is pure strain for white flowers. All the first-generation offspring of this cross have purple flowers. Explain why there are no white-flowering plants among the first-generation offspring.

WYY 02-Core-16A

What does the term *recessive bit* mean as it is used in the two-bit model?

WYY 02-Core-17A

What does the term *dominant bit* mean as it is used in the two-bit model?

WYY 02-Core-18A

WYY
02-Core-19A

Suppose you have the report of a study of the feature variations shown below which uses the symbols in the right-hand column of the table. Write the numbers of the feature variations listed below. After each number, state whether the feature variation is dominant or recessive.

FEATURE VARIATION	SYMBOL FOR THE BIT OF INFORMATION
1. Spotted seeds	b
2. Red flowers	M
3. Wrinkled pods	N
4. Yellow hair	j

WYY
02-Core-20A

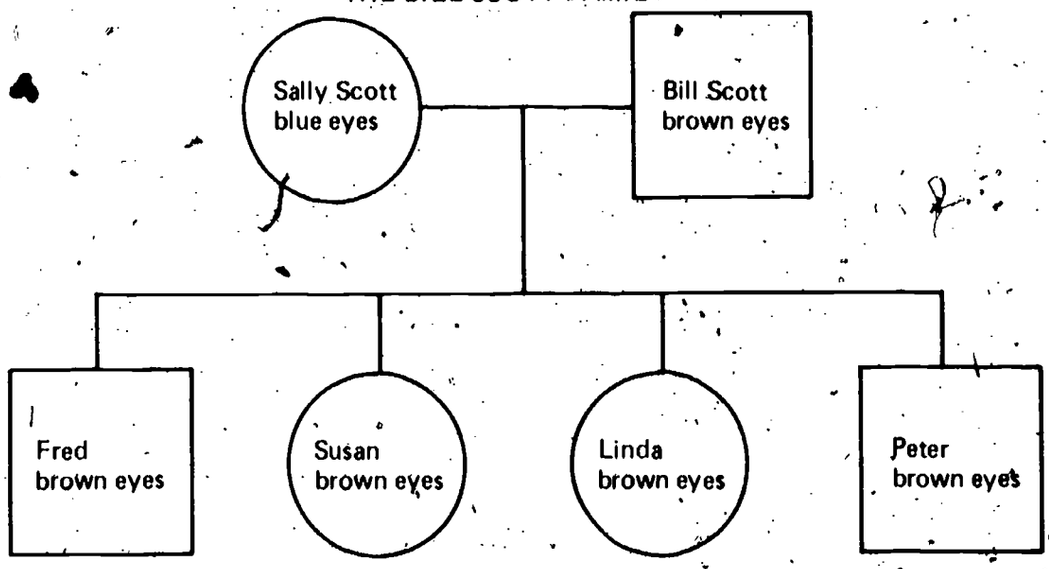
Write the numbers of the feature variations listed below. After each number, write a symbol to represent each of the feature variations.

1. Blue eyes (recessive)
2. Purple flowers (dominant)
3. Yellow body (dominant)
4. Wrinkled seeds (recessive)

WYY
02-Core-21A

Sally's parents and grandparents all had blue eyes. Bill's parents and grandparents all had brown eyes.

THE BILL SCOTT FAMILY



1. In the Bill Scott family which variation – blue eyes or brown eyes – is dominant?
2. Which variation is recessive?
3. State the reason for your answers to questions 1 and 2.

James has the second-generation offspring of a cross between two pure strains of fruit flies. He has lost his records of the appearances of the original parents and the first-generation offspring. Suppose that he has 38 red-eyed flies and 12 orange-eyed flies in the second-generation offspring. WYY 02-Core-1A

1. State the eye color of each of the original/pure-strain parents.
2. State the eye color of the first-generation offspring of this cross.

Jennifer crosses two pure-strain fruit flies, one with red eyes and the other with yellow eyes. She finds that all the first-generation offspring of this cross have red eyes. WYY 02-Core-2A

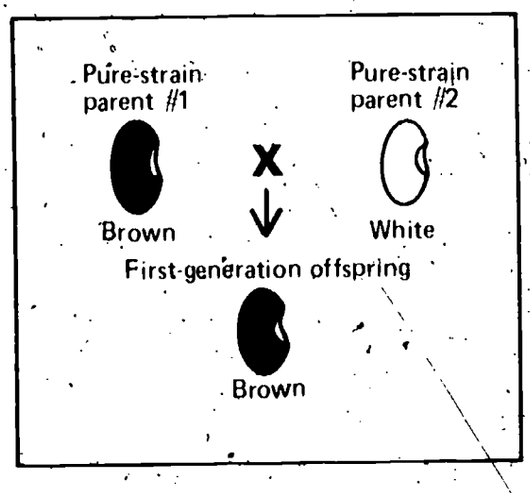
The first-generation offspring are then crossed with each other. Predict the ratio of red-eyed fruit flies and yellow-eyed fruit flies that will result from this second cross.

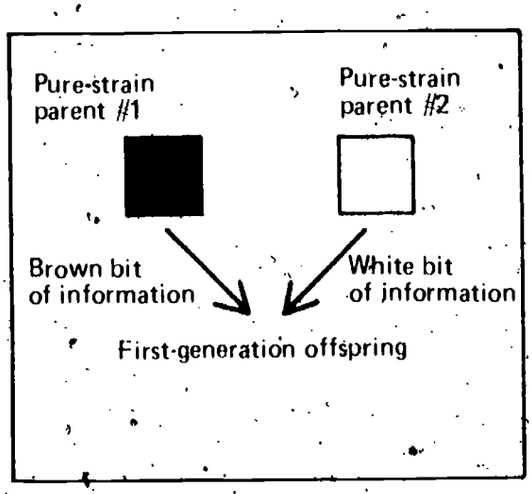
Choose the statement below that best describes the pattern by which features are passed from parents to offspring. WYY 02-Core-3A

a. The offspring show the same features as their female parent.
b. The features of the offspring are different from those of both of their parents.
c. The offspring generally show some features in common with each of their parents.
d. The offspring show the same features as their male parent.

What is the name of the science which deals with the patterns of inheritance? WYY 02-Core-4A

The figures below show a possible way to explain a cross between brown beans and white beans, using the one-bit model of inheritance. What are the assumptions of the one-bit model of inheritance? WYY 02-Core-5A





WYY 02-Core-6A

Why is the one-bit model of inheritance not a satisfactory model of inheritance for most features?

WYY 02-Core-7A

There are two models for light – the wave model and the ether model. Select the most important reason below for accepting one model rather than the other.

a. One model was developed more recently.
b. One model agrees more closely with the experimental evidence.
c. One model involves less math and is easier to understand.
d. A famous scientist developed one of the models.
e. Someone told you that one model is right and the other is wrong.

WYY 02-Core-8A

State the assumptions of the two-bit model of inheritance.

WYY 02-Core-9A

The inheritance of flower color in lilacs follows the two-bit model. Purple color masks white color. Suppose you crossed pure-strain white lilacs with pure-strain purple lilacs.

1. What will be the color of the flowers of the first-generation offspring of this cross?
2. What will be the color of the flowers of the second-generation offspring of this cross? Include a ratio in your answer.

WYY 02-Core-10A

John used a plant that is pure strain for the masked (recessive) variation of a feature in a test cross. Why wouldn't a plant that is pure strain for the masking variation be used in the cross?

WYY 02-Core-11A

Henry crossed two pure strains of plants. One was pure strain for yellow seeds (gg), and the other was pure strain for green seeds (GG). His data are shown below.

GENERATION	PLANTS WITH YELLOW SEEDS	PLANTS WITH GREEN SEEDS
Parents	1	1
1st-generation offspring	0	20
2nd-generation offspring	73	71

1. Can you explain these data, using the two-bit model of inheritance?
2. Explain your answer.

Suppose you crossed a pea plant that was pure strain for white flowers with one that was pure strain for yellow flowers. Which statement best describes the flowers of the first-generation offspring of this cross? WYY 01-Core-18A

a. Half the plants will have white flowers, and half will have yellow flowers.
b. Either all the plants will have white flowers, or all the plants will have yellow flowers.
c. There will be a 3-to-1 ratio of plants with yellow flowers to plants with white flowers.
d. There will be a 3-to-1 ratio of plants with white flowers to plants with yellow flowers.
e. All the plants will have yellow- and white-spotted flowers.

Suppose you were to cross snapdragons that were pure strain for yellow flowers with snapdragons that were pure strain for purple flowers. Select the statement below that best describes the appearance of the second-generation offspring of this cross. WYY 01-Core-19A

a. Half of the plants will have all purple flowers, and the other half will have all yellow flowers.
b. All of the plants will have one-color flowers, but I cannot tell if they will be yellow or purple.
c. All of the plants will have half purple flowers and half yellow flowers.
d. Some plants will have all yellow flowers, and the others will have all purple flowers. There will be a 3-to-1 ratio of the colors.
e. All of the flowers will be part yellow and part purple.

Two pure strains of tulips were crossed. In the second-generation offspring of this cross, there were 163 plants with red flowers and 48 plants with yellow flowers. WYY 01-Core-20A

1. What did the flowers of the first-generation offspring look like?
2. What did the flowers of the parent plants look like?

Your teacher will observe you for this check when he can. WYY 01-Core-21A

Your teacher will observe you for this check when he can. WYY 01-Core-22A

Your teacher will observe you for this check when he can. WYY 01-Core-23A

Your teacher will observe you for this check when he can. WYY 01-Core-24A

Your teacher will observe you for this check when he can. WYY 01-Core-25A

WYY 01-Exc 1-1-1A	In reporting experiments done to find out how characteristics are inherited, the word *cross* is often used. Define the word *cross* as it is used in such reports.
WYY 01-Exc 1-2-1A	Below are two definitions of ways in which people differ. Study these definitions, and answer the two questions that follow. Definition a: A person's *treasure-finding index* is his ability to find valuable objects which have been buried. Definition b: A student's *sprint index* is a measure of how rapidly he can run for short distances. It is measured by timing how long it takes the student to run 100 meters on a cinder track. 1. Which of the above is an operational definition? 2. Explain the reason for your answer.
WYY 01-Exc 1-2-2A	Whenever possible, an operational definition of anything should answer two questions. What are the questions that it should answer?
WYY 01-Exc 1-3-1A	Victor was crossing fruit flies during the winter. He stored his vials on the shelf next to the window. Some of his crosses were very slow in hatching, and some never developed into adults at all. What was the most likely cause of Victor's problems?
WYY 01-Exc 1-4-1A	What is the total number of bits of information that all of your great-grandparents had for the feature eye color?
WYY 01-Exc 1-4-2A	Peter has blue eyes. His great-grandfather Lucas had blue eyes, his great-grandfather Joseph had hazel eyes, and his great-grandmother Mary had blue eyes. 1. Can you determine which of his three great-grandparents contributed the bits for Peter's blue eyes? 2. Explain your answer.
WYY 01-Exc 2-1-1A	Mary counted 8 boys and 17 girls in her class. What is the rough ratio of girls to boys in her class? Express the ratio to the nearest tenth, or 1 decimal place.
WYY 01-Exc 2-1-2A	Bill calculated the rough ratios shown below. Convert these to rounded-off ratios. 1. 2.1 to 1 2. 2.9 to 1 3. 8.3 to 1 4. 15.7 to 1

1. What parts of plants and animals produce sperm? WYY
2. What does a sperm do? 01-Core-1A

For many organisms, producing offspring involves eggs and sperm. WYY
1. What is the source of an egg? 01-Core-2A
2. What is the function of the egg?

State what happens to sperm during the mating of animals. WYY 01-Core-3A

Get an etherizer, some ether, and vial WYY-01-Core-4 from the supply area. Etherize the fruit flies in the vial. Have your teacher check the etherized fruit flies. WYY 01-Core-4A

Get vial WYY-01-Core-5, two empty capped vials, an etherizer, and some ether from the supply area. Do not remove any flies from the vial yet. Etherize all the flies. Shake the vial gently. Remove the flies from the vial. Put the dead flies and the etherized flies into separate vials. Cap the vials, and label each as containing dead or etherized flies. Have your teacher check your work. Return all the flies to the vial you got them from. WYY 01-Core-5A

Get an etherizer, two empty vials with caps, some ether, and vial WYY-01-Core-6 from the supply area. Etherize the fruit flies. Separate the male flies from the female flies, and put them into separate vials. Cap the vials, and label each as containing male or female flies. Have your teacher check your work. Return all the flies to the original vial. WYY 01-Core-6A

State the steps you would follow to obtain virgin female fruit flies from a vial containing nonadult and adult fruit flies. WYY 01-Core-7A

Give an operational definition of the term *pure strain*. WYY 01-Core-8A

List the stages in the life cycle of a fruit fly. WYY 01-Core-9A

Get jar WYY-01-Core-10 and a hand lens from the supply area. Point out to your teacher the egg, the larva, the pupa, and the adult stages in the jar. WYY 01-Core-10A

What appearance would be possible for first-generation offspring of a cross between fruit flies that are pure strain for yellow bodies and fruit flies that are pure strain for black bodies? WYY 01-Core-11A

WYY 01-Core-12A

John studied some flowering plants which have many different features that show variation. Why would John study the inheritance of only one feature, such as seed color, in one experiment although the plants inherit many features at one time?

WYY 01-Core-13A

Andy had two pure strains of beans. One strain had plain seeds, and the other strain had spotted seeds. He crossed the strains to get the first-generation offspring. Then he crossed the first-generation offspring to get the second-generation offspring. Select the answers below that agree with the results he would get.

1. The first-generation offspring seeds
   a. were all the same.
   b. were a mixture of plain seeds and spotted seeds.
2. The second-generation offspring seeds
   a. were all the same.
   b. were a mixture of plain seeds and spotted seeds.

WYY 01-Core-14A

Joe crossed two pure-strain bean plants. One had spotted seeds, and the other had plain brown seeds. He crossed the first-generation offspring with each other. Predict the most likely ratio of variations of seed spots he will get in the second-generation offspring.

WYY 01-Core-15A

Tell your teacher that you are about to do this check.

In the supply area, you will find a box of beans labeled WYY-01-Core-15. Quickly and accurately, estimate the ratio of brown beans to white beans in the box.

WYY 01-Core-16A

Get vial A from box WYY-01-Core-16 in the supply area. Examine the beans carefully. Are they pure-strain beans?

WYY 01-Core-17A

The table below refers to the offspring produced by mating two pea plants, both of which had yellow seeds.

GENERATION	SEED COLOR
Parents	yellow
1st-generation offspring	yellow
2nd-generation offspring	yellow

1. According to the ISCS two-bit model, is this variety of pea pure strain for seed color?
2. Explain your answer.

Why You're You

WYY

NOTES TO THE STUDENT

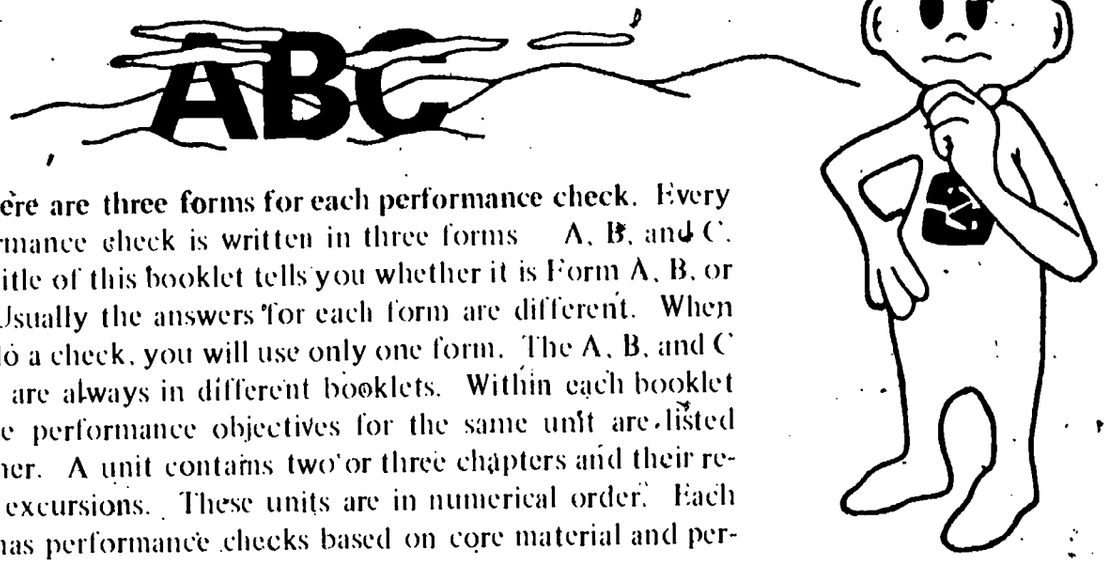
Now that you have completed several chapters, excursions, and self-evaluations, you are ready to help your teacher determine how well you are doing. The performance checks in this book will provide your teacher with this information. Then your teacher can help you with things you may not understand and can keep a record of your progress.

Read the next section carefully. It explains some important things about the performance checks in this book, and it gives you specific suggestions for using them.

What You Need To Know about Performance Checks

1. **You do performance checks when you are ready.** Performance checks are somewhat like the questions in the self-evaluations you do them when you are ready, not when the whole class is ready.

2. **Your teacher or both of you decide how many you do.** Your teacher or you and your teacher together will decide which ones you should do. You are not expected to do all of the performance checks.



3. **There are three forms for each performance check.** Every performance check is written in three forms A, B, and C. (The title of this booklet tells you whether it is Form A, B, or C.) Usually the answers for each form are different. When you do a check, you will use only one form. The A, B, and C forms are always in different booklets. Within each booklet all the performance objectives for the same unit are listed together. A unit contains two or three chapters and their related excursions. These units are in numerical order. Each unit has performance checks based on core material and performance checks based on excursions.

4. **Each performance check has its own number.** The number is in the outside margin of the page and will look like this: IV-03-Core-17A or WYY-02-Exc 4-2-2A. These numbers mean

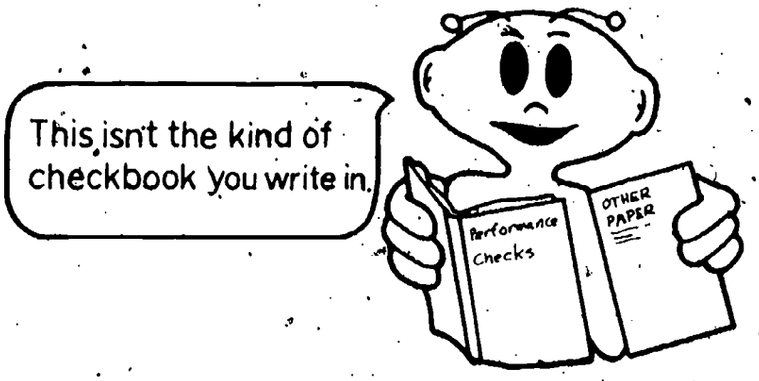
IV	- 03	- Core	- 17	A	and	WYY	- 02	- Exc	4-2	-2	A
text	unit	based on core material	check number	form of the check		text	unit	based on excursion material	excursion number	check number	form of the check

5. **Each performance check is separated from the other.** There is a line before each performance check and one after it. Some performance checks have several parts, so do everything called for between the lines. If there is no line at the bottom of a page, the check is continued onto the next page.

6. **Sometimes you will need to use equipment.** If special materials are needed, they will be in boxes labeled with the same number and sometimes the same letter too as the performance check for which you need them.

7. **Some performance checks have two or more answers.** If more than one answer is correct, you must select all the correct choices. In such cases, selecting just one answer is not enough.

8. **Some performance checks have no answers.** Occasionally, you may be asked to do something that is impossible and to explain your answer. If so, say that the task is impossible and explain why.



9. **You share books of performance checks and YOU DO NOT WRITE IN THEM.** Write your answers on other paper. Give the number and form of the performance check for each answer you write. If you are to draw a graph, a chart, or a map, your teacher may provide you with grid paper or a copy of the map or chart.

10. **Your teacher or his assistant will collect and mark your checks.** And sometimes you must ask him to watch or assist you as you do a check.

11. **Sometimes a review procedure will be suggested.** If you can't do a performance check, you may be asked to review a part of the text or a self-evaluation question. You may then be checked on the same material, so be sure you understand the material you review. Get help if you need it.

Tim put 85 beans into a glass jar. He asked ten different people to estimate how many beans were in the jar. Their estimates are shown below. **IV 02-Core-18A**

NAME	ESTIMATE
Gary	105
Helen	75
Karen	93
Brian	58
Ruth	69
Ralph	95
Carol	80
Gerry	73
Pat	120
Richard	88

What is the mean error of these estimates? Show your calculations.

You had several people estimate when one minute had passed. You then calculated the mean error of their estimates. Why is the mean error of measurements calculated? **IV 02-Core-19A**

Harry tested several students to see how accurately they could estimate when 15 seconds had passed. His data are shown below. **IV 02-Core-20A**

STUDENT	ESTIMATED TIME (in seconds)
Jim	12
Susan	14
Nancy	9
Frank	21
Carol	13
John	18
Sally	17
Mary	12
Wes	16
George	15

What is the mode error for the time sense of these students? Show your calculations.

IV
02-Core-21A

In much research about people, the researchers measure patterns and similarities within groups. Why are many researchers more concerned about similarities than about individual differences?

IV
02-Core-22A

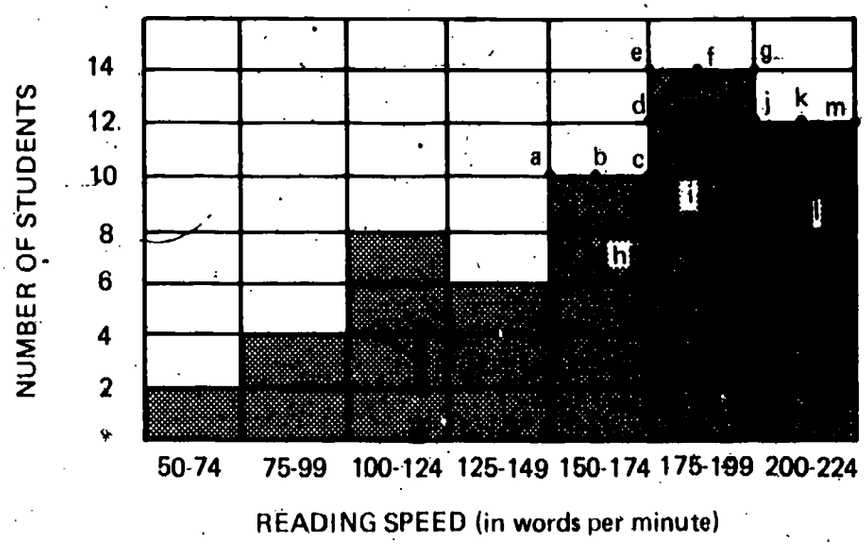
Gilbert calculated the mean age of all the students in his class to be 14 years 4 months. Rosalee is one of the students in his class.

1. Using only the above information, can you determine Rosalee's age to the nearest month?
2. Explain your answer.

IV
02-Exc 3-1-1A

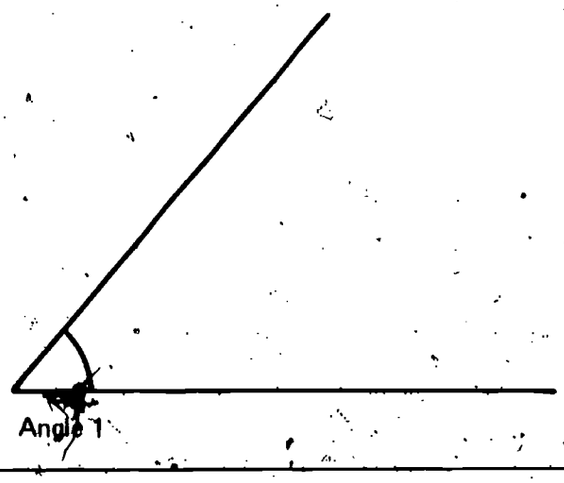
Mrs. Hill tested her students' reading speed. She plotted a histogram of the data collected.

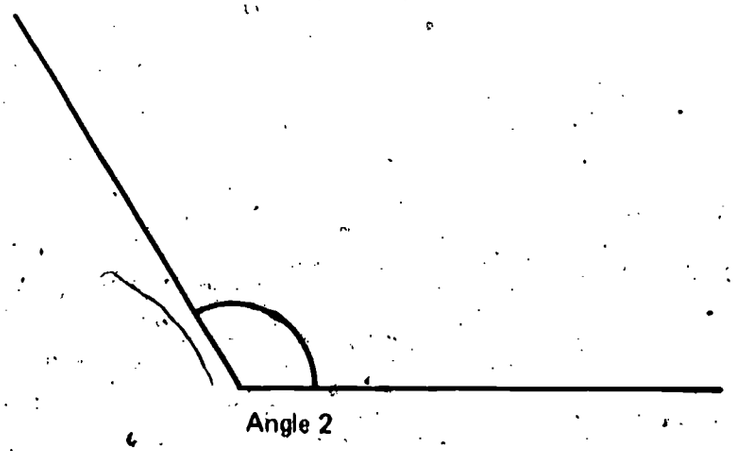
1. List the letters of the points in the histogram that she should use to change the histogram to a line graph.
2. What are these points called?



IV
02-Exc 4-1-1A

Use a protractor to measure the size of the two angles below. Record your answers on a separate paper.





Henry measured the height of all the students in his class. His measurements in inches are shown below. IV 02-Core-10A

59 73 58 61 71 58 59 63 70 60
62 60 58 65 62 64 61 63 54 67
55 61 64 62 68 57 60 59 58 61

Construct a table like the one below, and group Henry's data in fifths.

FIFTH	LIMITS OF RANGE FOR THAT FIFTH	NUMBER OF INDIVIDUALS
1		
2		
3		
4		
5		

Scientists will often do an experiment, collect some data, and draw a conclusion from their data. Then they will repeat the experiment, collecting even more data. Why are experiments often repeated many times? IV 02-Core-11A

You made three measurements of each student's peripheral vision and averaged the measurements. Why did you make three measurements and average them instead of making only one measurement? IV 02-Core-12A

The students of Bell Junior High School were selling pizzas to raise money for the school band. Cindy was in charge of keeping the records for her team. The number of pizzas each student sold is shown below. IV 02-Core-13A

1. Is the number of pizzas Harold sold above or below the mean for the whole class?
2. How far above or below the mean is it?

STUDENT	NUMBER OF PIZZAS SOLD
Harold	8
Jim	4
Bert	9
Karen	6
Lloyd	23
Hank	2
Norma	0
Dennis	1
Ted	5
Rick	8

IV
02-Core-14A

Janice had a pair of white mice that occasionally produced offspring. She kept track of the number of baby mice in each litter. Her data are shown below.

LITTER NUMBER	NUMBER OF BABY MICE
1	4
2	3
3	6
4	8
5	3
6	6
Total	30
Mean	5

How is it possible for the mean litter size to be 5 although there was no litter with 5 mice in it?

IV
02-Core-15A

Your text states that "Perhaps the best example of an average [normal] person is someone whose characteristics are *not* average." Explain what is meant by this statement.

IV
02-Core-16A

Dr. Jansen measured a certain worm. He found that it was 5 cm long.

1. Based only on the data above, is it possible to determine if the worm is large, medium, or small?
2. Explain the reason for your answer.

IV
02-Core-17A

Van tested several students for touch sensitivity. He also tested their ability to locate objects by hearing. During these tests, the students were told to keep their eyes closed.

1. Was it necessary for them to keep their eyes closed during the tests?
2. Explain your answer.

State whether each of the pairs of words below represents a continuous or an either-or variable. IV 02-Core-1A

1. Tall or short
2. Alive or dead
3. Dark or light
4. Skinny or fat

Will's data have a very wide range. What is an operational definition for the term *range* as it is used in that sentence? IV 02-Core-2A

Bill measured the number of push-ups the boys in his class could do. His data are shown below. IV 02-Core-3A

STUDENT	NUMBER OF PUSH-UPS	STUDENT	NUMBER OF PUSH-UPS
Fred	6	Oscar	15
Charlie	2	Tom	7
Doug	12	Roger	4
Henry	3	Jim	23
Tim	9	Carl	18

What is the range of his measurements?

Give an operational definition for the *mean* of a set of measurements. IV 02-Core-4A

Tom measured how long it took each of the boys in his class to run 100 meters. His data are shown below. IV 02-Core-5A

STUDENT	TIME (in sec)
Henry	15
Pierre	13
Roger	16
Rich	14
Chris	14
Bill	19
Fred	13
Mario	17

Calculate the mean of his measurements to the nearest whole number.

IV
02-Core-6A

What is meant by the *mode* of a set of measurements?

IV
02-Core-7A

Barbara asked her classmates to keep track of the number of hours of television they watched in a week. Her data are shown below.

STUDENT	TIME (in hours)	STUDENT	TIME (in hours)
Nick	2	Jean	1
Wendy	7	Doug	6
Joyce	5	Sheila	4
Bob	0	Mike	23
Henry	6	Bruce	11
Janice	8	Cathy	3

What is the mode of this set of measurements?

IV
02-Core-8A

Hank measured the weight of each student in his class. His table of data is shown below.

WEIGHT (in pounds)	NUMBER OF STUDENTS
70-79	1
80-89	4
90-99	6
100-109	9
110-119	5
120-129	3
130-139	1
140-149	2

Get a piece of graph paper from your teacher. On it, construct a histogram of Hank's data.

IV
02-Core-9A

Why are data often arranged in histograms or in other kinds of graphs?

Round off the following measurements to the nearest whole number. IV
01-Exc 2-1-2A

1. 114.2 cm
2. 864.6 cm
3. 291.9 cm
4. 359.5 cm
5. 526.0 cm

Sally measured the handedness of each of her classmates. She separated the results for the boys and girls. Her data are shown below. IV
01-Exc 2-2-1A

		HANDEDNESS		
		LH	RH	Totals
SEX	Boys	4	10	14
	Girls	3	12	15
	Totals	7	22	29

Suppose someone made the statement that girls are more likely to be left-handed than boys.

1. Could you use Sally's data to tell if the statement is correct?
2. Explain your answer.

Suppose someone else said that boys are more likely to be right-eyed than girls.

3. Could you use Sally's data to tell if this statement is correct?
4. Explain your answer.

Charles wanted to determine how many students in his class had driver's licenses and how many did not. Construct a table for collecting and analyzing his measurements. IV 01-Core-14A

Heather wanted to measure the number of words a person can read in one minute. She had all her classmates begin reading the same story at the same time. After they had read for one minute, she told them to stop. Her data are shown in the table below. Construct another table of all her reading speed measurements from which Heather will be able to construct a histogram. (Note: You need only to construct the table, not to enter the data in the table.) IV 01-Core-15A

STUDENT	NUMBER OF WORDS READ	STUDENT	NUMBER OF WORDS READ
Jack	170	Jake	320
Judy	120	John	310
Jason	250	Janet	140
Jody	270	Jean	190
Jill	128	Jerry	190
Joan	195	Joy	210
Jan	84	Jane	200
Joe	62	Jim	240

Faye wants to determine if there is any relationship between whether a student is right-eyed or left-eyed and whether he sits on the right-hand or left-hand side of the classroom. Construct a table for collecting and analyzing measurements to find out if these variables are related. IV 01-Core-16A

Joyce wants to find out whether a relationship exists between a person's having a driver's license and his grades in school. Construct a table for collecting these measurements. IV 01-Core-17A

Your teacher will observe you for this check when he can. IV 01-Core-18A

Your teacher will observe you for this check when he can. IV 01-Core-19A

Your teacher will observe you for this check when he can. IV 01-Core-20A

IV
01-Core-21A

Your teacher will observe you for this check when he can.

IV
01-Core-22A

Your teacher will observe you for this check when he can.

IV
01-Exc 1-1-1A

1. Suppose you measured the length of the school's football field (100 yards) in metric units. Which of the measurements given below would be closest to your measurement?

a. 9.1 cm	d. 9.1 m
b. 91 m	e. 91 cm
c. 91 mm	f. 910 m

2. Suppose you measured the thickness of your ISCS textbook in metric units. Which of the measurements given below would be closest to your measurement?

a. 70 mm	d. 7 mm
b. 7 m	e. 0.7 mm
c. 700 m	f. 7 cm

IV
01-Exc 1-1-2A

1. What is the distance between A and B in millimeters?
2. What is the distance between B and C in centimeters?

IV
01-Exc 1-1-3A

Art measured the width of a board as 20.45 cm. Peggy measured the same board with the same measuring device and reported it to be 20.42 cm wide. What is the most likely reason for the difference in their measurements?

IV
01-Exc 2-1-1A

Calculate the average of the following measurements to one decimal place.

2.6 cm
4.9 cm
9.2 cm
8.1 cm

Below are two definitions of ways in which people differ. Study these definitions, and answer the two questions that follow. IV 01-Core-1A

Definition a: A person's *treasure-finding index* is his ability to find valuable objects which have been buried.
Definition b: A student's *sprint index* is a measure of how rapidly he can run for short distances. It is measured by timing how long it takes the student to run 100 meters on a cinder track.

1. Which of the above is an operational definition?
2. Explain the reason for your answer.

Whenever possible, an operational definition should answer two questions. What are the questions that it should answer? IV 01-Core-2A

Perhaps you have heard people make statements such as "All students with long hair are just alike." IV 01-Core-3A

1. Can a statement like this ever be true?
2. Explain the reasons for your answer.

Scientists spend a great deal of time looking for patterns in the way things change. Why? IV 01-Core-4A

People differ in their ability to see different sized letters on an eye chart from several feet away. The ability to see is called *vision*. Write an operational definition of *vision*. IV 01-Core-5A

Suppose you wanted to compare the ability of different students in your class to play the guitar. From the choices below, select the best way of measuring guitar-playing ability. IV 01-Core-6A

a. Ask each person how well he can play the guitar.
b. Ask each person how many guitar lessons he has had.
c. Ask each person to play the same unfamiliar songs, and count the number of mistakes each makes.
d. Ask each person to play the guitar, and judge how well each does.
e. Ask a student who knows all of the guitar players well to tell you who is the best player.

When scientists want to compare different things, they usually try to use an appropriate measuring device, such as a ruler or a test. State a reason why it is important to use a measuring device when one is available rather than just relying on your own senses. IV 01-Core-7A

IV
01-Core-8A

Dina was measuring reaction time, using the dropping-meterstick method. She found that Jack had a much shorter reaction time than anyone else. She also noticed that Jack watched her hand release the meterstick. All the other students had watched their own fingers with which they caught the meterstick. Dina concluded that a student's reaction time, as measured by the dropping-meterstick method, is shorter when the student watches the release of the meterstick than when he watches the catch point. Describe an activity which you could perform to test this idea.

IV
01-Core-9A

What does a scientist mean when he says that a feature shows continuous variation?

IV
01-Core-10A

What do we mean when we say that a feature shows an *either-or* variation?

IV
01-Core-11A

Identify each of the variables below either as a continuous variable or as an either-or variable.

1. Whether a student has ever seen the ocean
2. How fast a secretary can type
3. The length of a boy's hair
4. If a man is a policeman or not
5. A person's age

IV
01-Core-12A

Fred measured the heights of the students in his class. His measurements in cm. are shown below.

Fred – 162	Hank – 180	Mary – 173
Henry – 170	Bruce – 152	Louise – 162
Charles – 143	Wendy – 162	Jim – 178
Isabel – 150	Greg – 167	Stephanie – 167
Sally – 147	Brian – 153	Wayne – 165
Betty – 140	Nadine – 153	Janice – 140

Draw a table similar to the one shown below, and use Fred's measurements to complete the table.

HEIGHT (in cm)	TALLY	TOTAL
139-146		
147-154		
155-162		
163-170		
171-178		
179-186		

IV
01-Core-13A

State two reasons that scientists usually arrange their data in charts, tables, or graphs.

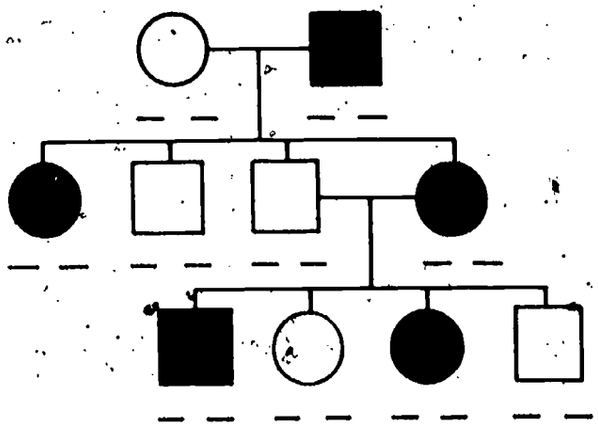
IV

Investigating Variation

Get from your teacher a copy of the chart below or paper to trace it.

WYY
03-Exc 7-2-1A

In some insects, inheritance of bristle length depends on the sex of the insect. In the males, short bristles are dominant over long bristles. In the females, long bristles are dominant over short bristles. Indicate on your chart a possible pair of bits carried by each of the insects. Use the letter B to represent the bit for long bristles and b for short bristles.



KEY	
■	Male with long bristles
□	Male with short bristles
●	Female with long bristles
○	Female with short bristles
— —	Places for bit symbols

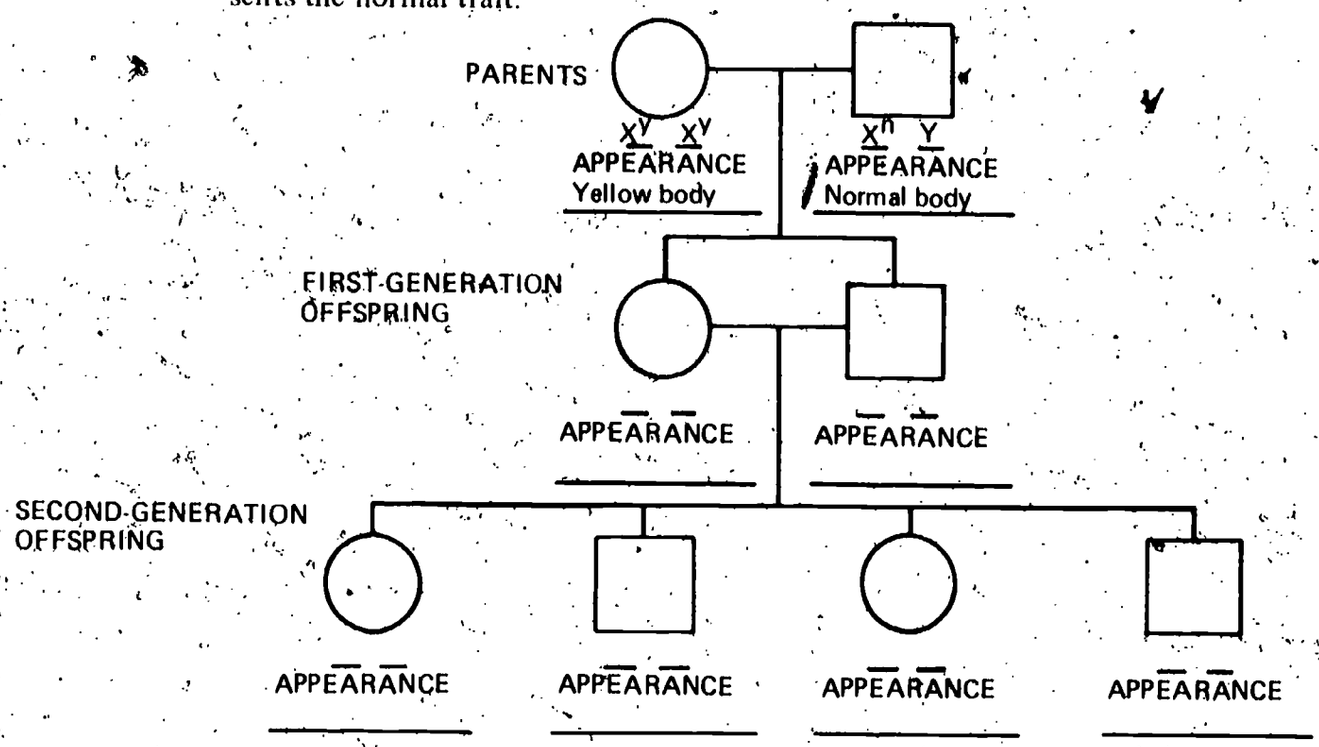
WYY
03-Exc 7-3-1A

King Henry VIII divorced several wives because they bore him only daughters. He wanted a son to be the next ruler.

1. Was his reasoning logical when he blamed his wives for producing only daughters?
2. Explain your answer.

WYY 03-Exc 7-4-1A

Get a copy of the chart labeled WYY-03-Exc 7-4-1 from your teacher. You may use Excursion 7-4 to help you answer this check. In fruit flies, the X chromosome carries the bit for the recessive variation yellow body color (X^y). The Y chromosome carries no information for this feature. The appearance of and bits for the parents are given in the chart below. You are to predict the appearance of and the bits (X^y, X^n, and Y) that will be carried by the first- and second-generation offspring of the cross by filling in the blanks on your copy of the chart. Remember that X^n represents the normal trait.



WYY 03-Exc 7-5-1A

Larry and Harry are identical twins. Like all identical twins, they inherited exactly the same genetic material from their parents. But Larry and Harry do not look exactly alike as adults. Explain what might cause these differences.

WYY 03-Exc 7-6-1A

Suppose you released one hundred green lizards and one hundred black lizards on a certain rocky island a year ago. There is not much vegetation on the island because it is mostly new, black volcanic rock. Once in a while the island is visited by birds which eat lizards.

1. Would you predict that there are more of one kind of lizard than the other living on the island now?
2. Explain your answer.

WYY 03-Exc 7-7-1A

The people in a certain tribe in East Africa think it is beautiful to have very long earlobes. To make their earlobes longer, they hang weights on their earlobes to stretch them. Suppose they did this for hundreds of years.

1. Do you think their children would be born with bits of information for longer earlobes?
2. Explain your answer.

Use your protractor to construct angles of 25° and 108° on your answer sheet, and label each of them.

IV
02-Exc 4-1-2A

Animals with different characteristics often live in different areas, eat different food, and have different enemies. The chart below shows some of the differences between two kinds of animals.

IV
02-Exc 4-2-1A

CHARACTERISTICS	ANIMAL A	ANIMAL B
Type of animal	large, hooved animal	large bird
Living area	open, flat plains	nests on mountain ledges
Main food	grasses	small animals
Method of feeding	grazes grass	swoops down from the sky at high speed
Enemies	large members of the cat family	man

1. Would it be advantageous for Animal A to have its eyes in the sides of its head or in the front of its head?
2. State the reason for your answer.
3. Would it be advantageous for animal B to have its eyes in the sides of its head or in the front of its head?
4. State the reason for your answer.

When you classified your fingerprints, using the standard prints shown below, you probably noticed that your fingerprints were not exactly the same as any of the standard prints. Why didn't your fingerprints match any of the sample prints?

IV
02-Exc 4-3-1A


Plain arch


Tented arch


Loop


Plain whorl

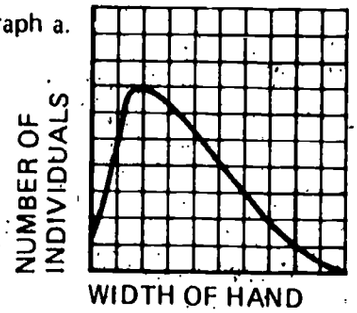
IV
02-Exc 5-1-1A

Researchers usually measure the characteristics of a population by making measurements on only a sample of the population. Why do they use a sample rather than measure the entire population?

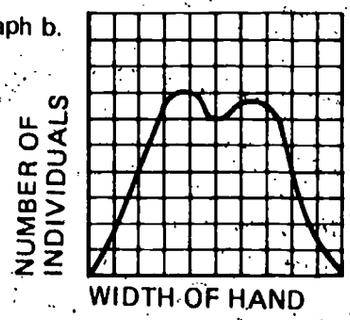
IV
02-Exc 5-1-2A

Which one of the curves below is a normal curve?

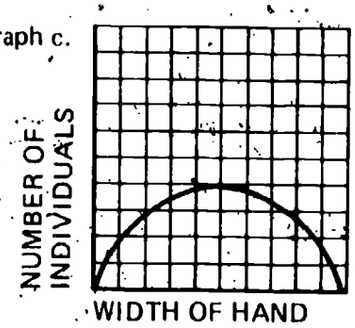
Graph a.



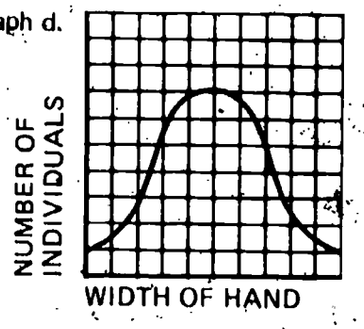
Graph b.



Graph c.



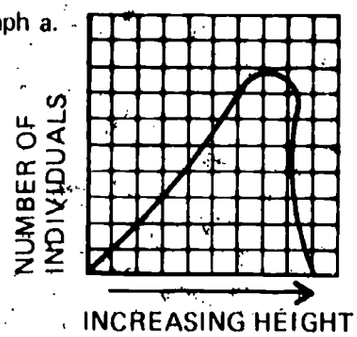
Graph d.



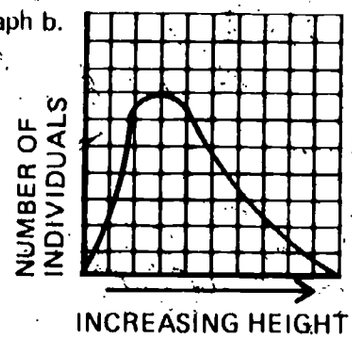
IV
02-Exc 5-1-3A

Suppose you were going to measure a continuous human variable such as height. You would select a random sample of people, measure their heights, and draw a graph of the results. Which of the graphs below would you expect your graph to look like?

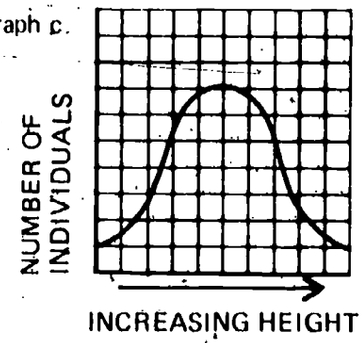
Graph a.



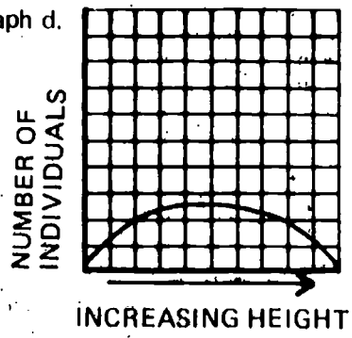
Graph b.



Graph c.



Graph d.



What is meant by *random sample*?

IV
02-Exc 5-1-4A

Researchers often spend a great deal of time and money getting a random sample. What is the purpose of a random sample?

IV
02-Exc 5-1-5A

Sally wanted to determine how many library books the average student in her school read each month. She couldn't ask everyone in the school, so she decided to select a sample. She stood in the library and asked the first 25 students who walked in how many books they had read during the last month.

1. Was her sample a random sample?
2. Explain your answer.

IV
02-Exc 5-1-6A