Ideas

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"Ideas" this month focuses on computers, how they are used, and some aspects of how they work. The more ubiquitous computers become, the more important it is that citizens understand the computer's possibilities and its limitations. Knowing something about how computers operate can help to increase this understanding. A discussion of the uses of computers and occupations that use computers would be a good way to introduce any of the "Ideas."

Ideas for Teachers
Levels: All grades

COMPUTER OUTPUT

Objective

To provide experience in reading data generated by a computer.

Materials

Worksheets and pencils.

Directions

Discuss the terms *output* and *printout*. Show the students examples of real computer printouts if you can. Then have the students use the information given in the printout on the worksheet to answer the questions.

Answers

(1) Yes. (2) Ethel, Patsy, Tracy, Vera, Virginia. (3) Ethel, Max, Patsy, Vera, and Waldo. (4) Ethel Patsy Vera, Waldo. (5) Bob, Waldo (6) They are girls, have at least one brother, and own a calculator. (8) 7.

Ideas for Teachers
Levels: All grades

INPUT MEDIA

Objective

To introduce the idea of input media used by computers and to illustrate one type of punched card.

Materials

Scissors, worksheet, a rod or pencil, several hole punches.

Directions

Discuss the term *input* and how computers get information. Show some examples of punched and unpunched computer cards if you can. Explain that the cards the students are making are designed for manual manipulation. Then have students carefully cut out the cards on the worksheets. They should punch holes

where the circles are and then follow the directions on the worksheet. Remind them that they are to cut along the dotted lines only if the words in that description DO NOT describe themselves. If the words do apply to themselves, then the hole should remain intact.

Gather the completed cards and use the notched corner to line them up. Then have students answer the questions on the worksheets by putting a pencil or rod through the appropriate hole. All cards that remain on the pencil will contain the names of the students that are in the correct group unless a card has been incorrectly punched or the wrong hole has been selected. If the wrong selections are made, discuss with the class how errors could occur.

Extensions

1. Combine characteristics. For example, find out who owns a calculator and has brown eyes.

2. Students take the data from the cards and make a table like the one in the first "Ideas."

3. Students may select other characteristics and make up punch cards.

Ideas for Teachers
Levels: 4-8

COMPUTER ROAD MAPS

Objective

To introduce flowcharting.

Materials

Worksheet and pencil.

Directions

Discuss with the students the purpose of a flowchart and how a flowchart is analogous to a road map.

Flowcharts show the computer the steps to follow to complete a job. Then have the students, working in small groups of four or five, follow the first flowchart. Discuss with the students how you could change the first decision box (Brown eyes?) to answer other questions - the number of boys or girls, the number older or younger than a certain age, the number who have pets, and so on.

Have the students complete the worksheets on their own.

Answers

(1) Write the numbers from 10 to 0, counting backwards.

(2)

(3)
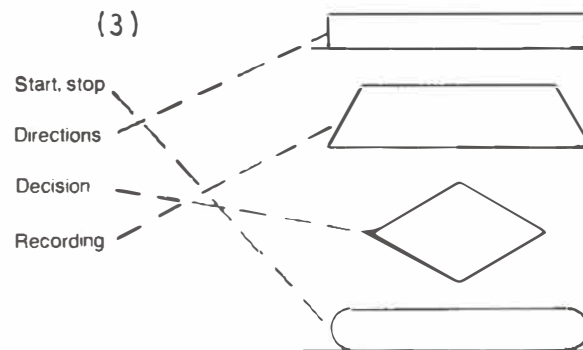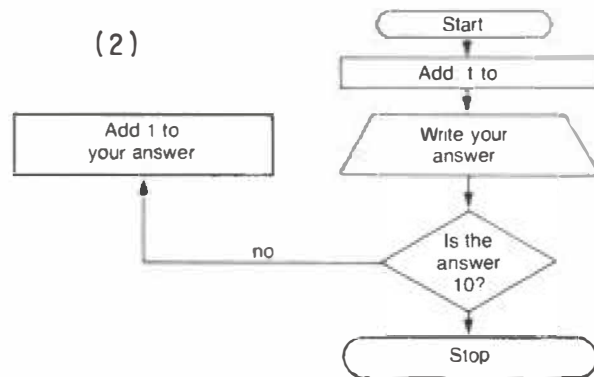
Extensions

1. Have students make flowcharts for counting the numbers of people in their families with:
   · birthdays in January, February, or March;

- who like sports;
- who drive cars;
- who are in school.

2. Have students suggest other characteristics that could be counted.

3. Have students make flowcharts that give directions for:
   - writing the even numbers from 10 to 30;
   - identifying the odd numbers between 45 and 57;
   - finding the prime numbers up to 41;
   - listing the things in the room that are shaped like a rectangle;

   and so on.

Ideas for Teachers
Levels: 5-8

PROGRAM THE COMPUTER

Objective

An introduction to simple program writing to solve word problems.

Materials

Worksheet and pencil.

Directions

Go over the sample problem and discuss the number sentence for solving it (45 - 26 = ☐). Read through the program that tells the computer how to solve the problem. Then have the students use the program for a model to tell the computer to subtract 12 from 25. Be certain that they note the changed order of the numbers (12, 25) in the program (DATA 25, 12). Review the computer symbols for the operations that are shown next. In particular, show how 24 divided by 3 (or 3 into 24) will be written 24/3. They can proceed then to writing the programs for the rest of the problems.

Answers

All are the same as the sample except for the second and fourth lines:

1. 20 C = A * B
   40 5, 23

2. 20 C = A/B
   40 354, 3

3. 20 C = A/B
   40 108, 4

4. 20 C = A+B
   40 27, 39

Extensions

1. Introduce other symbols such as

   ↑ , raise to a power
   ( ) , parentheses

   Make up more problems to solve.

2. If possible have the students try their programs on a computer.

Computer Output

Printout: Class census, 1981

Name	Girl	Brown eyes	Brown hair	Bro-ther(s)	Sis-ter(s)	Ride school bus	Play music	Like sports	Have calcu-lator
Bob		x		x	x			x	x
Ethel	x		x		x	x			x
Max				x		x			x
Patsy	x	x	x		x	x	x	x	x
Tracy	x		x	x				x	x
Pete		x	x				x	x	
Richard		x	x	x				x	x
Vera	x		x	x		x		x	x
Virginia	x			x					x
Waldo		x	x	x	x	x		x	x

Use the computer printout to answer the questions.

1. Does Patsy have brown eyes?
2. What are the names of the girls in the class?
3. Who rides a bus to school?
4. Who has brown eyes and rides the bus to school?
5. Who has at least one brother and one sister?
6. What do Virginia and Tracy have in common?
7. Use the printout to describe Max.
8. How many more people own a calculator than play a musical instrument?

IDEAS

Input Media

Computers sometimes use punched cards to get their input. To see how punched cards can be used —

1. cut out the card at the right,
2. punch out the circles with a hole punch,
3. cut along the dotted lines if the words next to each number do NOT describe you.

When everyone has finished, collect all cards, line them up using the notched corner as a guide, then put a pencil or rod through number 1 to see who the girls are in the group. The boys' cards will fall out. Write the girls' names. Is the list correct?

Use the cards to answer the following questions:

Who has brown eyes?
Who has brother(s)?
Who has a sister?
Who rides the bus to school?
Who plays a musical instrument?
Who likes sports?
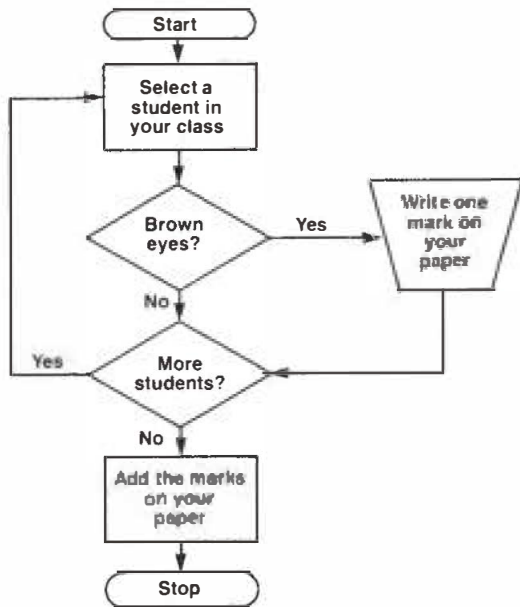Who owns a calculator?

Your name

_____

1. Girl

2. Have brown eyes

3. Have brother(s)

4. Have sister(s)

5. Ride bus to school

6. Play musical instrument
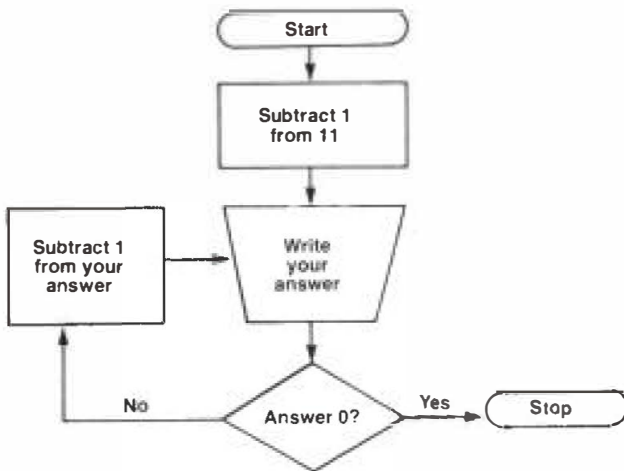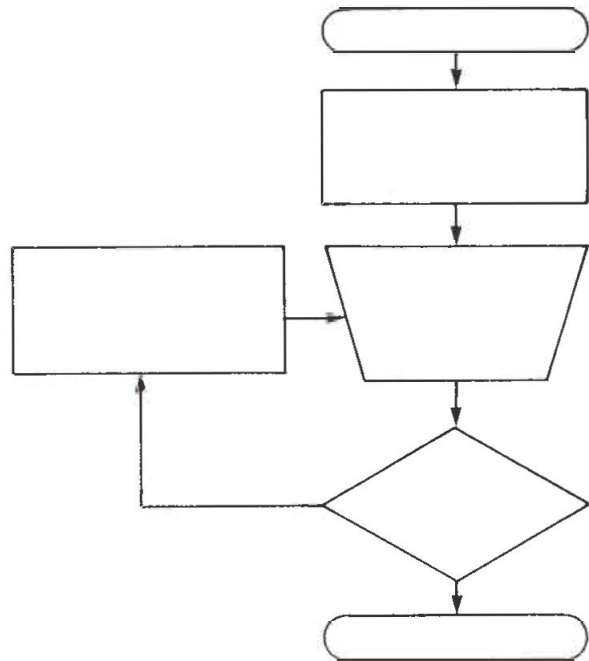
7. Like sports

8. Own a calculator

IDEAS

Computer Road Maps

1. Follow the directions of the flowcharts below. What job did each have you do?

```
        ( Start )
           ↓
    ┌──────────────┐
    │ Select a     │←──────┐
    │ student in   │       │
    │ your class   │       │
    └──────────────┘       │
           ↓               │
          ╱╲          Yes  ┌──────────┐
         ╱  ╲  ───────→    │ Write one│
        ╱Brown╲            │ mark on  │
        ╲eyes?╱            │ your     │
         ╲  ╱              │ paper    │
          ╲╱               └──────────┘
          No↓                   │
     Yes   ╱╲                   │
    ┌─────╱  ╲←─────────────────┘
    │    ╱More╲
    │    ╲students?╱
    │     ╲  ╱
    │      ╲╱
    │      No↓
    │  ┌──────────┐
    │  │ Add the  │
    │  │ marks    │
    │  │ on your  │
    │  │ paper    │
    │  └──────────┘
    │      ↓
    │   ( Stop )
```

2. Fill in the flowchart below to give directions for writing the numbers from 1 to 10.

```
   (          )
        ↓
   ┌────────┐
   │        │
   └────────┘
        ↓
┌──────┐  ╱▔▔╲
│      │→ ╲__╱
└──────┘     ↓
          ╱╲
         ╱  ╲
         ╲  ╱
          ╲╱
           ↓
        (      )
```

```
        ( Start )
           ↓
    ┌──────────────┐
    │ Subtract 1   │
    │ from 11      │
    └──────────────┘
           ↓
┌──────────┐   ╱▔▔▔╲
│ Subtract 1│→ │Write│
│ from your │  │your │
│ answer    │  │answer│
└──────────┘   ╲___╱
      ↑           ↓
  No ╱╲         Yes
 ┌──╱  ╲────────────→ ( Stop )
    ╲Answer 0?╱
     ╲  ╱
      ╲╱
```
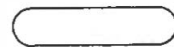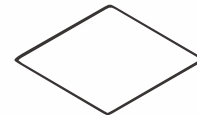
3. Match the flowchart symbols below with the kinds of messages they give.

Start, stop

Directions

Decision

Recording

```
┌────────┐
│        │
└────────┘

 ╱▔▔▔▔╲
╱      ╲
╲_____╱

  ╱╲
 ╱  ╲
 ╲  ╱
  ╲╱

(          )
```

23

Program the Computer

Sample: Forty-five students tried out for the team. Twenty-six were males. How many were females?

The program at the right tells the computer to subtract 26 from 45 to solve this problem.

Write computer programs for the following problems. The computer symbols for the operations are as follows: + (add), – (subtract), * (multiply), and / (divide).

```
10   READ A, B
20   LET C = A – B
30   PRINT C
40   DATA 45, 26
50   END
```

1. Five people each worked 23 hours on making the scenery for a play. How many hours did they work altogether?

2. The school sold $354 worth of tickets at $3 each. How many tickets were sold?

3. One hundred eight chairs were lined up in 4 rows. How many chairs were in each row?

4. Twenty-seven students are on the tennis team and 39 others are on the track team. How many students are on the track and tennis teams?