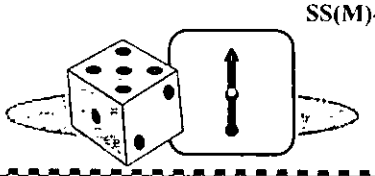
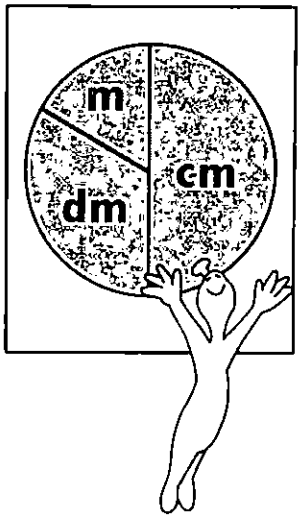
Objective: Construct items of specific lengths (cm, dm, m).



Activity:

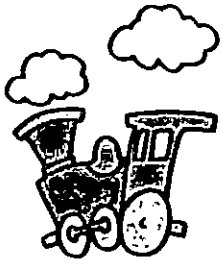
Materials: overhead spinner, spinner mat, dice, metre-stick.



- Play a (team) race game in the gym!
- Create a spinner mat like the one shown:
- The first player (or team) twirls the spinner and rolls the die, and then measures that distance from one edge of the gym floor toward the opposite edge.
- Play now passes to the other player (or team).
- Players (or teams) keep taking turns until one reaches the opposite wall, and that player (or team) wins!

PROBLEM SOLVING

Natalie used only black and purple rods to make a train 31 cm in length. How many of each rod did she use? Can you draw a line 31 cm long?



STRATEGY: *Act It Out*

ANSWER:

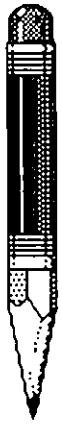
1 black and 6 purple rods were used.

adaptations:

DOWN

Play a similar game, but do not mix the various units (i.e., have students roll the die and measure across a page in cm only, or up the filing cabinet in dm only).

Construct a list of objects which would be measured using m, cm or dm.

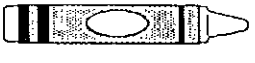


UP

Ask students to keep track of how many m, cm and dm they used during the game and use it to estimate the length of the gym floor using each of the three measures. Use a tape measure to check the reasonableness of the estimate.

Writing Corner:

Write out the instructions for drawing a straight line 8 cm in length.



Objective: Select the most appropriate standard unit (cm, dm, m) to measure a length.

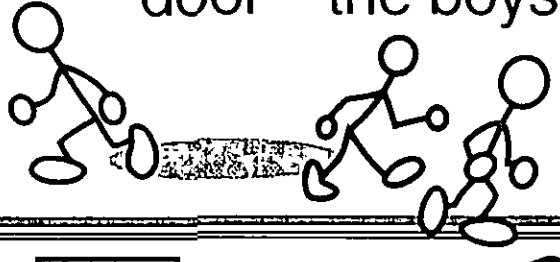
Representation:

Materials: paper strip (1 m in length), white counting rod, orange counting rod, eraser.

- A white rod is 1 cm in length. An orange rod is 1 dm in length. The paper strip is 1 m in length.
- How many white rods fit in an orange rod? How many orange rods fit along the paper strip?
- Try to use each rod and the paper strip to measure the length of the eraser. Which unit works best? Why?
- Try to use each rod and the paper strip to measure each of the following. Which unit works best? Why?
  - the top of your desk
  - the floor in your classroom
  - the door to your classroom
  - the length of your thumb

PROBLEM SOLVING

Who must walk farther to their washroom door from your classroom door—the boys or the girls?



STRATEGY: *Guess & Check*

ANSWER:

Answers vary.

adaptations:

DOWN

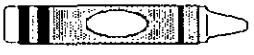
Start by measuring only using cm for several objects then gradually introduce longer objects, showing it takes too long (and too many white rods) to measuring some objects in cm. Repeat to make the transition from cm to dm, and from dm to m.

UP

Have students collect pictures of objects which would be measured in cm, dm, or m. Create a bulletin board display.

Writing Corner:

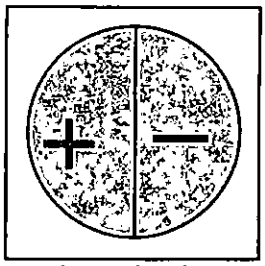
State a rule to explain which unit of measure you should use when finding the length of an object.



Objective: Estimate, measure, record, compare and order objects by length, height and distance around, using standard units (cm, dm, m).

Representation:

Materials: tape measure, objects in the room, paper, pencil.



• Create a spinner like the one shown. Work with a partner for this activity. Select 3 different objects of different lengths, and place them on the table top in order from largest to smallest (or longest to shortest).

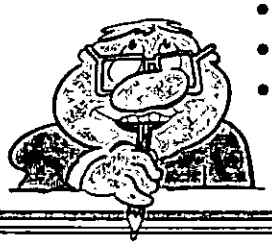
• Ask your partner to identify one of the three objects. Now twirl the spinner. If the spinner lands on the "+" symbol you must find an object in the room larger (or longer) than the selected object and the next larger object. f the spinner lands on the "-" symbol you need to find an object in the room smaller (or shorter) than the identified object and the next smaller object. If your partner selected the largest object and you spun a "+", then any larger object will do. Likewise if your partner selected the smallest object and you spun a "-", then any smaller object will do.

• Reverse roles. Continue building your set of objects until you have seven in all. Create a list of the seven objects. Estimate the length of each and then measure to check the accuracy of your estimate. Repeat the activity but measure for height, and then for distance around.

PROBLEM SOLVING

Sondra measured a candle, a pencil, an eraser and a comb. Using the clues below, find out how long each was:

- the candle was 10 cm longer than the pencil.
- the eraser was 9 cm shorter than the comb.
- the pencil was twice as long as the eraser.
- the eraser was 5 cm long.



STRATEGY: *Make a List.*

ANSWER:

Eraser - 5 cm, Pencil - 10 cm,
Comb - 14 cm, Candle - 20 cm.

adaptations:

DOWN

Select only 2 objects at a time, measuring each and comparing the lengths.

UP

Game: have students record the estimated height, length and distance around for each of 3 objects. Now measure each object. Score 1 point for each cm your estimate is over or under. Low score wins.

Writing Corner:

Describe how you estimate the length of an object in cm.

Objective: Estimate, measure, record and compare the area of shapes using non-standard units.

Representation:

Materials: pattern blocks.

- Take a large handful of pattern blocks. Use these blocks and put them together to cover the table without leaving any gaps or spaces.

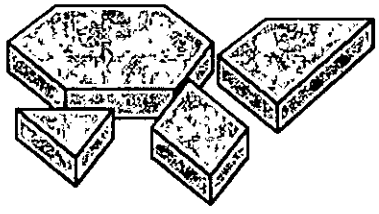
- How many yellow blocks would it take to completely cover your shape? Record your estimate, then try it and see.

- How many red blocks would it take to completely cover the shape? Record your estimate, and then test to check.

- Create a shape that would be covered by 10 yellow blocks placed together not leaving any gaps or spaces. After building the shape, try to cover it with 10 yellow blocks.

PROBLEM SOLVING

Which collection of pattern blocks would cover a larger area?



STRATEGY: *Act It Out*

ANSWER:

The first set.

adaptations:

DOWN

Cover a scrap of paper with several different kinds of objects such as cubes, paperclips, thumbtacks, tiles, etc.

Does it require the same number of each of these objects to cover the paper? Why?

UP

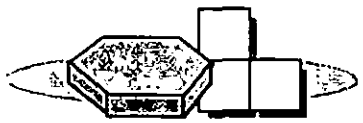
Take a yellow block and cover it with green blocks. How many green blocks are needed? Repeat with the red and blue blocks.

How can you use this information to predict how many yellow blocks are necessary to cover a shape.

Writing Corner:

Describe how you could tell if two shapes have the same area.

Objective: Construct a shape given a specific area in non-standard units.



Representation:

Materials: 6-sided die, pattern blocks, color tiles, construction paper, scissors.

(A) • Roll the die. Take the same number of green pattern blocks as the value rolled and place them on top of your construction paper such that one side of each block touches the side of another block.

• Continue rolling the die and adding green pattern blocks until you have used exactly 15 blocks.

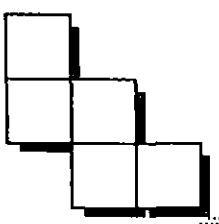
• Trace around your blocks and cut out the shape.

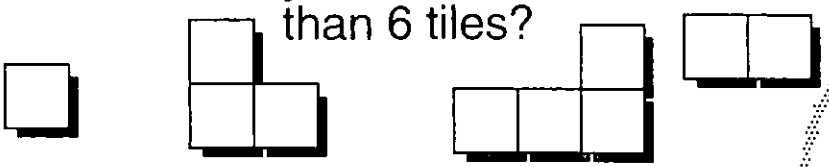
• Repeat.

(B) • Using the shape created above, and rolling the same die, see how many rolls it takes to cover each of the paper shapes (you made above) using color tiles.

PROBLEM SOLVING

Knowing that all tiles must touch each other on at least one side, how many different shapes can you make that have an area less than 6 tiles?





STRATEGY: *Guess and Check*

ANSWER:

There are 21 in all: 1 using 1 tile, 1 using 2 tiles, 2 using 3 tiles, 5 using 4 tiles, and 12 using 5 tiles.

adaptations:

DOWN

Have the class create a bulletin board display showing shapes with an area of 15 green pattern blocks.

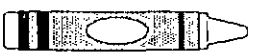
UP

Estimate then check: How many green pattern blocks will it take to cover a piece of paper? Note: you probably will not have enough green pattern blocks — time to problem solve!

Hint: How many green pattern blocks fit in a yellow pattern block?

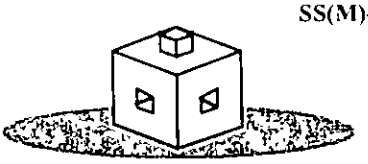
Writing Corner:

Will a shape built from 10 green pattern blocks have an area greater or less than a shape built from 10 color tiles? How do you know?



Objective:

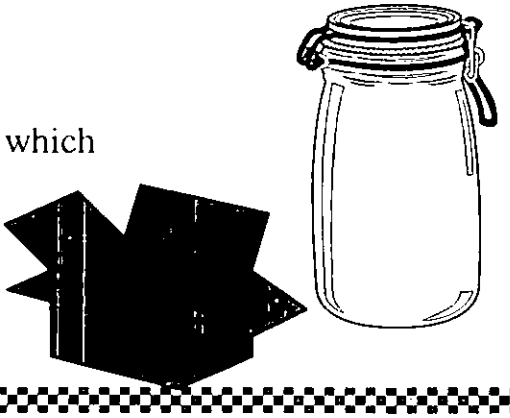
Estimate, measure, record, compare and order the capacity of containers, using non-standard units.



Representation:

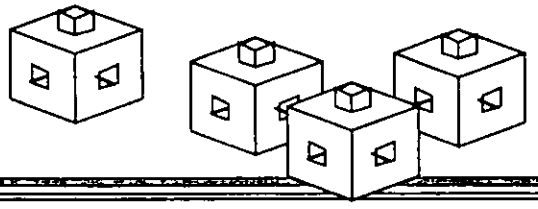
Materials: linking metric cubes, several small boxes, cans and bottles, paper, pencil.

- Take one container and place as many small metric cubes inside it as you can. Remove the cubes and count them.
- Take a different container. How many cubes do you think will fit in this container? Record your estimate. Check and see how close you were!
- Repeat until you have tried all of the containers.
- Sort the objects from largest to smallest (the one which can contain the most cubes down to one which can contain the least).



Problem Solving

June's box can hold 15 cubes. Marissa's box can hold 23 cubes. Kim's box can hold all of June's cubes and all but 7 of Marissa's. How many can Kim's box hold?



STRATEGY: *Act It Out.*

ANSWER:

Kim's box can hold 31 cubes.

adaptations:

DOWN

Repeat the activity above, but use more uniform shapes (e.g., only boxes or only cans). Have students fill several containers before making estimates on the remaining containers.

UP

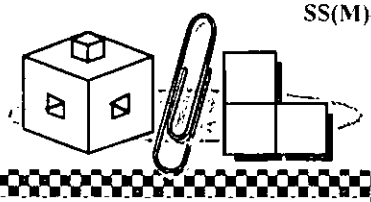
Place several hexalink cubes (e.g., 48) together to make a large rectangular solid. Wrap the solid in paper. Have students estimate the number of blocks inside. Can you make different arrangements of the same number of blocks which look to be different sizes?

Writing Corner:

Materials: one can and one box about the same size.

Which of these 2 containers holds more? Describe how you could test to see.

Objective: Estimate, measure, record, compare and order the mass (weight) of objects, using non-standard units.



Representation:

Materials: simple balance, color tiles, paper clips, linking metric cubes, several small objects.

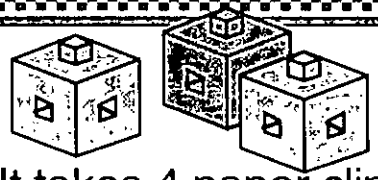
(A) Select one small object. Weigh the object three times: once with color tiles, once with paper clips and once with metric cubes.

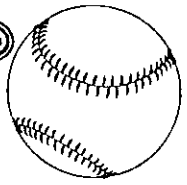
- how many color tiles does it take to balance the object?
- how many paper clips does it take to balance the object?
- how many linking metric cubes does it take to balance the object?

(B) Select 3 of the small objects (not the one used above). Make a list of the three objects and record an estimate for each: how many cubes would be required to balance each object? Check and see! Now sort the three objects from heaviest to lightest.

(C) Select 2 new small objects. Estimate how much they would weigh together. Record your estimate. Check and see!

PROBLEM SOLVING





It takes 4 paper clips to balance one color tile. It takes 3 color tiles to balance one hexalink cube. Joel's ball can be balanced using 5 cubes. How many paper clips are needed to balance his ball?

STRATEGY: *Draw a Diagram*

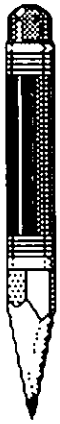
ANSWER:

It will take 60 paper clips.

adaptations:

DOWN

Limit the number of objects to be weighed to 2. Use only a single unit of measure (e.g., paper clips) at one time. Weigh one object, estimate the other.



UP

Find 2 different objects. Weigh one object in paper clips only. Weigh the other object in tiles only. Using the information you collected in (A) above, decide which of the two objects has the greatest mass.

Writing Corner:

Materials: two objects with known masses (measured in blocks).

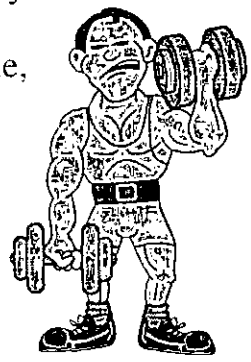
Knowing which object weighs more in blocks, which would weigh more measured in paper clips? Explain your answer.

Objective: Recognize that the size and shape of an object do not necessarily determine its mass (weight).

Representation:

Materials: plasticine, wooden block (2.5 cm on a side), hexalink cube, clay, piece of styrofoam, simple balance.

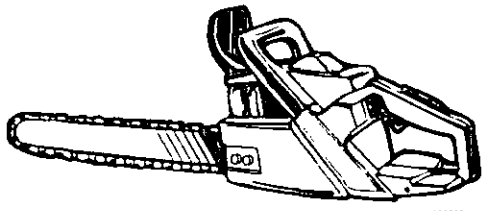
- Using the materials, create five blocks, approximately 2.5 cm on a side:
  - shape a block using the plasticine, shape another using the clay.
  - cut a block of the same size from the styrofoam.
  - you now have five blocks: wood cube, plastic cube, plasticine, styrofoam, and clay.



- Using the balance, sequence the blocks from lightest to heaviest.
- Answer the questions:
  - Which block was the heaviest? Which block was the lightest?
  - If you were to make blocks 5 cm on a side, would the sequence still be the same? Why?

Problem Solving

Which weighs more, a kg of wood chips, or a kg of styrofoam?



Which pile would be bigger?

STRATEGY: *Logical Reasoning*

ANSWER:

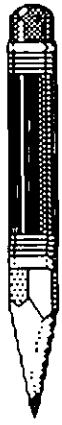
They weigh the same —1 kg each!
The styrofoam pile would be bigger.

adaptations:

DOWN

Use a large stryofoam chunk and a smaller clay ball to explain how size does not necessarily determine mass.

Use two balls of the same size (one of styrofoam and one of clay) to explain how shape does not necessarily determine mass.



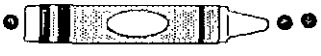
UP

Place a large styrofoam ball on one side of a balance. Use plasticine to create a ball to balance it on the other side.

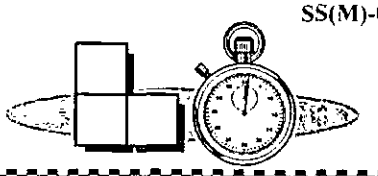
How many styrofoam balls of a given size are needed to balance a plasticine ball of the same size?

Writing Corner:

Do all objects with the same shape have the same mass? How do you know? Draw a picture to explain your answer.



Objective: Estimate and measure the passage of time related to minutes and hours.



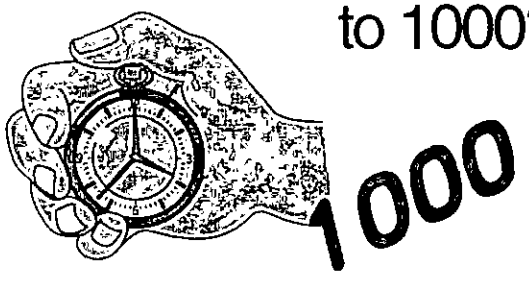
Representation:

Materials: color tiles, stopwatch.

- Take a collection of 100 color tiles and place them in one mixed pile.
- Have one volunteer sort the 100 tiles into like-colored piles, 5 to a pile.
- Estimate how long it will take to stack the tiles. Record your estimates. Let the person try, and time him or her. Who had the best estimate?
- Let everyone in your class try the same activity. How much time did you spend on this activity altogether?
- Make up your own task like the one above. Estimate how long it will take to complete and then try it to test your estimate.

PROBLEM SOLVING

How long would it take you to count to 1000?



STRATEGY: *Act It Out*

ANSWER:

Answers vary.

adaptations:

DOWN

Play a game:

Teacher times out one minute exactly. Students stand up when they think 1 minute has passed. After all students are standing, teacher announces who was closest to 1 minute. This student reveals his/her strategy.

UP

Have students keep track of how many hours and minutes they spend on each subject over one week.

Create a bulletin board or bar chart showing how time is distributed among the school subjects.

Which activities take up the most time of any given day?

Writing Corner:

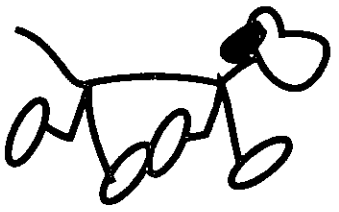
Describe a task that would take you about 1 minute to complete.

Now describe a job that would take you about 1 hour to complete.

Objective: Select the most approporiate standard unit to measure a given period of time.

Activity:

Materials: blank spinner mat, overhead spinner.



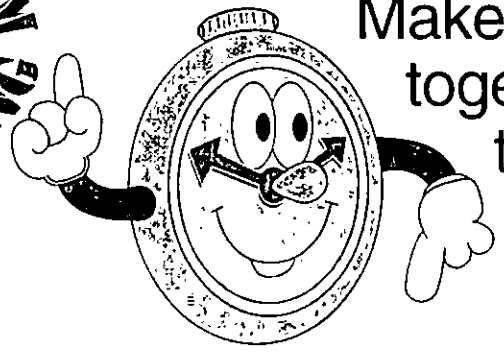
- Place the following activities on the spinner mat:

  walk the dog, cook supper, vacuum the house, build a house, rake the leaves, make a bed, set the table, do your homework, clean the garage, write your name, count to 10, eat a french fry.

- Have students take turns twirling the spinner, and describe how long it would take to complete the given activity. Example: it might take only seconds to write your name.

- Suggestion: as students complete one turn, have them add a new event to another blank spinner. When it is complete, move to the next spinner and play again.

Problem Solving



Make a list of 4 events which will together take about 10 minutes to complete.

Time yourself and see!

STRATEGY: *Act It Out*

ANSWER:

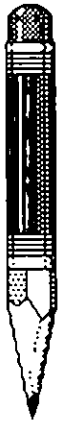
Answers vary.

adaptations:

DOWN

Introduce new units of time incrementally -- start with minutes and seconds, then include hours, days and years.

Create a list of activities which would normally be completed in a few minutes or in a few seconds. Build your list as you add new time units.



UP

Create a new spinner that has: seconds, minutes, hours, days, months and years.

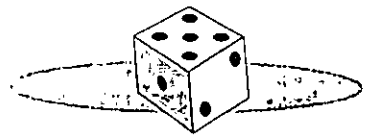
Players take turns twirling the spinner. Create a list of activites or events which are measured in the units spun.

See who can create the most unique list.

Writing Corner:

Some events like walking the dog could be measured in seconds, yet we measure them in minutes. Why is it better to measure it in minutes than in seconds?

Objective: Name, in order, the months of the year.



Activity:

Materials: paper, pencil, one 4-sided die, two 6-sided dice, one 12-sided die.

• Play this game with your friend! Race against your friend to construct a list of the months of the year, in order.

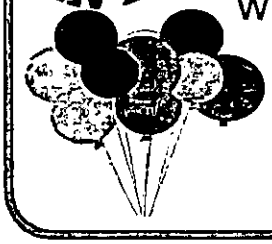
• On a turn you may choose to roll 1 die or any 2 dice. If you choose 2 dice you must add the values together to determine the value rolled.

• Once you roll a 1, you can write January on your list. o add February to your list you must roll a 2, etc. The first player to make a list of all 12 months wins.

• If your roll is successful (that is, you roll the value needed to list the next month), you may take another turn. If you do not roll the value needed your turn ends.

Adaptation: Players roll at the same time as many times as necessary adding months when they can. First player to list December wins.

PROBLEM SOLVING



Braden, Mark, Melody and Kara were all born the same year. One was born in June, one in July, one in April and one in December. Using the clues below, find out who is the oldest:

- Melody is younger and taller than Kara.
- Mark was almost a New Year's baby.
- Braden was born in a short month.
- Braden was born before Kara.

STRATEGY: *Make a List*

ANSWER:

From oldest to youngest they are Braden, Kara, Melody and Mark. Braden is oldest.

adaptations:

DOWN

Play the game as above, but start with a list of the 12 months numbered one through 12.

Cross the months off as they are rolled.

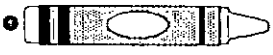
UP

Use the 12-sided die to play a game with a friend. Take turns rolling the dice, then first person to name the month indicated by the value rolled scores a point. High score wins.

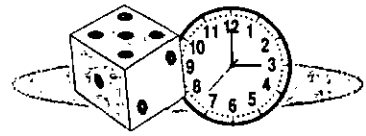
Play again, this time naming the month which comes before the value rolled!

Writing Corner:

Create a list of everyone in your class and their birthdays. Make a list of whose birthday is next, the next, and so on.



Objective: Relate the number of days to a week, months to a year, minutes to an hour, hours to a day.



Representation:

Materials: large clock face (drawn on poster paper, minutes and hours marked off), calendar page (marked off in days and months), dice, small markers.

• Play this game with a friend:

• The game has 2 game boards: a clock face and a calendar page. The objective is to race your way around the clock face (first around the outside to count off the number of minutes in an hour, then along the numbers on the face — twice, to show hours in the day), then to race through one week of the calendar (7 days in a week), then through the 12 months of the year. The first player to reach December wins.

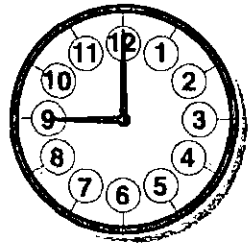
• Players take turns rolling the die and moving their markers. As they complete each stage (e.g., minutes, hours, days, months) they should write a sentence to describe the relationship.

Adaptation: if you land on a space held by any opponent, you send them back to the beginning of that stage of the game. For example, if your opponent is sitting on Wednesday, and you land on Wednesday, your opponent must start the days of the week over.

PROBLEM SOLVING

How many times does the minute hand on a clock point to a 3 in one day? during your school day?

How many times does the minute hand on a clock point to a 1 in one day?



STRATEGY: *Make a List*

ANSWER:

The hand will point to a 3 a total of 24 times in one day. It will point to a 1 a total of 120 times!

adaptations:

DOWN

Simplify the game by playing it in stages, e.g., just minutes in an hour.

Give players their own clock faces and have them move the hands through a full 2 hours to win the game.

UP

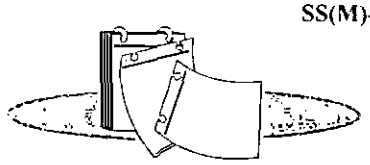
Using a calculator, compute each of the following:

- days in 2 years
- hours in a week
- minutes in a day
- hours in March

Writing Corner:

Write a story telling about something a crazy cat did each day for a week.

Objective: Read the date on a calendar.

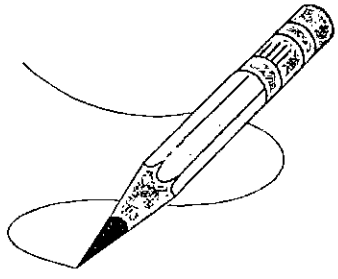


Activity:

Materials: calendar page with all 12 months on a single page, pencil, ruler.

- Create a calendar dot-to-dot!
- Make a list of dates which are to be connected by a line. Once all of the correct lines are drawn they will result in a picture.
- Example: connect all of the following dates on the 2000 calendar provided to make a letter of the alphabet:

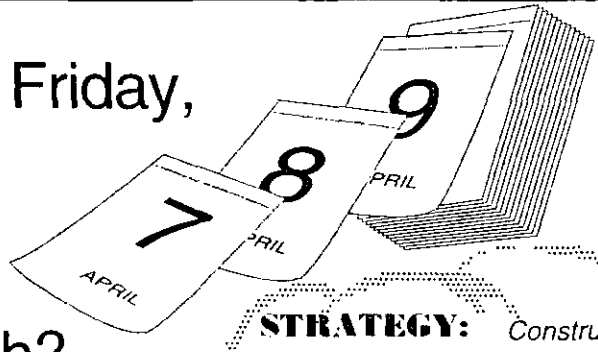
  January 10 → October 14 → May 24 →
  December 3 → March 17



Note: activities such as the one above will be specific to a particular calendar. Use the calendar templates appended.

PROBLEM SOLVING

If July 17th is a Friday, what day of the week is the following September 24th?



STRATEGY: *Construct a Model*

ANSWER:

September 24th will fall on a Thursday.

adaptations:

DOWN

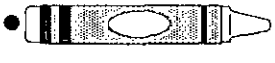
Use the same dot-to-dot activity as above, but use a single page from a calendar representing only one month.

UP

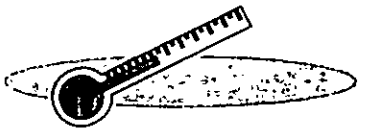
Using the activity above, write out instructions such that the lines would spell your name.

Writing Corner:

Make a list of all of your favourite days on the calendar. Explain why these days are so special.



Objective: Use a thermometer to determine rising and falling temperatures.



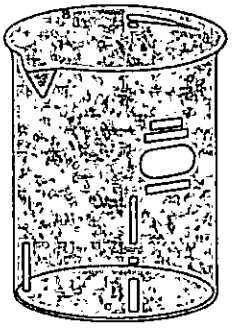
Activity:

Materials: beakers, water, ice, black construction paper, thermometer, paper, pencil.

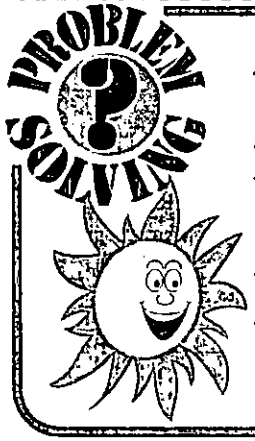
• Begin by placing the water in the beaker. Use the thermometer to record the temperature of the water.

• Place the ice in the water. Record the temperature every few minutes. How cold does the water get before the ice melts?

• Remove any remaining ice.



• Split the water equally into two beakers. Place both beakers in the sunlight; one on a piece of white paper and one on a piece of black construction paper. Record the temperature every few minutes in each beaker. Does one beaker of water warm up faster than the other?



The temperature rose 5 degrees before noon, and then another 6 degrees by 2 o'clock. It stayed at that temperature until 4 o'clock, when it started to fall. By 6 o'clock it had fallen 8 degrees to 16°C. What was the temperature that morning?

STRATEGY: *Work Backwards*

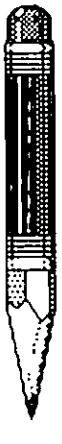
ANSWER:

It was 13°C that morning.

adaptations:

DOWN

Use a metre stick as a model of the thermometer. Place linking metric cubes along the edge, adding and removing blocks to show the temperature rising and falling. Tell a story that involves temperature change and model it using the metre stick.



UP

In the activity as it is described above, have the students create graphs to show the temperature as it rises or falls in the beakers. Alternatively, have the students graph the temperature each day and at different times during the day. Ask students to predict temperatures at given times tomorrow.

Writing Corner:

Describe something you enjoy doing outside when the temperature is high. Now describe something you enjoy doing outside when the temperature is near freezing.

Objective: Create equivalent sets of coins using pennies, nickels, and dimes up to $1.00 in value.

Representation:

Materials: money manipulative, real or play money (coins).

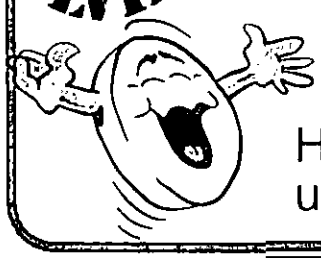
• Work with a partner for this activity. Have one partner place a collection of coin cards on the money board, leaving no gaps or spaces. Determine the value of that collection of coins.

• The other partner now removes some coin cards and replaces them with equivalent coins (e.g., remove a dime card and replace it with two nickel cards, remove a nickel card and replace it with 5 penny cards, etc.). Determine that the value has not changed.

• Repeat this many times. How many different ways can you find to make the same value as the one with which you started?

Note: if preferred, the same activity can be done without the money manipulative, substituting a set of real or play coins.

PROBLEM SOLVING



How many different ways can you make 36¢ using only pennies, nickels, dimes and quarters?

How can this be done using exactly 10 coins?

STRATEGY: *Make a List*

ANSWER:

There are 24 ways in all. It can be done with 10 coins by using 6 pennies, 2 dimes and 2 nickels.

adaptations:

DOWN

In the activity above have students place real or play coins on top of the coin cards. The coins can be removed at any time to create a set with the specified values.

UP

Keep track of how many different ways there are to make up each of the values up to 25¢.

Describe any patterns you might find.

Writing Corner:

Pretend a friend has just come to visit from another country. Write an explanation for him or her of the values and relationships between our coins.

Objective: Estimate, count and record using the cents symbol only, the value of collections of coins up to $1.00.

Representation:

Materials: real or play coins (mostly pennies, some nickels, a few dimes, no more than 3 quarters), overhead spinner, blank spinner mat.

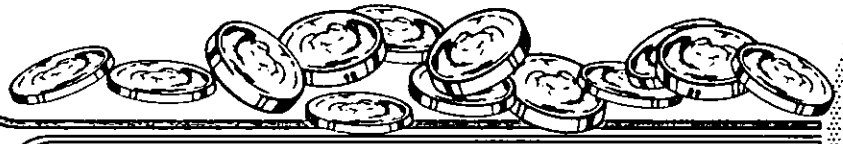
(A)
- take a handful of coins from the given collection of coins.
- estimate the value of the coins.
- count the coins to determine the actual value. How close were you?
- try this again to see if you can make an even better estimate.

(B)
- create a spinner mat with 4 equal sections: penny, nickel, dime, quarter.
- twirl the spinner 6 times, taking the coin spun to create a set of 6 coins.
- estimate the value of the set, then count to check how close you were.

(C)
- using the spinner above, play a game with a friend.
- take turns twirling the spinner and taking the coin spun.
- after 5 turns, who has the most money?

PROBLEM SOLVING

Angela has 3 of one kind of coin, 2 of another, and 5 of another. The value of her set of coins is 45¢. Which coins does she have?



STRATEGY: *Guess & Check*

ANSWER:

Angela has 3 dimes, 2 nickels and 5 pennies.

adaptations:

DOWN

Select 6 to 10 coins. Estimate the value. Use the money manipulative board to determine the value of the set.

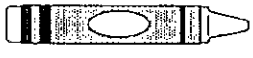
As one way to estimate the value of a set of coins use this strategy: **translate all coins into equivalent sets of dimes.**

UP

Play a game with a friend like the game described in part (C) above. Twirl the spinner taking the coin spun. If taking that coin would put you over $1.00 you must give up one of that coin instead. First person to reach $1.00 exactly wins.

Writing Corner:

Explain how you estimate the value of a set of coins.



Objective: Recognize and state the value, in cents, of a quarter, a dollar and bills to $10.00.

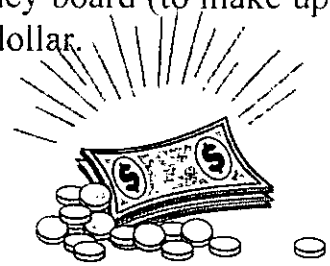
Representation:

Materials: money manipulative, real or play money.

• How many of the penny cards does it take to cover the quarter card? Write a sentence to explain how many pennies there are in a quarter.

• How many quarter cards does it take to cover the money board (or, in other words, to make up $1.00)? Write a sentence to explain how many quarters there are in one dollar.

• How many penny cards would it take to cover the entire money board (to make up $1.00)? Write a sentence to explain how many pennies in one dollar.



• Use what you know to figure out each of the following:
How many pennies in a $2.00 coin? a $5.00 bill?
a $10.00 bill?

Problem Solving

Tim decided to trade all of his money in for pennies at the bank. After trading he had 775 pennies. Assuming he had as few bills and coins as possible, what did he have before going to the bank?

STRATEGY: *Make a List*

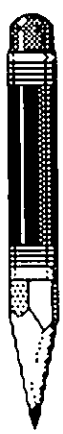
ANSWER:

Tim had a $5 bill, a $2 coin, and three quarters.

adaptations:

DOWN

Start with a large set of pennies and trade up until you reach a nickel. Then trade two nickels for a dime, then two dimes and a nickel for a quarter, and then four quarters for a dollar. How many pennies do you need to start with?



UP

Use a deck of cards (2 through 9). Turn over 3 cards to make a number less than 1000. How many pennies, nickels, dimes, quarters, $1 coins, $2 coins, and $5 bills are necessary to equal this number of pennies? Use as few of each as possible.

Writing Corner:

What would life be like if the only money we had was pennies?