Commentary

Venus, I

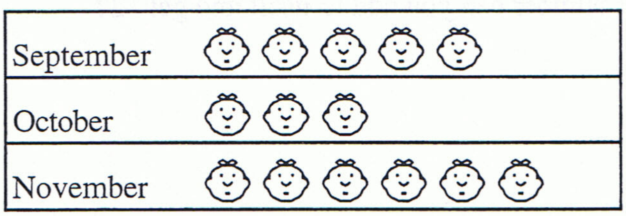
1. **(7)** 15 – 8 = 7. Students might use cubes to represent the strawberries. Making up a story to go with the problem might help some students who have trouble. They are likely to solve the problem by *counting on.*

2. **(12)** 5 + 7 = 12. Manipulatives to represent the bugs, or drawing pictures of the bugs, will help some students.

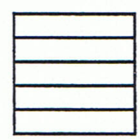
3. **(12)** 1st week-2 books, 2nd week-4 books, etc....6th week-12 books. Students who simply add or subtract the two numbers they see in the problem will need to act this out, with real books and a calendar.

4. **(fish)** The problem is an intuitive introduction to probability. The chance is greater for getting a fish because fish take up more area of the circle. Some students unfamiliar with spinners may choose "bird" because that is where the arrow is pointing to in the drawing.

5.



6. **(A square divided into 5 sections.)** Be lenient with student's drawings. Some will have the right idea, but their small motor skills aren't developed enough to draw such a figure precisely. Have them describe their figure to you verbally, and give them credit if their description is correct.



Commentary

Venus, II

1. **(A)** Students might want to cut out shapes like these, and see if they can make them fit. A is half of the square shape. The rectangle and hexagon will not fit the shape.

2. **(basket of berries and the truck)** 15¢ + 18¢ = 33¢.

3. **(Second Tile)** There are five dots on this tile. Each of the other tiles have seven dots.

4. **(Ben, Ken, Jen, Len, Zen)** Students might enjoy lining up like this themselves, to act out the roles. Drawing a picture most-to-least will also help answer the question.

5. **(9 + 4 = 13)**

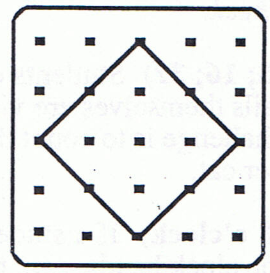
6. **(6)** Most students can *guess and check* to find the mystery number. They would perhaps guess it was 5, then go through the steps and find that 5 was too small because you don't get 14. So they would revise their guess up. *Working backwards* might be appropriate for some students. For them, you would start by reversing the last step -- what did you have, before you added 2 and got 14? Then what number can you add to itself and get 12?

Commentary

Venus, III

1. **(3)** This is a simple subtraction problem.

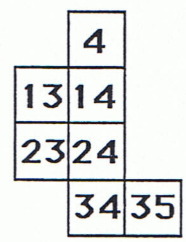
2. **(See the square to the right)** Students need to see geometric figures that are not in the usual orientation. They need to know that figures remain the same -- squares, triangles, and so on -- when they are rotated.



3. **(1)** Students will enjoy making their own survey similar to this one, and discussing the data. After they do so, this problem will be easy for them.

4. **(rectangle)** This may be the students' first introduction to the process of elimination. As they read each clue, they can write the name or initial on the shape. Then by process of elimination, the shape that is left must be Mark's.

5. This problem assumes that students have worked with a hundreds chart in class. If not, it would be necessary to introduce this to students before they attempt this problem. Based on the hundreds chart the student will see that each row is ten more than the previous row.



6. **(13 - Least; 96 - Greatest)** Students might enjoy taking only 2 digits at random from a stack of cards, and making both the greatest and the least number possible with those two digits. They can play a game in which each child draws 2 such cards from a deck, and the teacher draws a card at random that says either "greatest" or "least." The child who wins that round gets to be the teacher on the next round.

7. **(6¢, 9¢, 12¢, 15¢, 18¢, 21¢; ... 30¢)** Students will fill in the chart according to the pattern of counting by threes, or they might just count by ones each time. The final answer -- the amount for 10 pencils -- requires that they go beyond the chart.

Commentary

Venus, IV

1. **(5)** Students will probably add 2 + 8 + 1+ 3 = 14 and then subtract 14 from 19 to get 5. Some will start with 19 and subtract 2,8,1, and 3 to get 5. Others may *guess and check.*

2. **(8; 16; 32)** Students can count the cats to decide how many tails, although not all the tails themselves are visible. They can also count the ears, since they are visible. The challenge is to count the legs -- they are not visible, and a child will have to count four per cat.

3. **(8 o'clock)** If a student knows that the answer is 8:00 but doesn't know how to draw the clock hands, give them partial credit.

4. **(10)** This problem could be modeled by taking 5 pieces of paper, 1 per bug, and cutting them apart. An extension of this problem, which will come up in later years, is to consider what happens when those 10 bugs break in half, and then those 20, and so on.

5. **(The chart would be similar to that below.)**

Child Pulling	Child Riding
Alice	Sam
Alice	Kevin
Sam	Alice
Sam	Kevin
Kevin	Alice
Kevin	Sam

6. **(6)** The problem involves both adding and subtracting, and also has extraneous information. The two positive runs are added, and the yardage lost is subtracted. The jersey number has nothing to do with it. Some students might not know what the terms mean, if they are unfamiliar with football. It would profit those students to have a little about the game explained to them before they attempt the problem.

7. **(10)** Students can draw triangles in the large shape, to cover it. 12 triangles exactly fit, and this number is closer to 10 than to 5 or 20. A visual estimate should tell students that 5 is not enough, and 20 is too large a number.

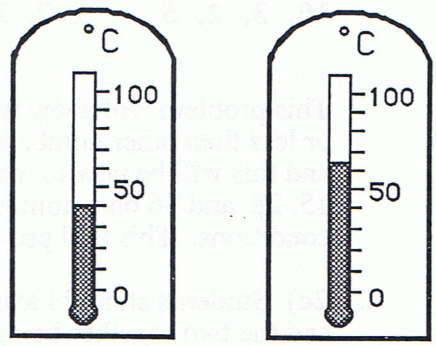
Commentary

Venus, V

1. **(5 dots, 3 dots, 1 dot)** The first box has 11 dots, the second has 9 dots, the third has 7 dots. The pattern is then the odd numbers, counting backward from 11.

2. **(The marked thermometers are shown to the right.)** Each line on the thermometer represents 10 degrees, although this will not be obvious to all students. They may have to be prompted to see what number they count by -- *ten* -- starting with zero, to get to 50 at the 5th count. Practice in counting by tens should help. The second thermometer requires that they realize that 65 is half way between 60 and 70. As students practice counting by tens, this can be an extension.

   (Don't expect the children's marks on the thermometer to be precise.)



40°   65°

3. Students can *guess and check* with + and - to find the answer. Or, they might notice that + had to precede 6 since it's impossible to add the three previous numbers, subtract 6, and get 11. So the three numbers before 6 must turn out to be 5, once the computation is done for them. This makes the problem simpler.

$$3 \boxed{+} 4 \boxed{-} 2 \boxed{+} 6 = 11$$

4. **(2)** Fair shares is a good way for students to meet division before ever knowing how to perform the operation with numbers. The problem would be easy if the 6 cookies were grouped 2 to a plate, but here students will have to take one from both plates and give if to the middle person, to divide them fairly. They might draw lines from each child to 1 cookie, to show giving them out, then a second line.

5. **(14)** Students can actually act out a problem like this, using paper instead of crayons.

6. **(40¢)** Drawing a picture of the cards with buttons on them, till you have 12 buttons, will help students. Then they can label each card with 10¢, and count by tens to find the total.

7. **(10)** The pattern is that the white squares increase by 1 each time you move to the next figure --1, 2, 3, and so on -- and the grey squares increase by 2 each time -- 4, 6, 8, and so on. Therefore the next number of grey squares would be 10. Some students might draw the next picture, and actually count the grey squares to verify this answer. An extension of the problem would be to continue the pattern further.

8. **(a. hands, etc.; b. fingers or toes; c. hair)** The notion is for students to think about numbers that come naturally to them. Part (c) requires them to think about a large number, but one that is "real-world" to them.

Commentary

Venus, VI

1.

Less than 11	Greater than 15 less than 28	Greater than 36	Numbers that do not belong in any basket
10, 3, 2, 5	1 7, 26, 20, 19	39, 42, 48	29, 31, 34

This problem will show which students have an intuitive feel for numbers that are greater than or less than other numbers. The middle basket requires that a number meet two conditions, and this will be new to many students. A help would be to indicate the "critical numbers" 11, 15, 28, and 36 on a number line, with a basket drawn under the set of numbers that match its conditions. This will provide a visual interpretation of the problem.

2. **(2¢)** Students should have an intuitive knowledge of a dime being 10¢ and a nickel being 5¢, and the two together being 15¢. Therefore removing 13¢ from 15¢ leaves 2¢.

3. **(3, 11)** Students can subtract 4 from 7 to find the answer that belongs in the box, or they might find it simply by knowing that 3 is the number that adds to four to give seven. In either case, 3 is then added to 8, giving 11.

4. **(20 and 50)** Students might find the boxes in a number of ways. They might start with the largest, 50, then *count on* by tens for the box of 20. Or they might simply add the numbers as 5 tens plus 2 tens, getting 7 tens or 70. Or, they might use a calculator and add 20 + 50.

5. **(bottom)** Taking out three blocks, labeling them with the 3 colors, and stacking them up according to the two conditions will help students who have trouble with this problem. One possible source of difficulty is that the symbols on the blocks (6, A, and P) are arbitrary, but some students will assume they have meaning in the problem.

6. **(8)** Students can count the concentric triangles, as well as the individual ones. Some will have trouble with the triangle with a square in it, feeling that this somehow is disallowed. Or, they might count the square, not distinguishing it from a triangle.

Commentary

Venus, VII

1. **(14; 35)** If the dog ate 9 flies, then the cat ate 12 flies and the bird ate 14 flies. Together they ate 9 + 12 + 14. This problem may be troublesome for children because you don't simply add or subtract with the numbers that appear. It might be helpful if they act out the situation, using manipulatives, stressing the words *more than* in the problem.

2. **(20)** If one lamb has 4 legs, 2 lambs have 8 legs, and so on to 5 lambs having 20 legs. Students might draw stick figures of the lambs, and count their legs as they draw them.

3. **(2)** If one truck costs 13¢, then 2 trucks cost 26¢. You can only buy 2 trucks for 30¢, and you'll have 4¢ left. A student might want to act this problem out with 30 pennies, putting down 13 for each purchase.

4. **(ABC)** Since B belongs to the square and the triangle, it counts as belonging to the triangle.

5. **(46)** As 4 tens are 40, the *tens* place has a 4 in it. Therefore there is a 6 in the *ones* place. Students might enjoy doing some more "mystery number" games like this, giving a hint as to either the *ones* or *tens* digit first, then the other.

6. **(–, +)** Using trial and error, the student can put the correct symbols in the circle to make sense.

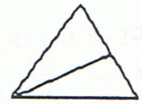
$$13 \ominus 4 \oplus 8 = 17$$

7. **(10)** Research is beginning to show that students coming to first grade already have intuitive knowledge of some fractions, and "half" is one of those. They may not get this problem correct, but many can divide a collection of food or other such common objects among several children. In this case, two children could act out the roles, one starting with 20 pennies and the other with none. They would divide them by going "one for you, one for me," and so on.

Commentary

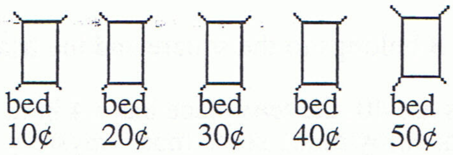
Venus, VIII

1. The outside figures which repeat are square, oval, then triangle. Also, there are two lines in the first set of three such figures, then one line slanting down from left to right in the second set, then one line slanting up from left to right in the third set. The last figure is shown to the right.



2. **(One clock should show 2:30 o'clock.)** Students have a choice in this problem of the way they should answer. A student who knows both ways of recording time should receive an extra, bonus star.

3. **(5 times)** Students can draw a picture to solve the problem. They should be encouraged to count by tens also.



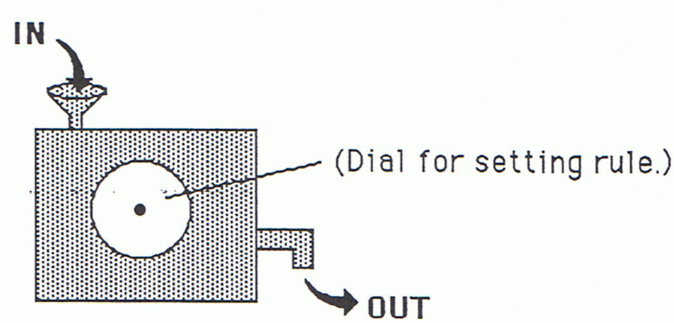
4. **(4)** Students could write all the numbers from 1 to 40, and select those with a 7. Some will be able to do this problem mentally, by thinking 7, 17, 27, 37, perhaps by counting out loud.

5. **(a. > b. = c. <)** Most students will be able to add the amounts of money on each side mentally. If not, they can use a calculator. The difficult part, but important, is for them to write down or remember what sum they get for each side, until they have computed the amount on both sides, and can compare.

6. **(15)** Counting all the days from December 17 to 31 is the most likely way that students will find this answer. A calendar presents a lot of patterns for students to look for, and might be useful in other math activities.

7. **(17, 20, 31)** It is interesting and instructive for students to see a model of a function machine, of which this problem is one type. They will enjoy having a physical model of such a machine, as shown below, with a dial that really turns. Then they can play a game with each other, with one making up a rule (the rule setter)and "setting the dial," and the other giving **In** numbers. The rule setter thengives the **Out** number, and they record this on a chart. After the rule is discovered, the roles are reversed.

   For an extension of this situation, once the rule is discovered, have the student give an **Out** number, and the other student try to decide what number went **In**. Do not stress reversing the rule -- allow them to decide on the **In** number simply by intuition.

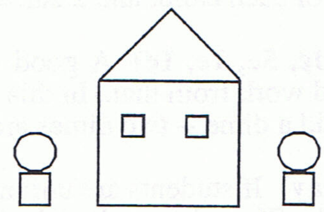


Commentary

Venus, IX

1. **(43¢)** The ears, nose, and teeth are 9 triangles, which costs 27¢. The two eyes are squares and cost 10¢. The face is a circle and costs 6¢.

   Students might practice this problem with a different shape, such as the house and two bushes to the right.



2. **(20 or 21 cm)** Students will solve this in different ways. Some will count by ones from 4 (or perhaps 4 1/2), up to 25. Some might count by ones, but start at 25 and work down to the other end, 4. Others will mark the length of the tape dispenser on a piece of paper or another object, and hold that distance up to zero on the scale and read the other end. Others will count backwards (25, 24, 23, ...) down to 4, but then they won't know the answer unless they know how many times they counted. A few might subtract 4 from 25.

3. **(9, 11)** Students might practice making patterns like these out of tiles, cubes, or other manipulatives. A prompt might be to ask students having difficulty with such problems -- how do you get from step 1 to step 2? How do you get from step 2 to step 3? This will encourage them to relate each figure to the one which immediately follows or precedes it. Students who are unfamiliar with patterns might have trouble focusing on the parts of the pattern, and be looking globally at the design.

4. **(19)** Students might *guess-check-revise* for this problem. That is, they might try a number like 10 to start, and see if they get 13 after subtracting 6. They then revise their guess of 10 accordingly.

5. **(3)** To balance the scale, the student has to draw three apples on the right side of the scale. A key to solving such problems is some familiarity with balance scales in the classroom, knowing that the same weight must be on both pans for the bar to be horizontal. This model is important for later work with Superstars as a balanced scale is a physical embodiment of the way the equals sign is used in mathematics.

6. **(4)** Students will approach this problem in different ways. Some will count out individual pieces one at a time for the 4 kids, till all are gone. Others will divide each pizza into four equal parts, so each kid will get 2 pieces from each pizza for a total of four. Still others might think initially that 2 kids can share both pizzas, and cut each pizza in half and thus give 4 adjoining pieces to each kid.

7. **(48, 46, 45, 86, 85, 84, 65, 68, 64, 56, 58, 54)** Students might practice this problem with only 3 cards first, and different numbers than the four given.

Commentary

Venus, X

1. **(12)** Students need to include Jill with her five friends to make six children. Drawing a picture of each child, and 2 cupcakes per child, will help find the answer by counting.

2. **(25¢, 10¢, 5¢, 1¢, 1¢)** A good strategy is for students to start with the largest coin they can, and work from that. In this case, start with a quarter because 2 quarters is too much. Then add a dime -- two dimes are too much. Continue in this fashion.

3. **(Saturday)** If students are unfamiliar with a calendar, they might not know to place a 1 in the box under Thursday, and a 2 in the next box, and so on. Practice problems like this could involve looking at a real calendar for the present month, and discussing questions similar to these, to familiarize a child with the way a calendar is set up.

4. **(First grade)** The Kindergarten class has 28 students, while the first grade class has 29 students.

5. **(10 squares)** Each window pane is a small square, and the window frame itself counts also. Therefore each window actually has 5 squares showing. The two windows together would therefore have 10 squares.

6. **(accept any answer from 6 to 10, (8 to be exact))** Students with good visual estimation skills or accurate drawings skills might find a reasonable answer without using a real object such as a plate. A nickel is about the same size as one of the plates shown, and so can be used repeatedly to get a good estimate.

7. **(12; 6)** Some students will forget to count the fourth wheel on the car, because it can't be seen. Another common mistake is to either not count the two friends, or count the two friends but not yourself. This problem involves a concrete example of ratio -- 4 wheels to each car; 2 headlights to each car. Similar problems would involve considering a real car and additional ratios -- seat belts, air bags, radio speakers, and so on. Other transportation objects offer more possibilities -- bicycles, big wheels, wagons, skates, and so on.