Algebra Readiness Materials Part 2

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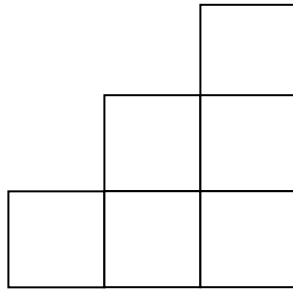
Problem of the Month "Growing Staircases"

Growing Staircases

Level A:

This is a staircase that goes up three steps.
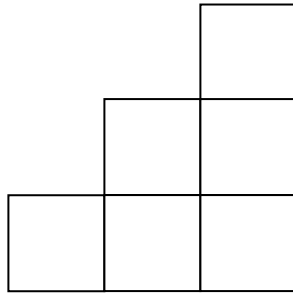
How many blocks are needed for the first step?

How many blocks are needed for the second step?

How many blocks are needed for the third step?

How many blocks in all are needed to make this staircase of three steps?

Explain how you know.

Level B:

Draw the blocks in the diagram to make the fourth step.

How many blocks in all are needed to make a staircase with five steps?
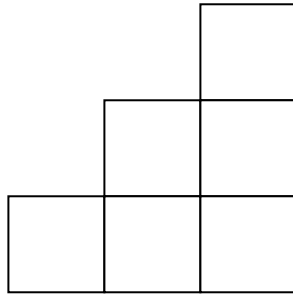
How many blocks does it take to build just the twelfth step?

How many blocks in all are needed to make a staircase of ten steps?

A staircase has 105 blocks. How many stairs does it have?

Explain your answers.

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Level C:

How many blocks are needed to make just the one hundredth step? Explain how you know.

Write a rule to find the number of blocks needed for the nth step. Explain your rule.

Write a rule to find the total number of blocks needed to make a staircase with n number of steps. Explain your rule.

Write a rule that given y number of blocks, you can tell how many steps are in the staircase. Explain your rule.

3

THE PUZZLE

This problem gives you the chance to:
• Solve and reason about equations

A magazine contains a puzzle.

Each symbol represents a
number.

Different symbols have
different values.

The sum of each row is given
at the side of the table.

♥	♥	♠	♠	28
♥	♥	♥	♥	24
♣	♣	♦	♠	42
♥	♣	♦	♠	36

Try to find out the value for each symbol:

heart = ♥ , spade = ♠ , club = ♣ , diamond = ♦.

[5]

Modeling Expressions
Assessment Task

Dolores and Viviana are building area models of number expressions. Viviana built the following model.
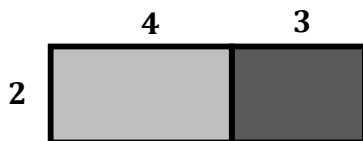
Viviana wrote the number expression 2 • (4 + 3) sq. units and explained that 2 is the width and 4 + 3 is the length of the model.

1. What is the area of the model? _____ sq. units

Dolores wrote a different number expression: (6 + 2) • 5 sq. units

2. Write an equivalent number expression without using parentheses. Only include the digits 2, 5, 6 in your expression.

    _____sq. units

    What property did you use to make the equivalent expression?

    _____

    3. Draw the area model of Dolores' expression.

The students then drew the following area model:

4   **3**

4

3
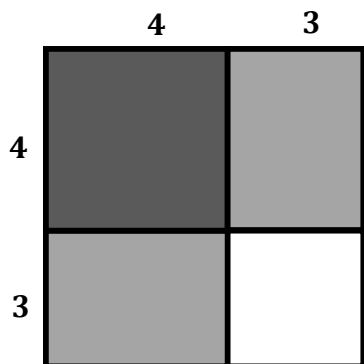
4. Write an expression with parentheses to model its area. Only include the digits 3, 4 in your expression.

   _____ sq. units.

5. Write an expression without parentheses to model its area. Only include the digits 3, 4 in your expression.

   _____ sq. units.

6. Dolores wrote the following expression to model the area:

   4 • 4 + 2 • 4 • 3 + 3 • 3

   Explain why Dolores' expression fits the model.

   _____

   _____

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Banquet Tables
MAC Assessment Task

You are helping to plan a big reception for your sister's wedding. The reception hall has banquet tables shaped as hexagons. One person can sit at each side of the table.
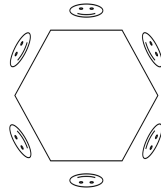
1. How many people can sit around one banquet table? _____

You have just found out the hall where you are holding the reception is long and narrow. There is not enough room to spread the tables out. Your brother has an idea, what happens if we push two tables together so that one of the sides from the first table is touching a side from the second table.
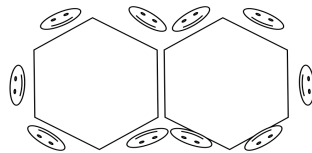
2. How many people can sit around two banquet tables?

_____

Your brother drew a picture of six banquest tables.
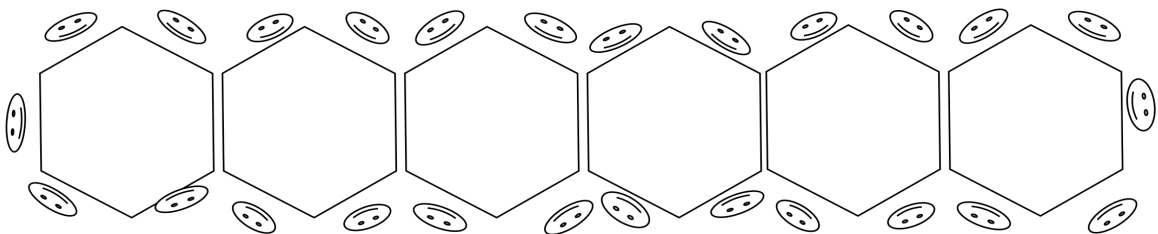
3. Explain how the relationship increases as you add more tables.

_____

_____

4. There will be 115 guests at the reception. How many tables are needed?

_____

Show how you figured it out.

5. Write an equation with variables to represent the relationship between the number of tables (x) and the number of guests that can be seated (y).

_____

Use a specific case to show the equation works.

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The Number Cruncher

This problem gives you the chance to:
• relate function rules and pairs of values

The Number Cruncher is a machine for altering numbers.
Each day it has a new rule.

The Number Cruncher

On **Monday,** if you put in 4, it comes out as 8.
If you put in 3, it comes out as 6.
If you put in 10, it comes out as 20.
Monday's rule is to **double** the number.

1. **What is Tuesday's rule?**
If you put in 5, it comes out as 7.
If you put in 12, it comes out as 14.
If you put in 30, it comes out as 32.
Tuesday's rule is

2. **What is Wednesday's rule?**

    3   ➤   9
    4   ➤   12
  10   ➤   30
Wednesday's rule is

3. **What is Thursday's rule?**

13 ➡ 5
10 ➡ 2
77 ➡ 69

Thursday's rule is

_____

4. **What is Friday's rule?**

25 ➡ 5
60 ➡ 12
100 ➡ 20

Friday's rule is

_____

5. **What is Saturday's rule?**

5 ➡ 9
30 ➡ 59
19 ➡ 37

Saturday's rule is

_____

6. **Make your own rule for Sunday.**

Sunday's rule is

_____

Using your rule, show what happens to two numbers.

_____ ➡ _____

_____ ➡ _____

7. **Next Monday, the Number Cruncher's rule will be to add 4 and then multiply by 3.**

Which numbers will be produced if these numbers are put in?

2 ➡ _____

8 ➡ _____

13 ➡ _____

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Cans of Kola

This problem gives you the chance to:
• use numbers in a practical situation

Chris wanted to see which Kola Kola was the best price.
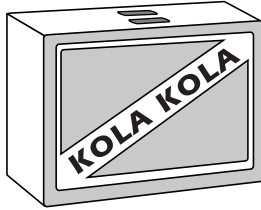
12-pack $3.20
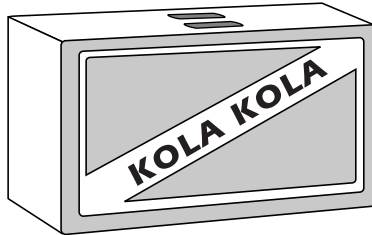
24-pack $4.24

6-pack $1.60

She wrote:

The 6-pack costs $1.60

The 12-pack costs $3.20,
so I divided by 2 on
the calculator.
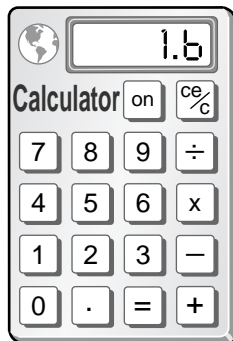
The 24-pack costs $4.24,
so I divided by 4 on
the calculator.
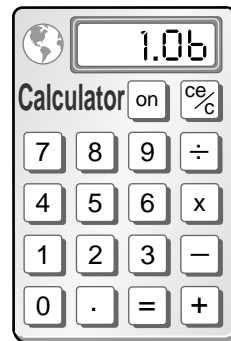
To find the best price, I just compare these three values.

1. Will Chris's method of figuring out the best price for soda work?
Explain your reasoning.

_____

_____

_____

_____

2. Chris said, "The 6-pack costs $1.60. The calculator shows that 6 cans from
the 12-pack cost 1.6 and 6 cans from the 24-pack cost 1.06. I'm not sure which
is the best price."

Write a short note to Chris to help her understand the meaning of 1.60, 1.6 and 1.06.
Then recommend the "best buy" to her, explaining how you know it is the lowest price.

_____

_____

_____

_____

_____

3. Chris has one coupon for 10% off any Kola Kola purchases.
Find the lowest price Chris would pay for 30 cans.
Explain how you got your answer.

_____

_____

_____

8

_____

To Buy or Not to Buy

The suggested retail price of a computer is $2,500. A storeowner has a plan. He is going to mark up the computer 15% and sell it at that new price for the first week.

He knows his customers love sales. So starting the second week he plans to have a 15% off the price sale.

The storeowner tells his head clerk, "The customers will think they are getting the computer for a sale, but they are actually getting the retail price."

The storeowner is wrong, explain why.

Picking Apples

This problem gives you the chance to:
• work out costs from given rules

Anna goes to pick apples.
She sees two orchards next to each other; David's orchard and Pam's orchard.
The signs below are at the entrance to the orchards.

DAVID'S APPLE ORCHARD Pick your own apples!	PAM'S ORCHARD DELICIOUS APPLES
First 10 pounds $2 per pound	$10 entry fee First 10 pounds $1.50 per pound
Each additional pound $1 per pound	Each additional pound $0.75

Anna wants to pick 40 pounds of apples.

1. a. How much does this cost at David's orchard? _____

   Show your calculations.

   b. How much does it cost at Pam's orchard? _____

   Show your calculations.

Chris has $30 to spend.

2. a. How many pounds of apples will he get if he goes to David's orchard? _____
        Explain how you figured it out.

        _____

        _____

        _____

    b. If Chris goes to Pam's orchard, how many pounds of apples will he get? _____
        Explain how you figured it out.

        _____

        _____

        _____

3. How many pounds of apples must Chris pick before Pam's orchard is cheaper than David's?

    Show your work.   _____
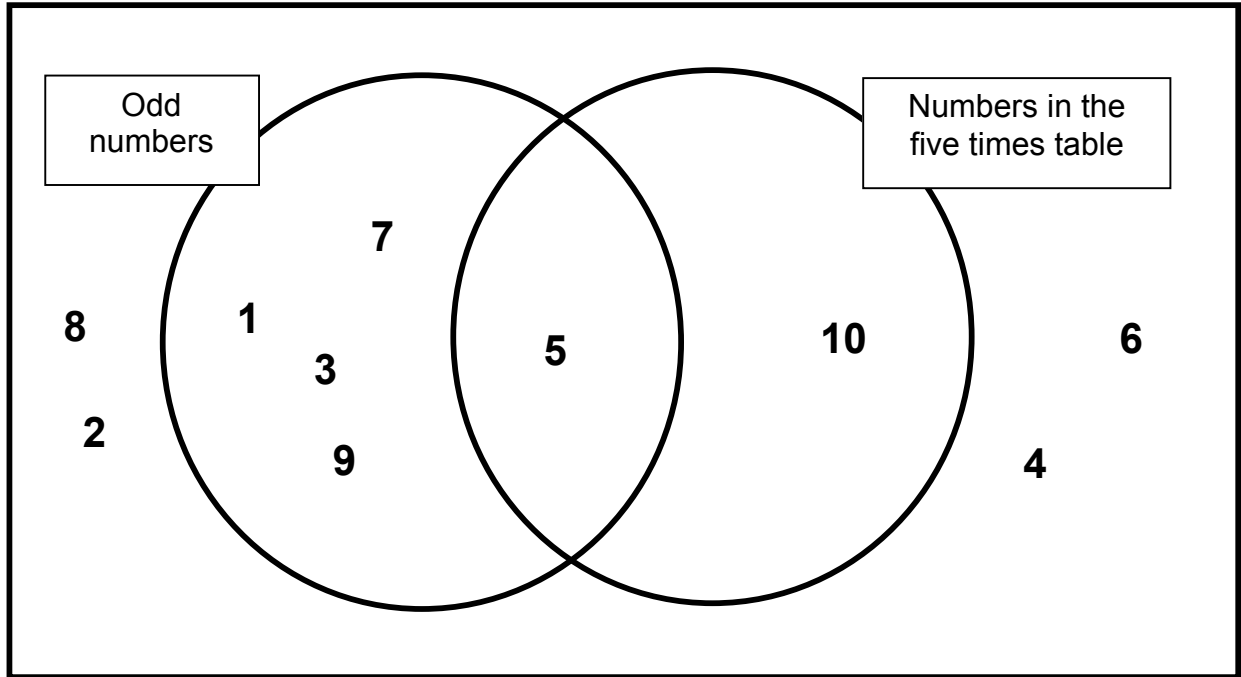
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Odd Numbers

This problem gives you the chance to:
• sort numbers into sets and explain your choices
• test statements about odd and even numbers

The diagram below shows how Sue sorts some numbers.

Odd numbers

Numbers in the five times table

8

7

1

3

2

9

5

10

6

4

1. Explain why the number 5 is in the overlap region of the two circles.

2. Write the numbers 11, 12, 13, 14 and 15 in the correct regions of the diagram.

Odd Numbers   Test 8

16

3. Pete says that when you add two numbers that are multiples of 5 you get a number that is a multiple of 10.

   (a) Give an example to show that this is **sometimes** true.

   _____

   _____

   _____

   (b) Give an example to show that this is **not always** true.

   _____

   _____

   _____

4. Jane says that when you add two odd numbers you **always** get an odd number.

   (a) Give an example to show that this is **not** true.

   _____

   _____

   _____

   (b) Explain why two odd numbers **always** add to make an even number.

   _____

   _____

   _____

8

17