

The inspiration for this compilation of problems has come from many sources.

Thank you to:

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and

special thanks to the ATA Educational Trust for making this project possible.

For a digital copy, please visit www.aliciaburdess.com

A 21st Century Learning Promise: I promise to do all I can to keep the spark of curiosity, creativity, and learning alive in every child; to help all children discover their talents, develop their passions, deepen their understanding, and apply all this to helping others, and to creating a better world for us all.

-author unknown

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Read This First

This resource is the result of a two year-long collaborative project to identify and compile problems that align with the grade 2 curriculum outlined by the Alberta Mathematics Program of Studies (2007). It is an initial attempt to answer our essential question, “**How can teaching through problem solving engage every student and drive learning forward?**”

This resource is not meant as a bank of worksheets to be given arbitrarily to students. Rather, it is designed to be a journey through problem solving for the entire math classroom. Problems worth solving take time. Some problems may take only one block, others will take longer. Use your professional judgment to choose your problems, guide your teaching, and facilitate student learning. The focus is meant to be on the experience of the problem solving process - the thinking, the connections, and the understanding. Sample solutions are provided as a single example of many possible problem solving strategies. Our intent is for you the teacher to be deeply involved in the problem solving process with your students and hopefully with your colleagues. Take risks, make mistakes, and don't worry so much about the destination as about the journey. Complement these problems with mini-lessons, games, and projects to teach the Grade 2 Program of Studies.

This is our first draft. Some outcomes have more problems linked to them than others. This project will be ongoing; and will continue to be changed and improved as it is continually tested with students.

Materials:

For all problems in this book, we recommend using vertical non-permanent surfaces, and dry-erase markers and erasers. Any additional materials will be problem specific. We also make available an assortment of manipulatives to provide the students with a choice as to which ones to use to best solve the problem. Don't worry if they choose something that won't really help, because this is part of the problem solving process. They will learn from mistakes. Manipulative options (add to this list as you see fit):

- Counters (anything)
- Base ten blocks
- Animal figures
- Hundred charts
- Pattern blocks
- Dice
- Playing cards
- Number cards
- Number lines
- 3D solids
- 2D shape chart
- Popsicle sticks
- Snap cubes
- Plastic coins
- Addition charts

A Problem Solving Classroom

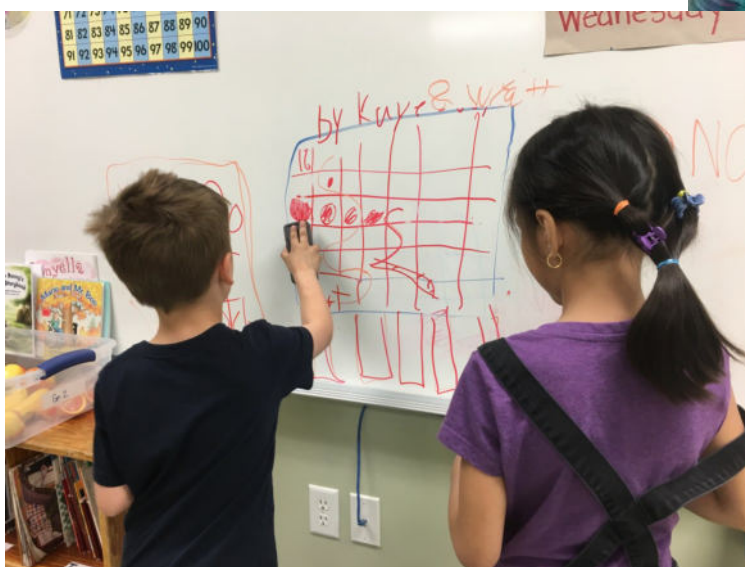
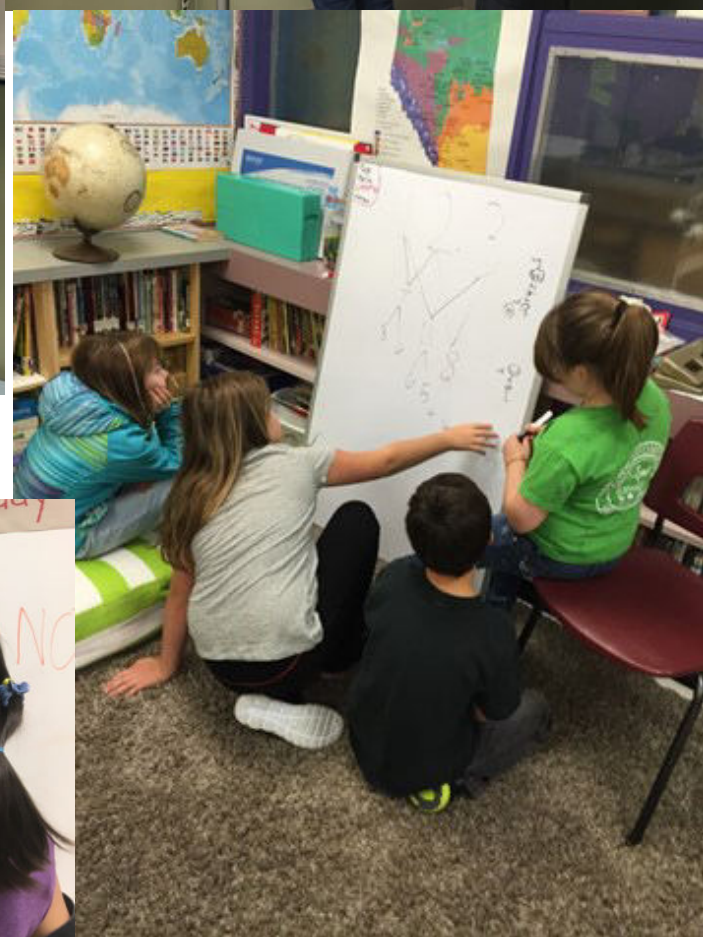
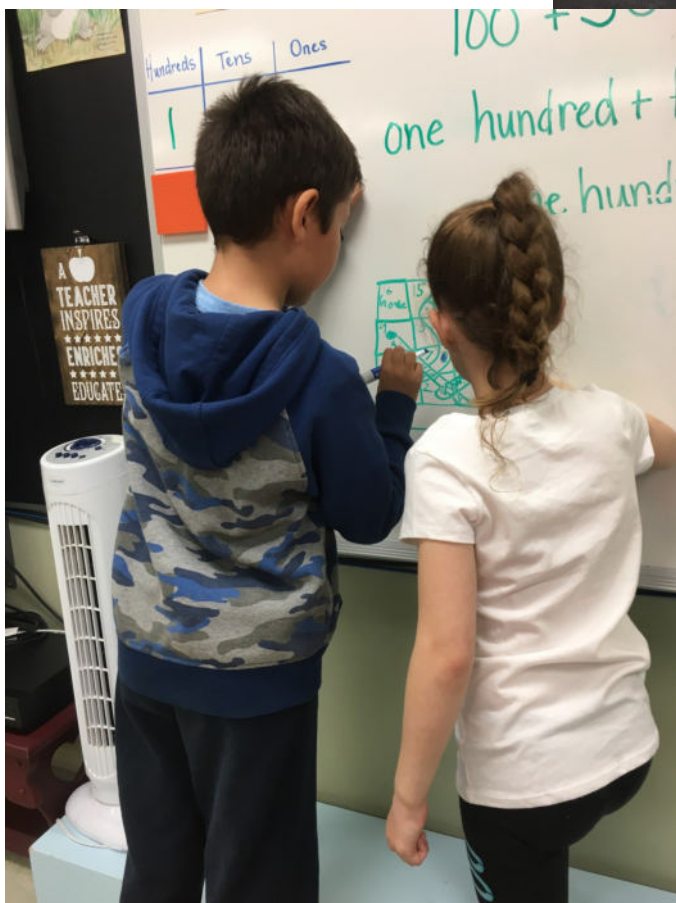


“Problem solving is a powerful teaching tool that fosters multiple, creative and innovative solutions. Creating an environment where students openly look for, and engage in, finding a variety of strategies for solving problems empowers students to explore alternatives and develops confident, cognitive mathematical risk takers. Learning through problem solving should be the focus of mathematics at all grade levels. When students encounter new situations and respond to questions of the type How would you ...? or How could you ...?, the problem-solving approach is being modeled. Students develop their own problem-solving strategies by listening to, discussing and trying different strategies” (Alberta Mathematics Program of Studies, 2007).

Teaching through problem solving is about inviting students to think about mathematics, to take risks, and to persevere. Collaboration is the key component of problem solving. Students need to be working together, sharing strategies, and learning from one another. The role of the teacher is to inspire, facilitate, and regulate. No telling, no showing, no giving answers. Your job is to motivate, question, and guide attention to big ideas!

Problem solving is our focus and problem solving is our lesson. This collection includes low - floor, high-ceiling problems with multiple entry points enabling all students to access and experience success with the problems. In our experience, teaching through problem solving, levels the playing field. Students will struggle; this struggle will help them deepen their understanding and expand their skills. Problem solving gives the chance for all learners to be creative, think outside the box, and have a voice.

“Coming to know something is not a spectator sport although numerous textbooks, especially in mathematics, and traditional modes of instruction may give that impression” (Brown and Walter, *The Art of Problem Posing*).



Getting Started With Students

Random Groups + Non-Permanent Pen + Vertical Surfaces + Group Work, Collaboration, Communication + Different Skills and Strategies = A Thinking Classroom

Students should work in **random groups**. This can be done using Popsicle sticks, a deck of cards, the random group generator on the Smart Board, etc. This will teach students how to work with everybody and anybody. This helps break down social barriers and nurtures a learning community in which students feel safe to take risks and make mistakes. This also discourages students from being labeled and grouped based on their “pre-conceived” mathematical abilities. If it is always random, it is always fair; the students know that the groups will always change and that they are expected to be able to work with everybody.

(For more information, please read THE AFFORDANCES OF USING VISIBLY RANDOM GROUPS IN A MATHEMATICS CLASSROOM by Peter Liljedahl, Simon Fraser University, Canada – In press)



Students should work at **vertical surfaces**. This allows everyone to have access to the workspace. It also allows for the teacher to easily see how each group is working, and who needs some direction, motivation, or extra help. Vertical surfaces are easily accessible by teachers for formative assessment. While standing in the middle of the room, it is possible to see everybody. It allows both students and teachers to see at-a-glance the problem solving process, identify misconceptions, direct questioning, redirect the students, motivate group work, plan for discussions, mini-lessons and future lessons. Students' initial work should be on a **non-permanent** surface which encourages the risk-taking necessary for true problem solving. The non-permanence of the surface allows students to make mistakes without any long term consequences.

Whiteboards, windows, lockers, filing cabinets, shower curtains, shelf liner, writeable paint, table and desktops, and interactive whiteboards are a few examples of non-permanent vertical surfaces. Be sure to check the surface to ensure that the dry erase marker comes off prior to students writing on it.



Students need to develop and practice **group work, collaboration, and communication skills**. They need to learn how to listen to each other, to share their ideas, to question, and to trust their abilities and the abilities of others. **Different skills and strategies** need to be embraced while helping each other to create a safe learning environment.

Suggestions for Teaching Through Problem Solving

Group sizes depend on the teacher, the students, and the specific problem. We like 3 as a rule, but often have groups of 4 and occasionally students work in partners.

Students solve their problems in random groups at a vertical surface. There is only **one pen per group and it must be shared**. The person with the pen is not allowed to write down his or her ideas. Remind them not to hog the pen! This helps keep the groups working together.

Gallery Walks / Mobilization of knowledge: encourage the students to walk around the classroom to see other groups for ideas, to see different strategies, to get unstuck. This is also a great way to provide feedback, instigate new discussions, and direct your teaching.

When you want to utilize a specific group's work to discuss a strategy, some specific math, misconceptions, etc, first **move all of the students to the center of the room, away from the work** in order to remove ownership of it (alleviate fear, embarrassment, etc.). Then move students back to the work to discuss it.

Encourage students to work together to work through the problem and get an answer. Advise them to work with their answer to see if they can find an alternate way, or use a different strategy, to explain their ideas and to **present their solution**.

Use non-traditional assessments such as observations, checklists, posters, videos, photos of work, written solutions that tell the story of how the problem was solved, etc. This allows students to show their problem solving process, to explain their thinking, and to showcase their understanding. Students can “present” their solutions as a group, in partners, or individually depending on what the teacher is assessing or needs to see.

Remember that problem solving takes practice. More “traditional” learners may struggle to communicate and collaborate. It will require practice listening to other people’s ideas and strategies. It can be frustrating working in groups and some students may find it difficult to explain their ideas. Many students lack confidence in math as well as in problem solving. **Students need to be taught how to think, how to collaborate, how to communicate, how to problem solve, and how to persevere.**

What is a Problem Worth Solving?

A problem worth solving is accessible to all students. It has multiple entry points, has a low floor, wide walls, and a high ceiling. These problems lend themselves to natural differentiation where all students are able to address the problem at their level and experience success. A problem worth solving allows the use of multiple strategies and varying facets of mathematics.

“A problem-solving activity must ask students to determine a way to get from what is known to what is sought. If students have already been given ways to solve the problem, it is not a problem, but practice. A true problem requires students to use prior learnings in new ways and contexts. Problem solving requires and builds depth of conceptual understanding and student engagement”.

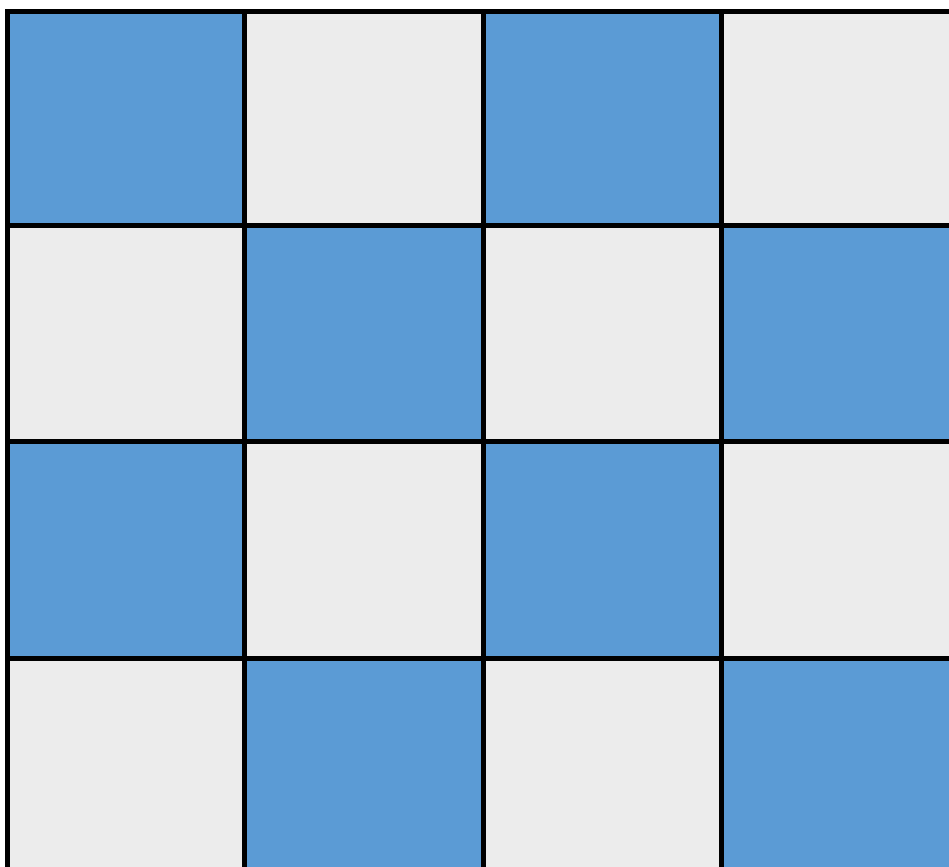
(Alberta Mathematics Program of Studies, 2007).

The
Checkerboard Problem
is an exemplary problem
and it is our favourite
example of
a problem worth solving.

Checkerboard N1, N9, N10, PR3, SS8

Problem:

How many squares are there on a 4 x 4 checkerboard?



If this is too difficult for your students, try starting with a 2 X 2 checkerboard, then a 3 X 3 checkerboard.

Credit: Adapted from a problem by Rita Zazkis

Extension:

How many squares are there on a 5 x 5 checkerboard? A 6 x 6?

BACK

Checkerboard N1, N9, N10, PR3, SS8

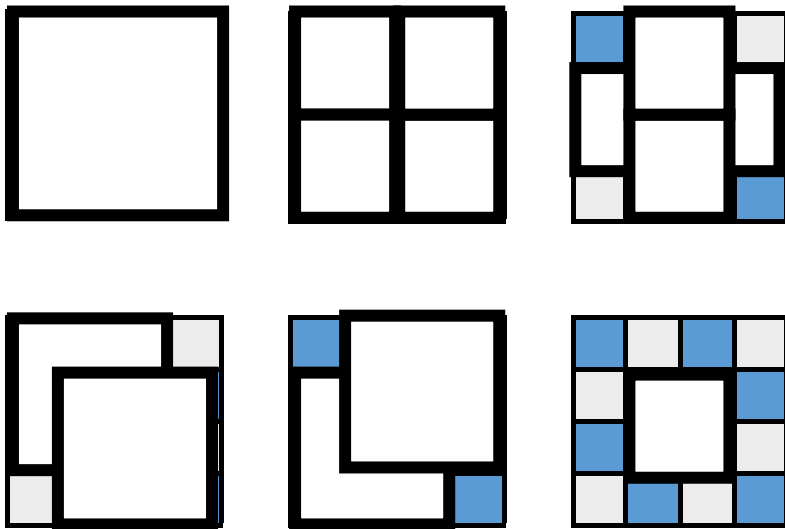
Outcome Objective:

SS8: Describe, compare and construct 2-D shapes, including: triangles, squares, rectangles, circles.

Material Suggestions:

- Multiple copies of a picture of a 4 by 4 checkerboard
 - Scissors to cut out different sized squares
 - Crayons
 - Flip tiles
-

Sample Solutions: 16, 17, 21, 25, 27, 29, 30



Are there more?

Notes:

Students as young as grade 3 have been successful at solving this problem with an 8 x 8 checkerboard. Let them struggle and explore.

Mathematics related to trying to identify all of the squares will emerge:

- Number sense: counting
 - Addition
 - Counting by 2s
 - Recognizing squares inside squares (2D shapes)
 - Recognizing a pattern
 - Arrays (not part of the grade 2 curriculum, but early exposure does not hurt): introduces multiplicative thinking.
-

Assessment Idea:

Have students initially solve the problem within a group, but individually write up their own solution which explains the process, tells the story of how the problem was solved, and explains the mathematics!

How to Use This Resource

Section 1: Pages 16-56

Problems to Create a Thinking Classroom (Problems to Target the Front Matter)

The **first section** of problems is meant to be used to create a **thinking classroom**. Use these problems to teach students how to solve problems. These problems are included to address the Front-Matter of the curriculum as well as previous math concepts and outcomes. Students will go through the processes of learning to communicate, collaborate, reason, visualize, take risks, and persevere. The math classroom should become a culture of respect, responsibility, and thinking. Continue using these problems throughout the year! ***No sample solutions or curriculum links are provided for these problems. We want the teachers to learn with the students, take risks, make mistakes, and persevere! Feel free to google answers as a last resort if you really get stuck.**

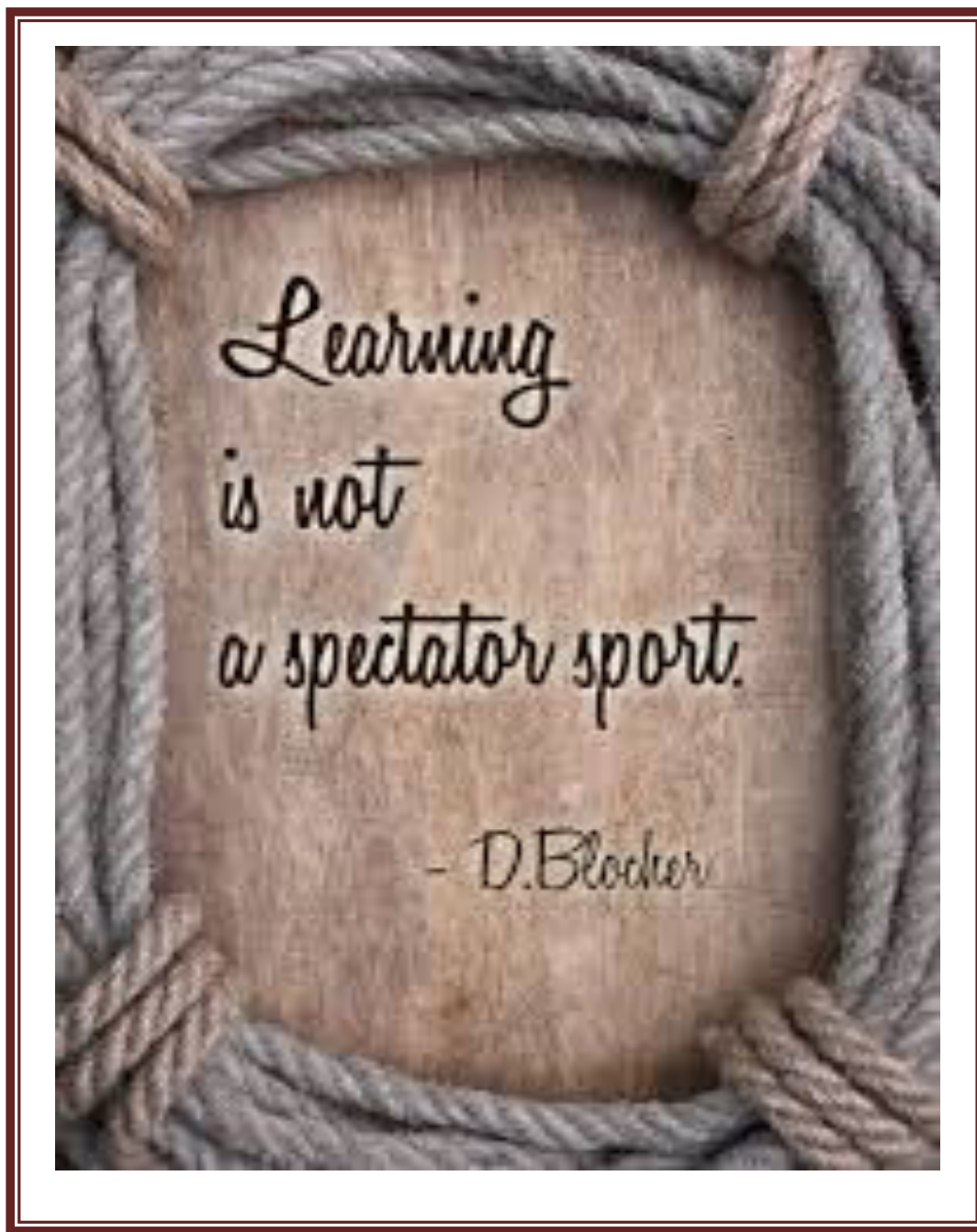
[Section 2: Pages 58-252](#)

Problems to Target Curricular Outcomes (as Well as the Front Matter)

The **second section** of problems continues to build on these skills. These problems are **linked to the specific outcomes** in the grade 2 curriculum. As you are planning your lessons, select the problems in section two to best support your practice and to satisfy the needs of your students. The problems are not in any order as far as progression goes. They are simply organized by outcome.

As you work your way through the grade 2 math curriculum by teaching through problem solving, please contact Carrie with feedback, new ideas, exemplary problems, sample student solutions, etc. at carriesutton@gpcsd.ca

Problems to Create a Thinking Classroom
(Problems to Target the Front Matter)

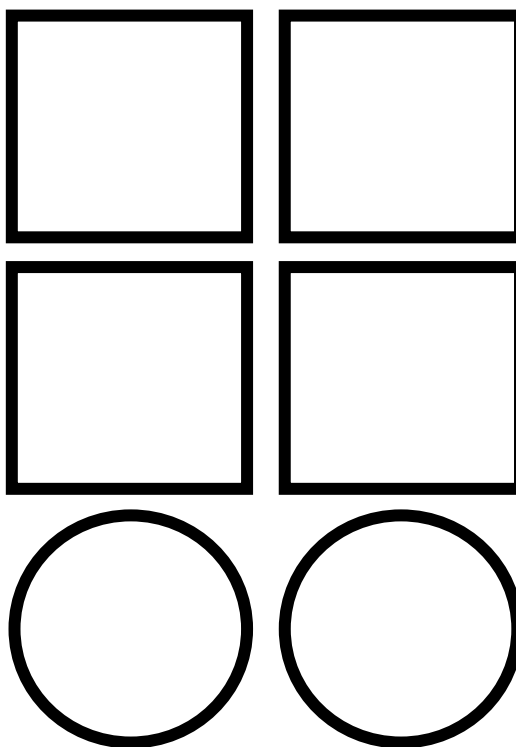


Page	#	Problem	Page	#	Problem
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35	19	Name Paths	55	39	Hot Chocolate
36	20	Rubber Ducks	56	40	Aliens

#1: Coloured Shapes

Problem:

What colour is each shape?
Write it on the shape.



Clues:

- Red is not next to grey.
- Blue is between white and grey.
- Green is not a square.
- Blue is on the right of pink.

Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

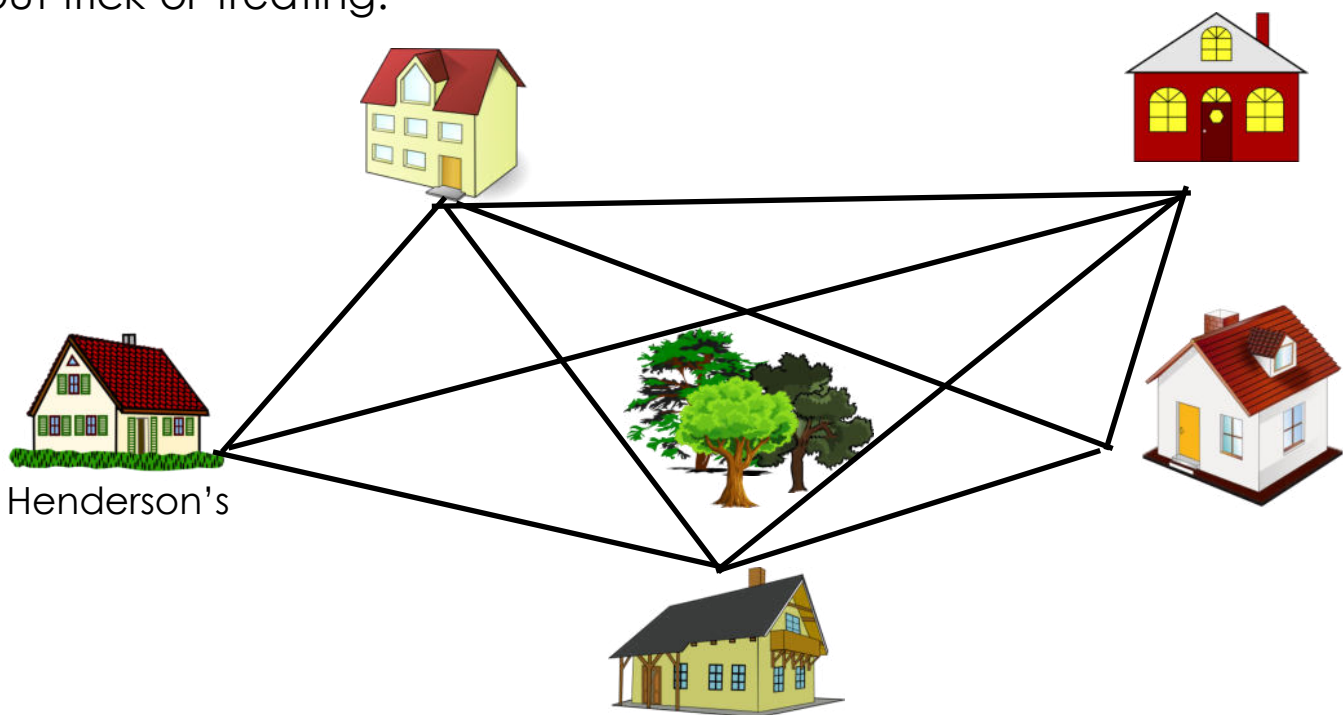
Notes:

BACK

#2: Trick or Treating

Problem:

Mrs. Henderson told her son, Brody, that he was going to have to take his little sister, Aspen, trick-or-treating around their neighborhood on Halloween night. His mother agreed that he only had to take her to 4 houses, and then he could go out with his friends. Brody wanted to plan ahead, so his friend, Matthew, helped him create a map of the neighbourhood with all the houses he must visit with Aspen. When Aspen saw what Brody was doing, she decided to plan her own route to maximize the time she could be out trick-or-treating.



Which is the shortest path (what Brody wants)?
 Which is the longest path (what Aspen wants)?
 How many different paths are there to go to all five houses?

Credit: Adapted from: Ray, Max (2013). *Powerful Problem Solving Activities for Sense Making with the Mathematical Practices*. Portsmouth, NH: Heinemann.

Notes:

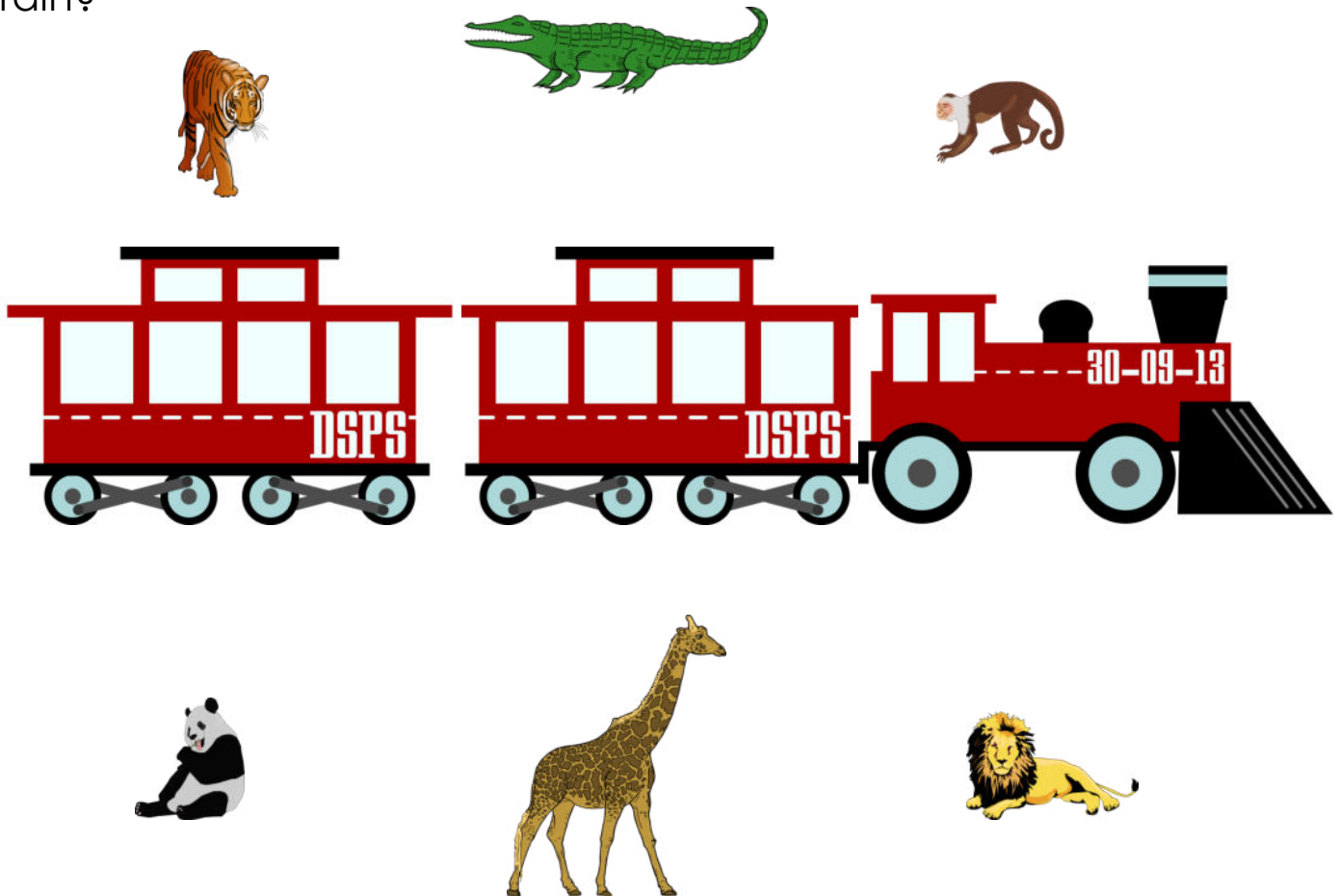
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#3: Zoo Train

Problem:

The zoo has a train that carries people between exhibits. One morning the first passengers got on at Monkey House. At Alligator Pond the number of people who got on was 3 more than got on at Monkey House.

The train made 4 more stops: Tiger Thicket, Panda Playground, Giraffe Savannah, and Big Cats. At each of these stops, 3 more passengers boarded the train than at the previous stop. At Big Cats, 20 people got on the train. How many passengers in all boarded the train?



Credit: Adapted from: Ray, Max (2013). *Powerful Problem Solving Activities for Sense Making with the Mathematical Practices*. Portsmouth, NH: Heinemann.

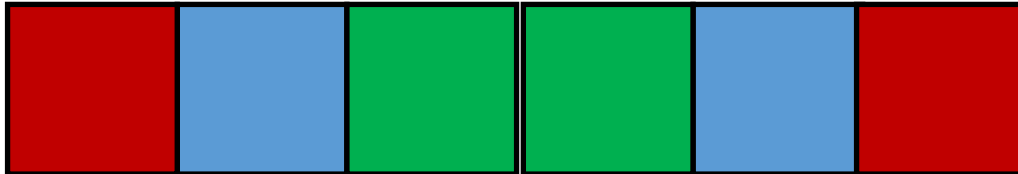
Notes:

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#4: Line of Symmetry

Problem:

Marlin had six squares: two red, two green, two blue. He put them in a line. The squares made a symmetrical pattern.



Arrange the six squares in a line. Make the line of squares symmetrical.

How many different lines can you make like this using these blocks?

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if you added two yellow squares?

How many different symmetrical lines could you make then?

Notes:

BACK

#5: At the Fair

Problem:

Emilia and Kaley are at the fair. They have ten more minutes before they have to leave. They have three tickets each to ride three rides each. What three rides could they take before they have to leave?

Rollercoaster - 6 minutes
 Bumper Cars - 5 minutes
 Tea Cups - 4 minutes

Ferris Wheel - 2 minutes
 Swings - 1 minute
 Merry-Go-Round - 3 minutes



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

How many other ways could they use their 10 minutes and 3 remaining tickets?

Notes:

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#6: Sticker Rewards

Problem:

Dylan has earned 10 stickers for reading books. He can trade the stickers for items in the class store.

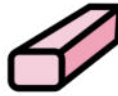
1 sticker - bookmark

2 stickers - eraser

3 stickers - pencil

4 stickers - notepad

What can Dylan get with his 10 stickers?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

What could Dylan get if he had 15 stickers?

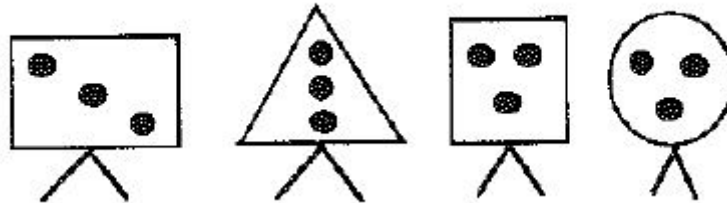
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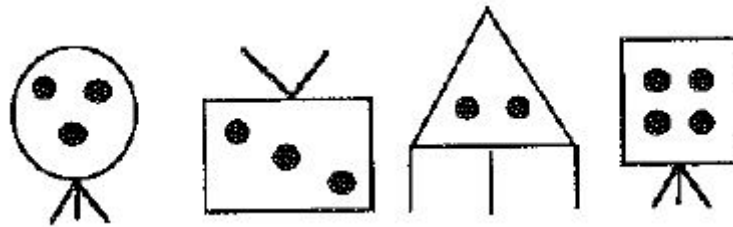
#7: Waggies

Problem:

All of these are Waggies.



None of these are Waggies:



Can you draw 4 new Waggies?

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Create a new problem, giving examples and non-examples and have a friend draw four more that are examples.

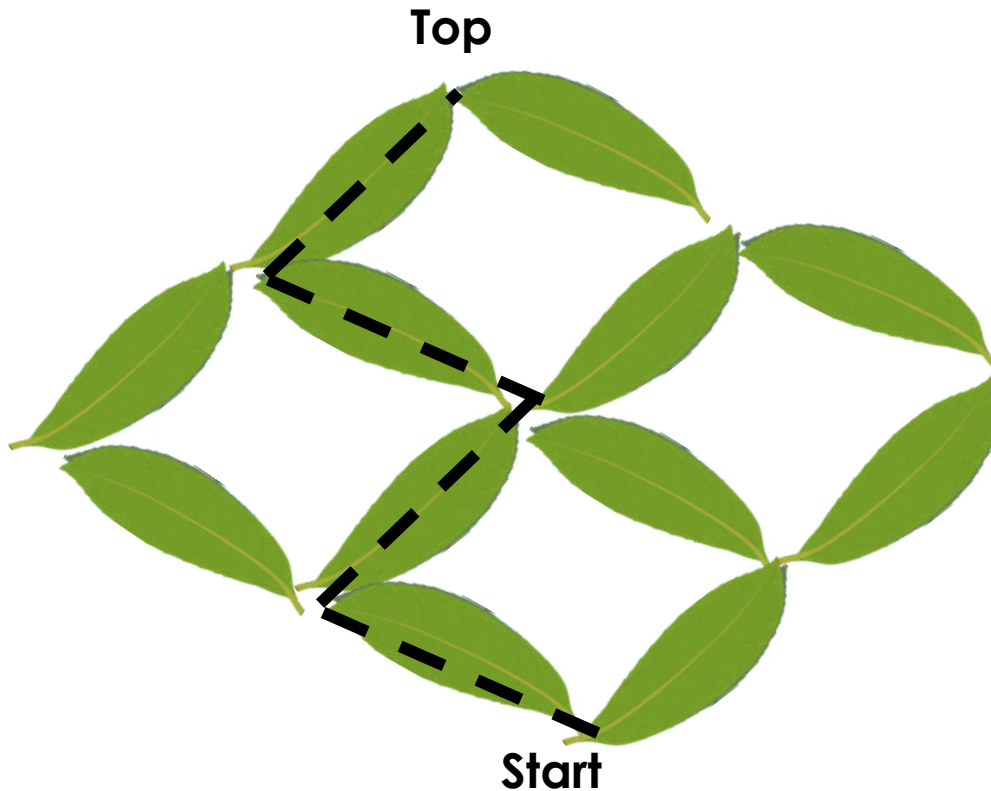
Notes:

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#8: Jack and the Beanstalk

Problem:

Jack climbed the beanstalk. He always went upwards.



He first did it like this: left, right, left, right.

Find three other ways that Jack can climb the beanstalk.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

How many ways are there for Jack to climb the beanstalk?

Notes:

BACK

#9: Birthdays

Problem:

Mom and Rodney are talking about birthdays.

They take Rodney's age and double it.

Then they add 5.

The answer is 35.

Mom says this is her age.

How old is Rodney?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Make up more problems like this. Try to use some of these words:

double half add subtract

Notes:

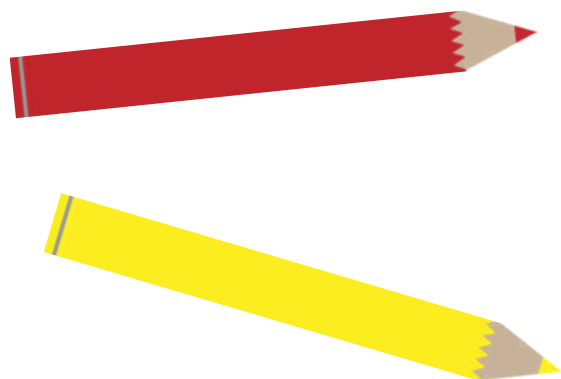
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#10: Christmas Tree

Problem:

Rudolph put four stars on a tree. He coloured each star either red or yellow.

In how many different ways can Rudolph colour the four stars?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

How many different ways could Rudolph colour the stars if there were five of them? Six of them?

Notes:**BACK**

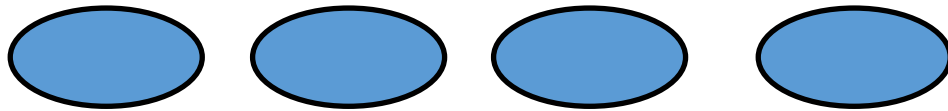
#11: Four Duck Ponds

Problem:

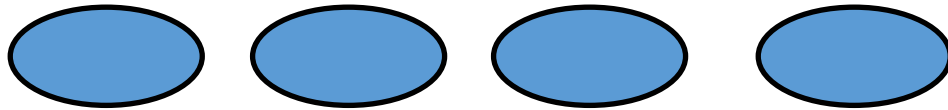
There are 14 ducks and you must use them all each time.



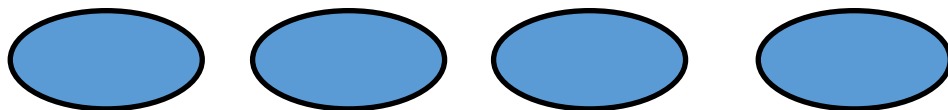
1. Make each pond hold two ducks or five ducks.



2. Make each pond hold twice as many ducks as the one before.



3. Make each pond hold one less duck than the one before.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Notes:

BACK

#12: Treasure Hunt

Problem:

Diego and Finley are pirates. Between them they have three precious jewels: a ruby (R), a diamond (D), and an emerald (E).



Complete the table.

Show which jewels each pirate could have.

Marlin	R							
Finley	D E							

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

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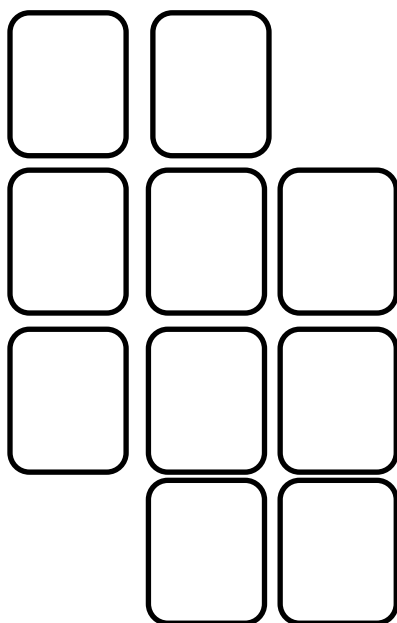
#13: Next Door Numbers

Problem:

Take ten cards numbered from 0 to 9.



Arrange them like this.



Do it so that no two consecutive numbers are next to each other, horizontally, vertically, or diagonally.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

There are lots of ways to do it. How many ways can you find?

Notes:

BACK

#14: Nick-Names

Problem:

Dawn, Mark, Josh and Tina are friends.



They each have a nick-name.

Their nick-names are Spider, Curly, Ace and Fudgy, but not in that order.

What is the nick-name of each friend?

Clues:

- Josh plays tennis with Curly and goes swimming with Ace.
- Tina has been on holiday with Curly but travels to school with Fudgy.
- Spider, Curly and Dawn play on the football team.
- Spider sometimes goes to tea with Josh.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Notes:

BACK

#15: Stickers

Problem:

The twins collected some animal stickers. They each had the same total number.



Brodie had 3 full sheets and 4 loose stickers.
Sadie had 2 full sheets and 12 loose stickers.

Every full sheet has the same number of stickers.
How many stickers are there in a full sheet?

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

How many stickers do the twins each have?
How many stickers do the twins have all together?

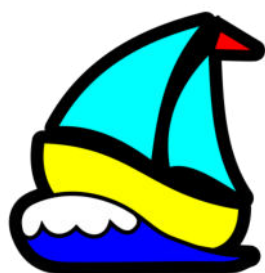
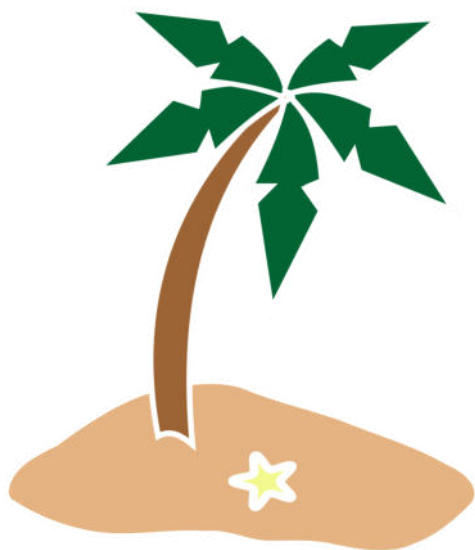
Notes:

BACK

#16: Sail Away

Problem:

Two boys and two girls want to sail to an island.
The boat will hold only two girls **or** one boy.



How can all four of them get to the island?

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

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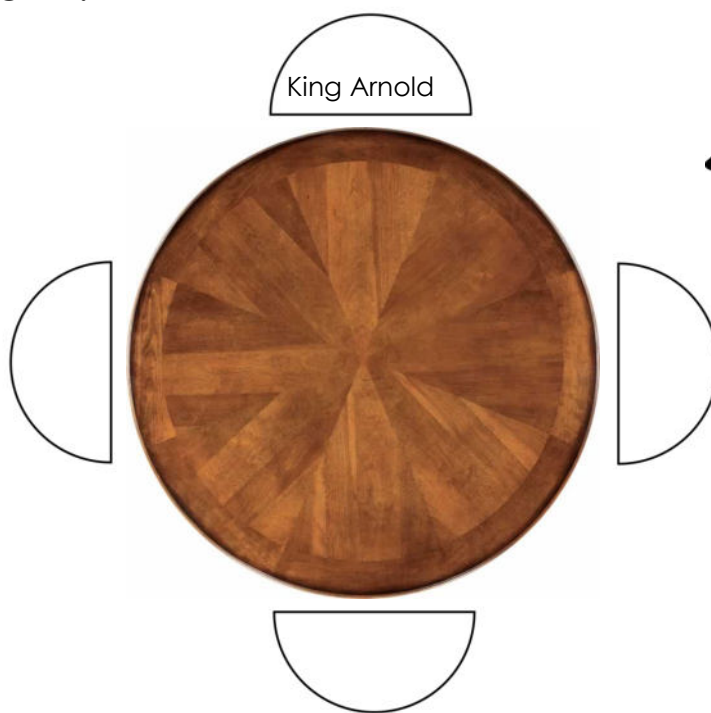
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#17: King Arnold

Problem:

King Arnold sits at a Round Table.

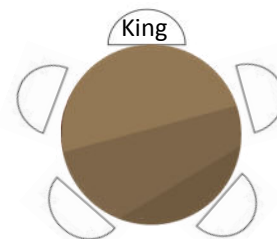
There are three empty seats.
In how many ways can three
knights sit in them?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if there are 4 empty seats?
In how many ways can 4 knights sit in them?



Notes:

BACK

#18: Ski Lift

Problem:

On a ski lift the chairs are equally spaced.
They are numbered in order from 1.

Kaye went snowboarding.
She got in chair 10 to go to the top of the slopes.

Exactly half way to the top, she passed chair 100 on its way down. How many chairs are there on the ski lift?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Make up other problems like this.

Notes:

BACK

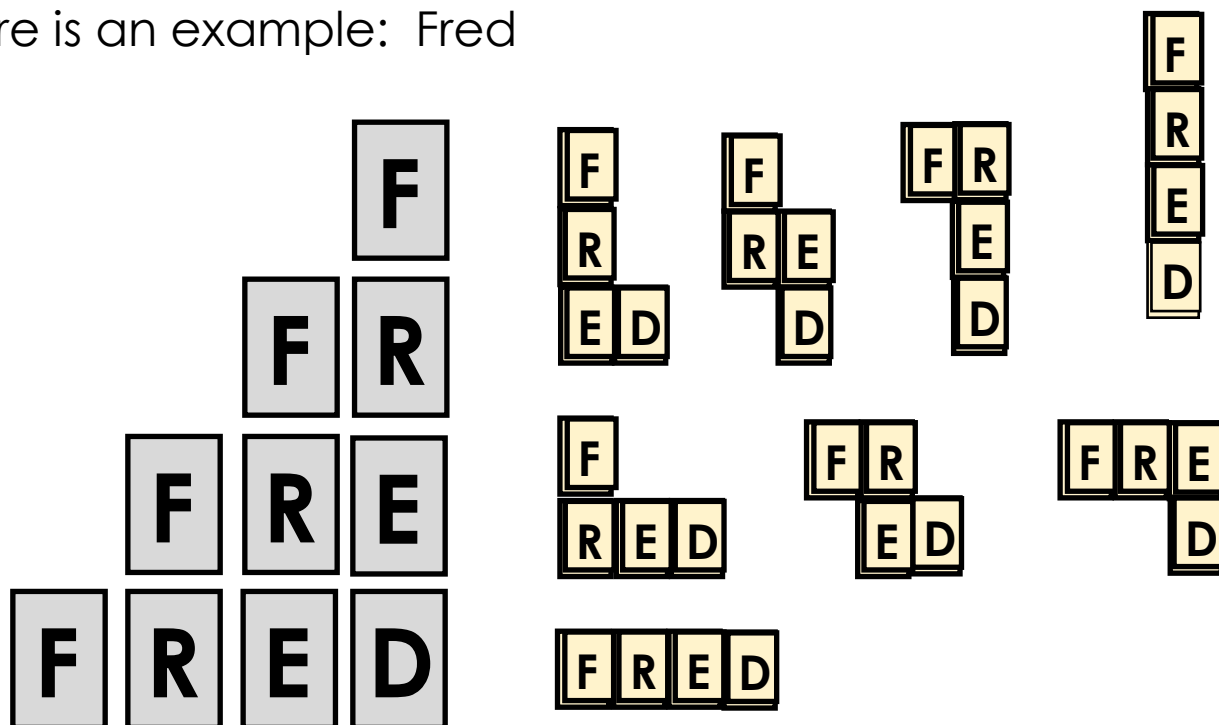
#19: Name Paths

Problem:

Using letter tiles, create a triangle of squares using the letters of your name.

How many ways are there to spell your name moving either across, across and down, down and across, or down?

Here is an example: Fred



There are 8 ways to spell Fred.

Credit: Bresser, Rusty and Holtzman, Caren (2006). *Minilessons for Math Practice K-2*. Sausalito, CA: Math Solutions.

Notes:

BACK

#20: Rubber Ducks

Problem:

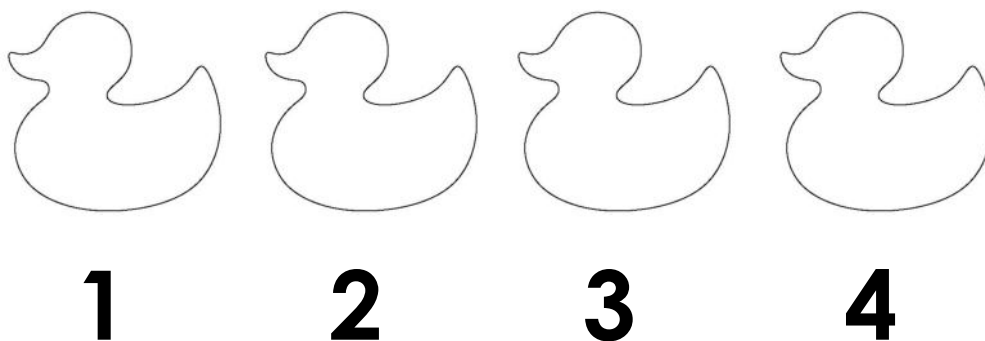
Baby Talia lines up 4 rubber ducks in the tub.

The red duck is behind the blue duck.

The yellow duck is behind the red duck.

The yellow duck is not next to the green duck.

What colour is each duck in line?



Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 1 Teacher Resource Book* (pp. 22-23). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

Make up a new problem like this one.

Notes:

BACK

#21: Race Cars

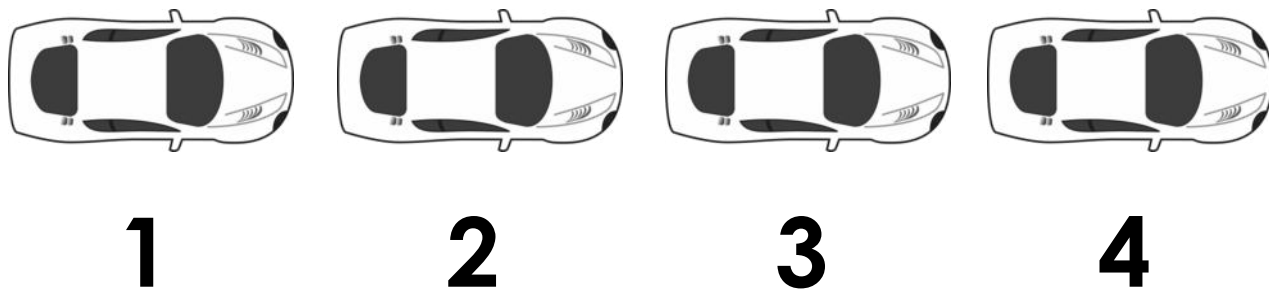
Problem:

Sidni has 4 model race cars lined up.

A blue car is between 2 red cars.

The green car is not first in line.

What colour is each car in the line?



Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 1 Teacher Resource Book* (pp. 24-25). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

Make up a similar question and have a classmate solve it.

Notes:

BACK

#22: Toy Cats

Problem:

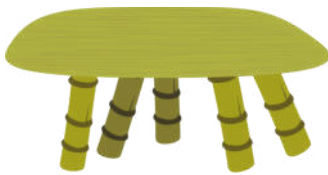
The Fur and Fuzz Toy Store has 8 toy cats.

The cats are on 3 tables.

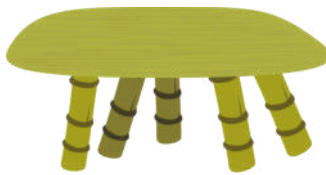
There are 5 cats in all on table A and table B.

There are 7 cats in all on table B and table C.

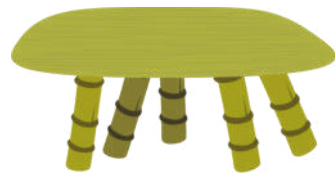
How many cats are on each table?



A



B



C

Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 1 Teacher Resource Book* (pp. 2-3). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

Create a similar problem like this one.

Notes:

BACK

#23: The Last Dot

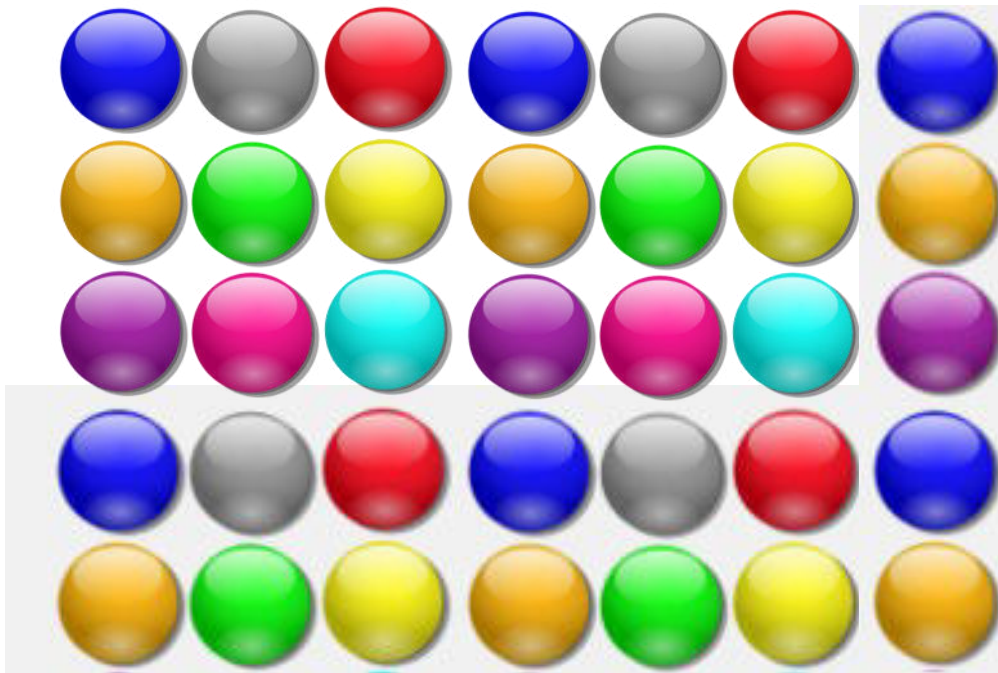
Problem:

In this game, the winner is the person who takes the last dot. You need an array of 35 dots.

In each turn, players may choose to take away one, two, or three dots.

Play continues until one of the players can cross out the last dot.

The player who crossed out the last dot is the winner.



Credit: Adapted from: www.trainingforchange.org

Extension:

Make a larger array and play again.

Notes:

BACK

#24: Wolf, Sheep, Cabbage

Problem:

You need to move the wolf, sheep, and cabbage to the opposite shore by rowing them over, one at a time, in a boat. It gets more difficult though because when you are not around, the wolf will eat the sheep, the sheep will also do the same if left alone with the cabbage.

How do you do this?



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Notes:

BACK

#25: Moving Colours

Problem:

Give each student a coloured circle (or use different shapes) red or yellow (or other colours) that you have prepared. There should be equal numbers, or one more of one of the colours.

Ask students, “How many students have red circles and how many students have yellow circles?” Encourage them to get up and move around the room to work this out.

More possible questions:

How can we show that we have an equal number of each colour, or more of one colour than the other colour?

How many students can fit in a row on the carpet?

How many rows will we have?

What would be the best arrangement?



Credit: Adapted from a problem retrieved from <https://www.youcubed.org/task/moving-colors/>

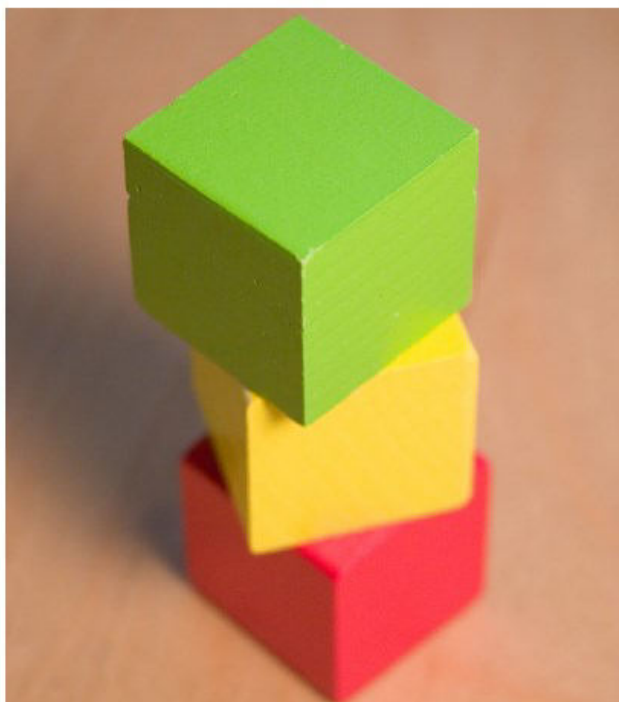
Notes:

BACK

#26: Three-Block Towers

Problem:

Three Block Towers



How many different towers can you make using one red, one blue and one yellow block?

nrich.maths.org

Credit: Retrieved from <https://nrich.maths.org/7196>

Extension:

How many can you make if you have one green block as well?

Notes:

BACK

#27: Ice Cream Scoop

Problem:

Your favourite ice cream shop has 10 flavours of ice cream. How many different 2-scoop cones can you make with 10 flavours?



Credit: Adapted from: <https://www.youcubed.org/task/ice-cream-scoop/>

Extension:

What about 12 flavours?

What about “n” flavours?

Notes:

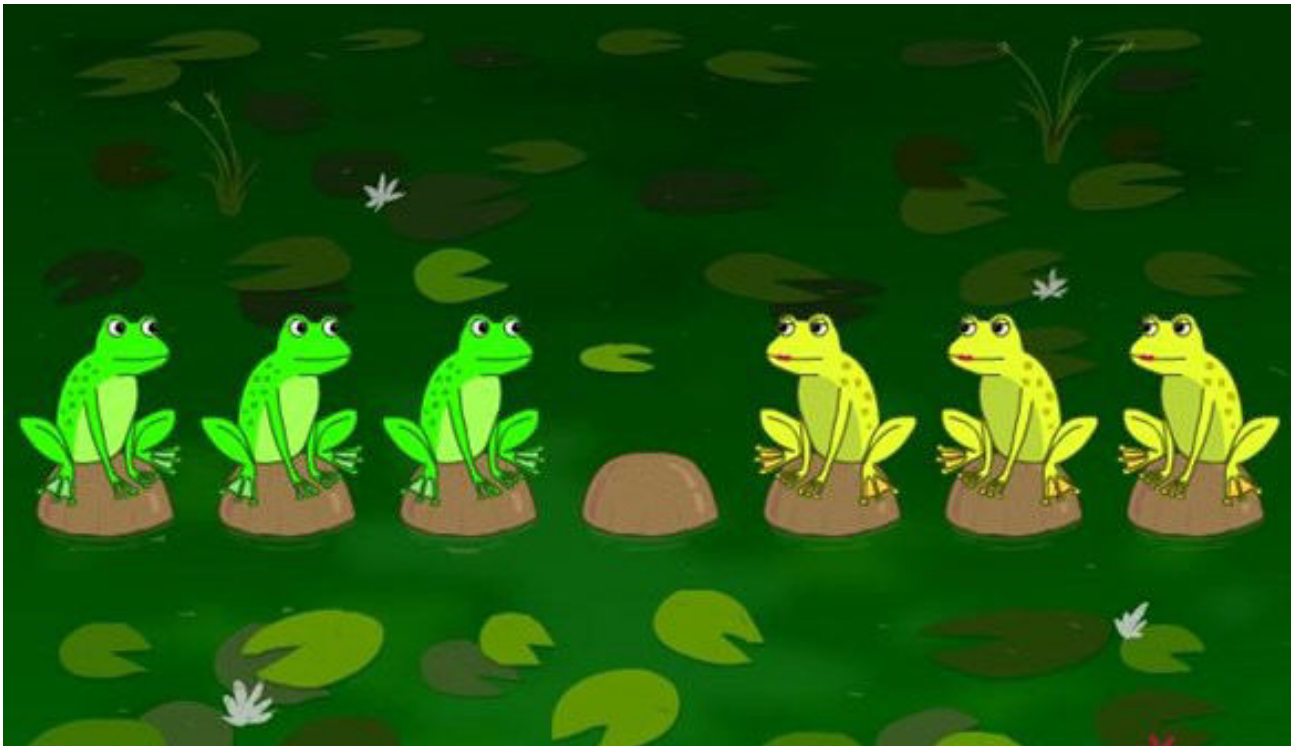
BACK

#28: Green Frogs

Problem:

Can you get all of the dark green frogs to the right of the empty spot and all of the light green frogs to the left of the empty spot? The frogs move by either “hoping” or “sliding” forwards to a vacant spot. Sliding backwards is not allowed.

Note: A frog can only slide into a vacant spot next to it OR can only hop over one other frog, at a time, to land in an open spot.



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Notes:

BACK

#29: 30 Scratch

Problem:

Roll a die to choose 4 numbers from 2 to 7. (If a one is rolled, it is considered to be a 7).

Use these digits in combination with any operation to make the numbers 2 to 30.

Rules:

- Digits cannot be used twice?
- Digits cannot be put together to make 2-digit numbers.



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Notes:

BACK

#30: 1 to 10 Cross-Out

Problem:

Write the numbers from one to ten.

Cross out any two numbers and write down their difference.

Add that number to the end of the list.

Keep going until the last number.

Tell me something about that number.

Try this several times.

What do you notice?



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Extension:

Once you have a guess, how are you going to check that it's true?

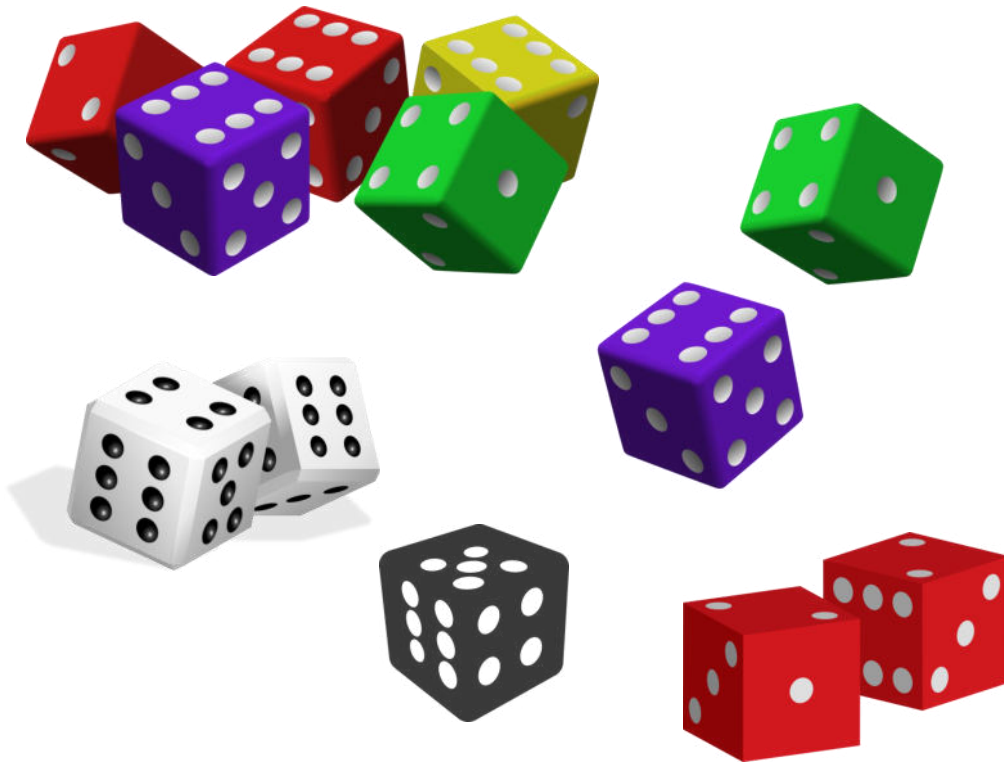
Notes:

BACK

#31: Dice Tower

Problem:

Make a tower of dice so all visible sides add up to 68.



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Extension:

There are 4 visible sets of sides.
What do the other sides add up to?

Notes:

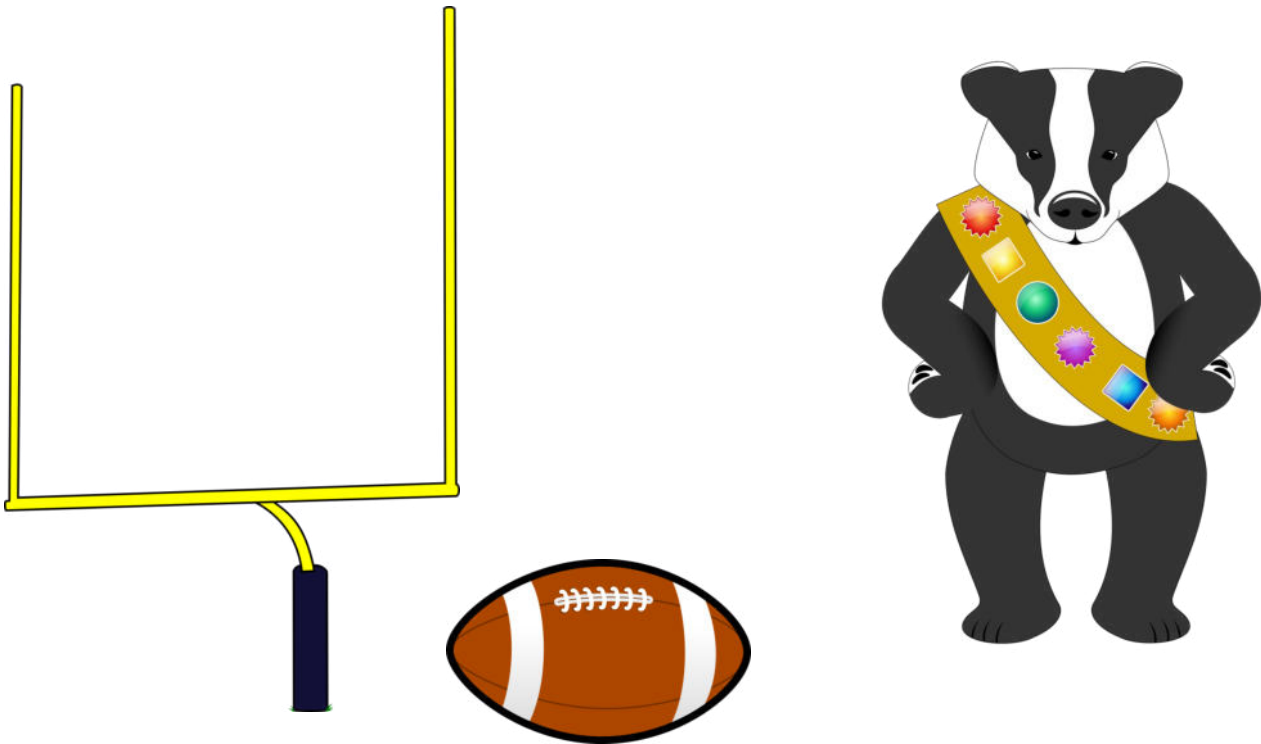
BACK

#32: Bucky Badger

Problem:

Bucky the Badger is a mascot for his school's football team. Every time his team scores, Bucky does a number of push-ups equal to his team's total points at that time.

If his team finished with 50 points, how many push-ups could Bucky have done?



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

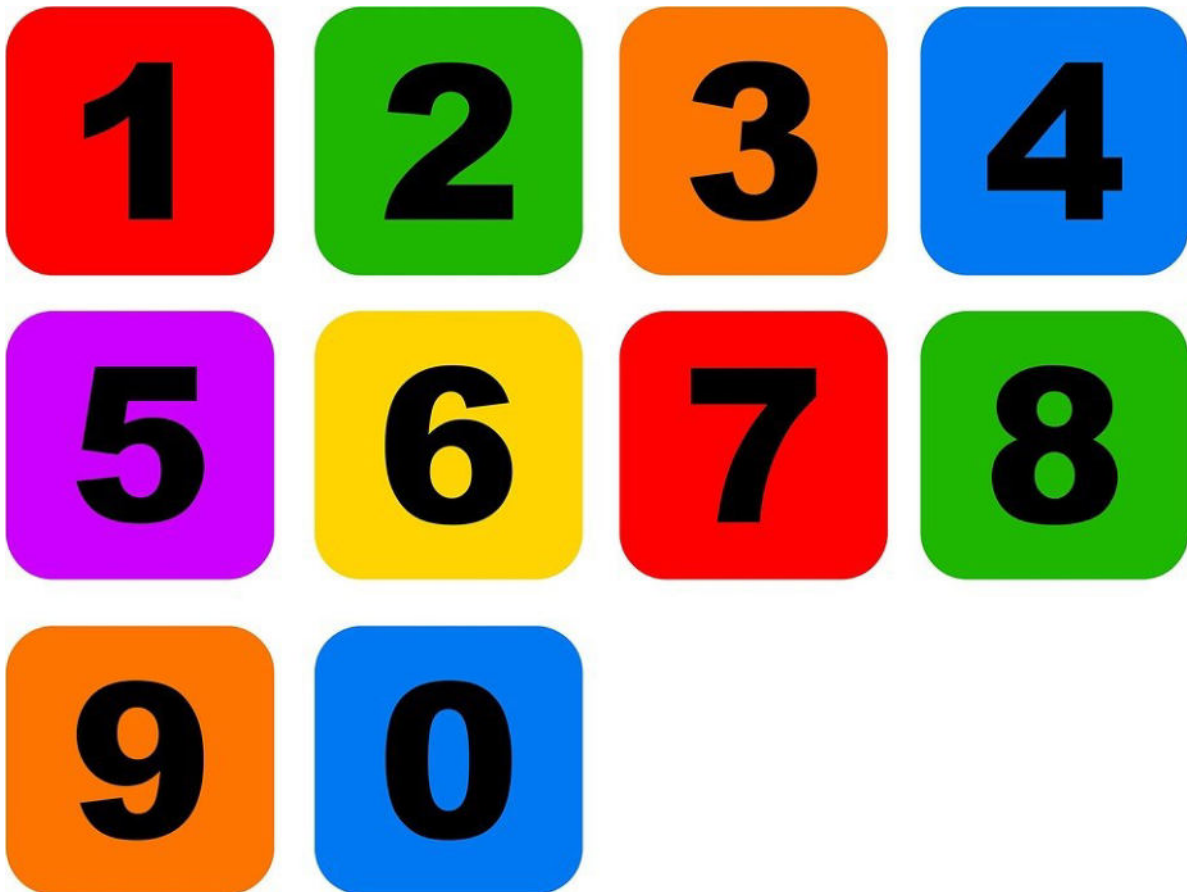
Notes:

BACK

#33: Sevens

Problem:

If you write out the numbers from 1 to 100, how many times would you write the number 7?



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Extension:

How many times do you write the other numbers?
Which number is written the most times?

Notes:

BACK

#34: Nine Colours

Problem:

Nine Colours



You have 27 small cubes, 3 each of nine colours.

Can you use all the small cubes to make a 3 by 3 by 3 cube so that each face of the bigger cube contains one of each colour?

nrich.maths.org

Credit: Retrieved from <https://nrich.maths.org/768>

Notes:

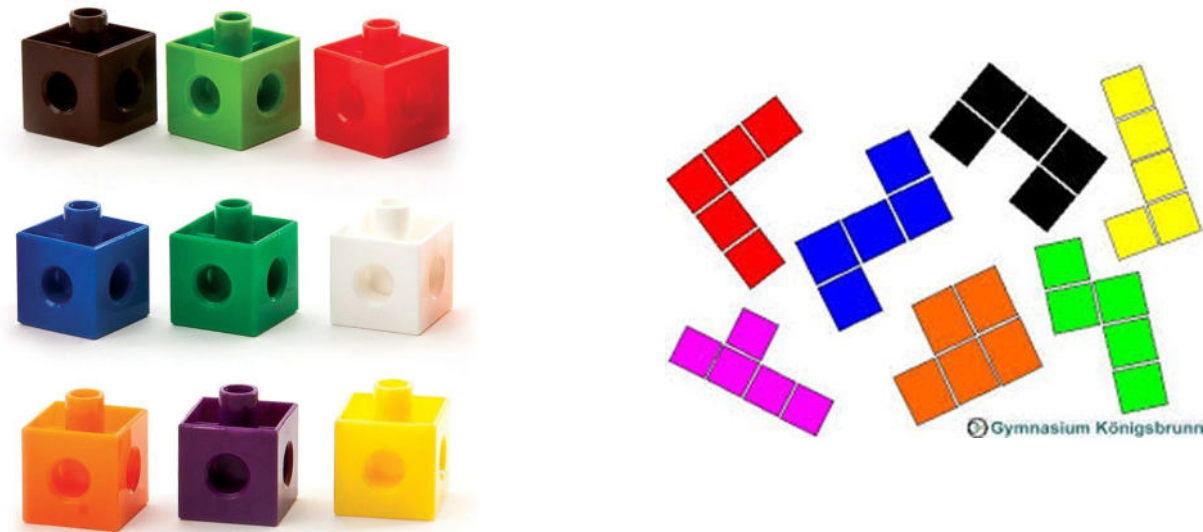
BACK

#35: Pentominoes

Problem:

How many different pentominoes can you make?

A **pentomino** is a plane geometric figure formed by joining five equal squares edge to edge. Using snap cubes, how many different 3-D “pentominoes” can you make? (The pentomino obtained by reflecting or rotating a pentomino does not count as a different pentomino).



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Extension:

Can you tile a rectangular box with each pentomino?

Can you tile a rectangular box with a mix of pentominoes?

Notes:

BACK

#36: Snap Cube Shapes

Problem:

How many unique shapes can you make using 7 snap cubes for each one?



Credit: Carrie Sutton

Extension:

How many unique shapes can you make using 8 snap cubes for each one?

Notes:

BACK

#37: Eggs in Baskets

Problem:



Eggs in Baskets



There are three baskets, a brown one, a red one and a pink one, holding a total of ten eggs.

The brown basket has one more egg in it than the red basket.

The red basket has three fewer eggs than the pink basket.

How many eggs are in each basket?

nrich.maths.org

Credit: Retrieved from <https://nrich.maths.org/2002>

Notes:

BACK

#38: How Close to 100?

Problem:

This game is played in partners. Two children share a blank 100 grid.

The first partner rolls two regular dice.

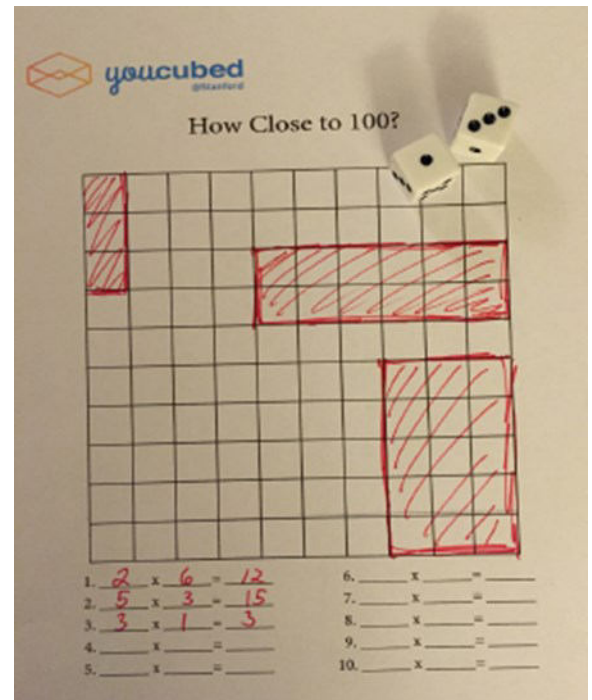
The numbers that come up are the numbers the child uses to make an array on the 100 grid.

They can put the array anywhere on the grid, but the goal is to fill up the grid to get it as full as possible.

After the player draws the array on the grid, he or she writes in the number sentence that describes the grid.

The second player then rolls the dice, draws the array on the number grid and records their number sentence.

The game ends when both players have rolled the dice and cannot put any more arrays on the grid.



Credit: Retrieved from <https://www.youcubed.org/task/how-to-close-100/>

Extension:

Each child can have their own number grid. Play moves forward to see who can get the closest to 100.

Notes:

BACK

#39: Hot Chocolate

Problem:

How many different combinations of hot chocolate can you make? You must include one item from each category. Try to estimate your answer before beginning. Draw or build.

Flavor: white chocolate, coconut milk, milk chocolate

Topping: whip cream, mini marshmallows, yogurt sprinkles

Stirrer: cinnamon stick, candy cane, chocolate spoon



Credit: Adapted from ACM - ICPC Live Archive

Extension:

Add different categories to extend the problem. For example: add types of containers or types of sprinkles.

Notes:

BACK

#40: Aliens

Problem:

I woke up from a dream and only remember parts of it.
The aliens were very different - they only had one arm each.
When I left, they waved goodbye.

Some held up 1 finger.

Some held up 2 fingers.

Some held up 3 fingers.

In all, 24 fingers were held up.

How many aliens were there?



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

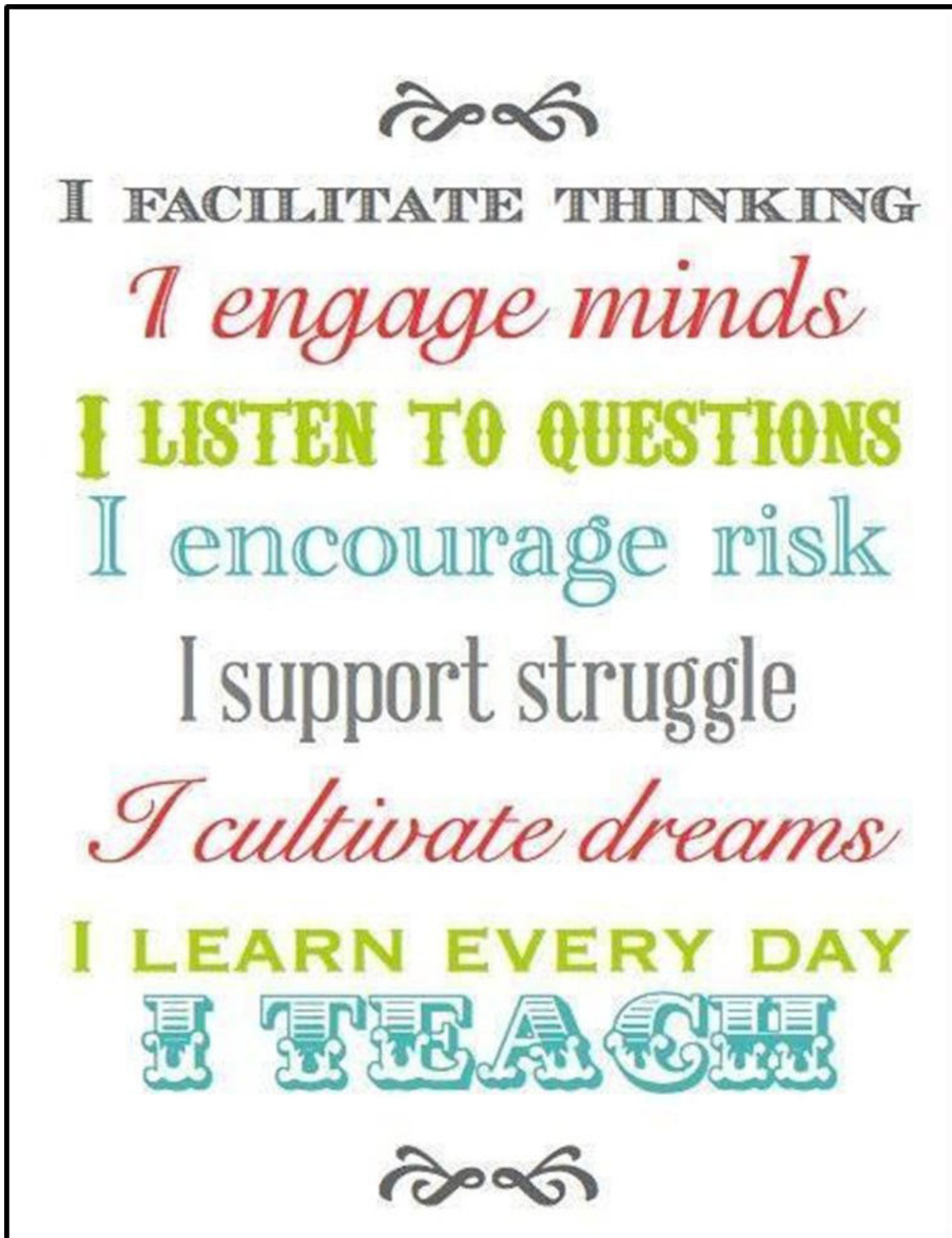
Extension:

How many aliens would there be if 36 fingers were held up in all?

Notes:

BACK

Problems to Target Curricular Outcomes



As Well as the Front Matter

Grade 2 Alberta Mathematics Student Learner Outcomes:

NUMBER SENSE

MN1. Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

MN2. Demonstrate if a number (up to 100) is even or odd.

MN3. Describe order or relative position, using ordinal numbers (up to tenth).

MN4. Represent and describe numbers to 100, concretely, pictorially and symbolically.

MN5. Compare and order numbers up to 100.

MN6. Estimate quantities to 100, using referents.

MN7. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100.

MN8. Demonstrate and explain the effect of adding zero to, or subtracting zero from, any number.

MN9. Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

MN10. Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

PATTERNS AND RELATIONS

PR1. Demonstrate an understanding of repeating patterns (three to five elements) by:

- describing
- extending
- comparing
- creating

patterns using manipulatives, diagrams, sounds and actions.

PR2. Demonstrate an understanding of increasing patterns by:

- describing
- reproducing
- extending
- creating

numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.

PR3. Sort a set of objects, using two attributes, and explain the sorting rule.

PR4. Demonstrate and explain the meaning of equality and inequality, concretely and pictorially.

PR5. Record equalities and inequalities symbolically, using the equal symbol or the not equal symbol.

SHAPE AND SPACE

SS1. Relate the number of days to a week and the number of months to a year in a problem-solving context.

SS2. Relate the size of a unit of measure to the number of units (limited to nonstandard units) used to measure length and mass (weight).

SS3. Compare and order objects by length, height, distance around and mass (weight), using nonstandard units, and make statements of comparison.

SS4. Measure length to the nearest nonstandard unit by:

- using multiple copies of a unit
- using a single copy of a unit (iteration process).

SS5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes.

SS6. Sort 2-D shapes and 3-D objects, using two attributes, and explain the sorting rule.

SS7. Describe, compare and construct 3-D objects, including:

- cubes
- spheres
- cones
- cylinders
- pyramids.

SS8. Describe, compare and construct 2-D shapes, including:

- triangles
- squares
- rectangles
- circles.

SS9. Identify 2-D shapes as parts of 3-D objects in the environment.

STATISTICS AND PROBABILITY

SP1. Gather and record data about self and others to answer questions.

SP2. Construct and interpret concrete graphs and pictographs to solve problems.

	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	PR1	PR2	PR3	PR4
#1: Makale's Laboratory	x													
#2: Snakes and Ladders	x													
#3: Money in Hand	x								x					
#4: Gobstopper	x								x					
#5: Ride at the Fair	x								x					
#6: Fireworks	x								x					
#7: Sally the Snake	x								x					
#8: Stamps	x								x					
#9: Mattie the Mouse	x								x					
#10: Zids and Zods	x								x					
#11: Counting Shells	x								x					
#12: Spaceship	x								x					
#13: Birds' Eggs		x												
#14: Three Monkeys		x												
#15: Odds and Evens		x												
#16: Darren the Detective		x			x									
#17: Who is Third?			x											
#18: Dinosaur Race			x											
#19: Neighbours			x											
#20: Mr. Lincoln's Line			x											
#21: The Race			x											
#22: Largest Difference				x	x				x					
#23: Make 100					x				x					
#24: Coin Sort					x								x	
#25: A Lot of Legs						x								
#26: Digit Dance							x							
#27: Griffin's Number							x		x					
#28: Noah's Ark								x						
#29: Balloon Puzzle									x					
#30: Zoo Puzzle									x					
#31: Albert Square									x					
#32: Shape Puzzle									x					
#33: Chocolate Chip Cookies									x					
#34: The Fishing Game									x					
#35: Mystery Square									x					
#36: Addition Game									x					
#37: Bean Bag Toss									x					
#38: Shopping Fun									x					

PR5	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SP1	SP2	
												#1: Makale's Laboratory
												#2: Snakes and Ladders
												#3: Money in Hand
												#4: Gobstopper
												#5: Ride at the Fair
												#6: Fireworks
												#7: Sally the Snake
												#8: Stamps
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												#12: Spaceship
												#13: Birds' Eggs
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												#15: Odds and Evens
												#16: Darren the Detective
												#17: Who is Third?
												#18: Dinosaur Race
												#19: Neighbours
												#20: Mr. Lincoln's Line
												#21: The Race
												#22: Largest Difference
												#23: Make 100
												#24: Coin Sort
												#25: A Lot of Legs
												#26: Digit Dance
												#27: Griffin's Number
x												#28: Noah's Ark
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												#31: Albert Square
												#32: Shape Puzzle
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												#34: The Fishing Game
												#35: Mystery Square
												#36: Addition Game
												#37: Bean Bag Toss
												#38: Shopping Fun

	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	PR1	PR2	PR3	PR4
#39: Crossword									x					
#40: Number Lines									x					
#41: Card Sharp									x					
#42: Monster									x					
#43: Cross-Road									x					
#44: Toy Shop									x					
#45: Roly Poly									x					
#46: From Planet Zeno									x					
#47: Circle Sums									x					
#48: Card Challenge									x	x				
#49: Nature Walk										x				
#50: Stones										x				
#51: Fish Bowls										x				
#52: Worm										x				
#53: Snap It										x				
#54: Bean Bag Buckets										x				
#55: Double Riddles										x				
#56: Sum Up										x				
#57: Pick a Pair										x				
#58: Puppy Treats										x				
#59: Four-Pin Bowling										x				
#60: Line Up											x			
#61: Number Patterns												x		
#62: 15th Letter												x		
#63: Count On												x		
#64: Squares to Stairs									x			x		
#65: Mountain Range									x			x		
#66: Beauty													x	
#67: Buttons													x	
#68: Gold Bars														x
#69: The Queen's Coins														x
#70: Shape Sort														
#71: Calendar Quest														
#72: Measuring Matters														
#73: Teacher's Desk														
#74: All Square														
#75: Paper Clips														
#76: Square It Up														

PR5	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SP1	SP2	
												#39: Crossword
												#40: Number Lines
												#41: Card Sharp
												#42: Monster
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												#51: Fish Bowls
												#52: Worm
												#53: Snap It
												#54: Bean Bag Buckets
												#55: Double Riddles
												#56: Sum Up
												#57: Pick a Pair
												#58: Puppy Treats
												#59: Four-Pin Bowling
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												#68: Gold Bars
												#69: The Queen's Coins
x												#70: Shape Sort
	x											#71: Calendar Quest
		x										#72: Measuring Matters
			x									#73: Teacher's Desk
			x					x				#74: All Square
				x								#75: Paper Clips
					x			x				#76: Square It Up

PR5	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SP1	SP2	
						x		x				#77: Odd One Out
							x					#78: Stacking Shapes
							x	x				#79: Mystery Bag
								x				#80: Straw Squares
								x				#81: Fallen Shapes
								x				#82: Seeing Shapes
								x				#83: Spot the Shapes 1
								x				#84: Spot the Shapes 2
									x			#85: Shape Detectives
									x			#86: 3-D Objects
										x		#87: Get to School
										x		#88: Most Popular Flavour
											x	#89: Favourite Colour
											x	#90: Birthdays
											x	#91: Grade Two Pets
											x	#92: Favourite Fruit
											x	#93: Favourite Card Game

Use the space below to add problems you find.

								x				Checkerboard (pp. 11 - 12)
												The Principal (p. 66)

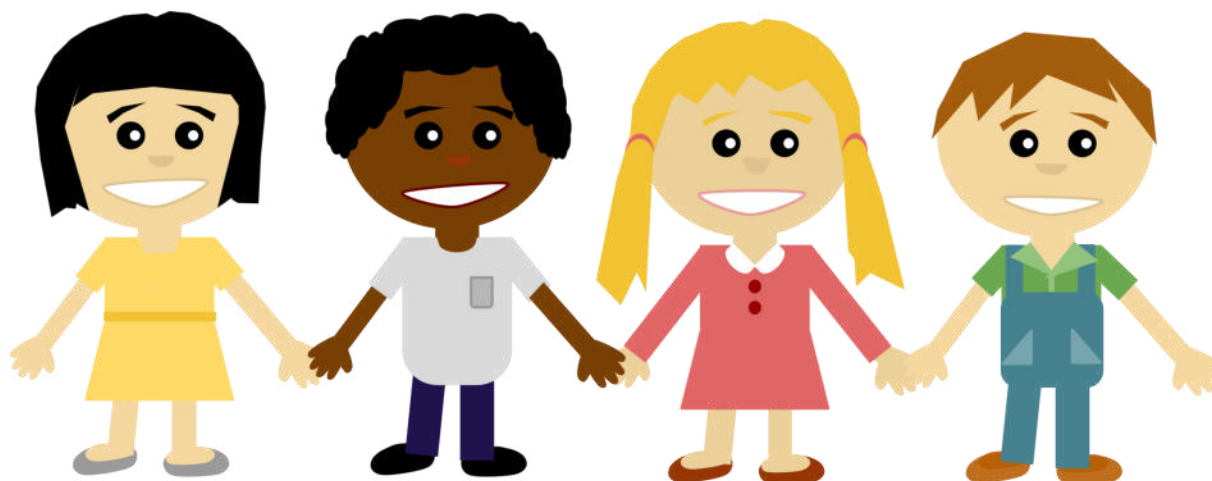
Just For Fun: The Principal

Problem:

The Principal looked out his window and counted 36 legs.

What could he have counted?

How many different answers can you find?



Credit: Rachel Graham

Extension:

Students can change the number of legs the Principal saw.

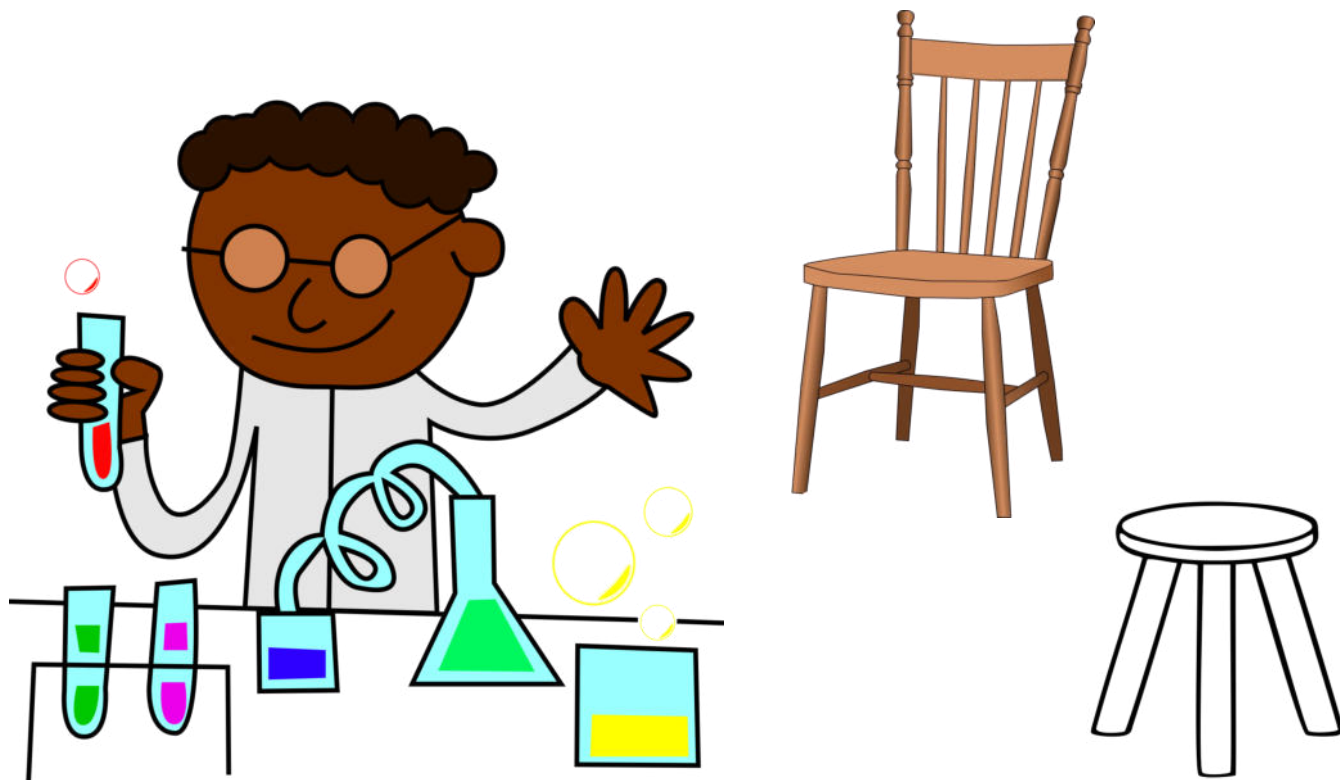
Notes:

BACK

#1: Makale's Laboratory N1

Problem:

Makale's laboratory has some stools with 3 legs and some chairs with 4 legs. If there is a total of 26 legs on the stools and chairs, how many stools and chairs are in Makale's lab?



Credit: Mathematics Learning

Extension:

Can you find another way?

BACK

Makale's Laboratory

N1

Outcome Objective:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
 - 10s, using starting points from 1 to 9
 - 2s, starting from 1.
-

Material Suggestions:

- Counters
 - Chairs
 - 3-legged stools
-

Sample Solutions:

5 chairs and 2 stools



2 chairs and 6 stools



Notes:

#2: Snakes and Ladders N1

Problem:

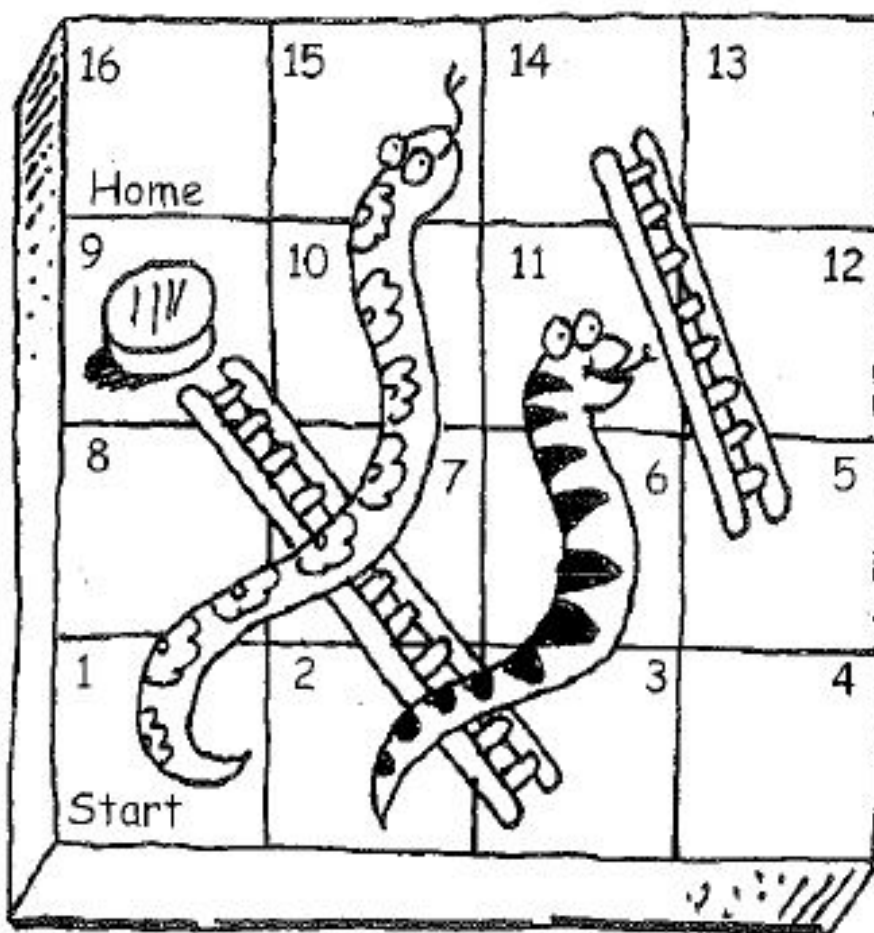
Your counter is on 9.

You roll a 1 to 6 dice.

After 2 moves, you land on 16.

Find all the different ways you can do it.

Watch out for that snake!



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Think of other questions you could ask.

BACK

Snakes and Ladders

N1

Outcome Objective:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
 - 10s, using starting points from 1 to 9
 - 2s, starting from 1.
-

Material Suggestions:

- Six-sided die (1 to 6)
 - Paper copies of the game board
 - Bingo chips for game pieces
-

Sample Solutions:

- 1 then 6
- 3 then 4
- 4 then 3
- 5 then 2

Note:

- 2 then 5 won't work, because if you roll a 2 first, you slide down the snake
 - 6 then 1 won't work either, because if you roll a 6 first, you slide down the snake
-

Notes:

#3: Money In Hand

N1, N9

Problem:

I have lots of pennies, nickels, and dimes in my pocket.

I put three coins in my hand.

How much money do you think I have in my hand?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

I put five coins in my hand.

How much money do you think I have in my hand?

BACK

Money In Hand

N1, N9

Outcome Objective:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

Material Suggestions:

- Pennies, nickels, and dimes
- Plastic coins

Sample Solutions:

- 3 pennies (3 cents)
- 3 nickels (15 cents)
- 3 dimes (30 cents)
- 2 pennies + 1 nickel (7 cents)
- 2 pennies + 1 dime (12 cents)
- 2 nickels + 1 penny (11 cents)
- 2 nickels + 1 dime (20 cents)
- 2 dimes + 1 penny (21 cents)
- 2 dimes + 1 nickel (25 cents)



Notes:

#4: Gob Stopper

N1, N9

Problem:

Anya bought a gob-stopper.

It cost 50 cents.

She paid for it exactly, using nickels, dimes and quarters.

Which coins did she use?



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Extension:

What if the gob-stopper cost \$1.00?

Which coins did she use?

BACK

Gob Stopper

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Nickels, dimes, and quarters
- Plastic or paper coins

Sample Solutions:

- 10 nickels
- 5 dimes
- 2 quarters
- 8 nickels + 1 dime
- 5 nickels + 1 quarter
- 6 nickels + 2 dimes
- Etc.



Notes:

#5: Ride at the Fair

N1, N9

Problem:

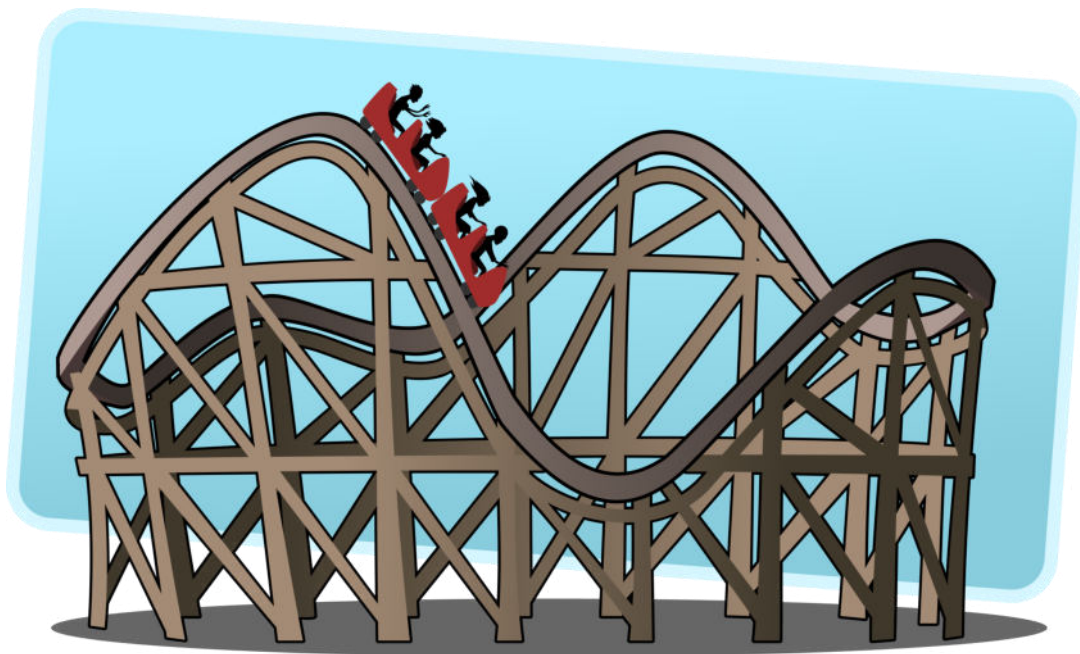
Baji wanted a ride at the fair.

Rides cost from 50 cents to one dollar (\$1.00).

His mom asked Baji to pay less than 80 cents towards it.

Baji paid exactly four coins towards the ride.

Which coins did Baji use.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

If Baji could use any number of coins, how many different ways can you find for him to pay less than 80 cents?

BACK

Ride at the Fair

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Nickels, dimes, and quarters

Sample Solution:

- 2 quarters + 1 dime + 1 nickel
- 2 quarters + 2 dimes
- 2 quarters + 2 nickels
- 1 quarter + 3 dimes
- 1 quarter + 2 dimes + 1 nickel



Notes:

#6: Fireworks

N1, N9

Problem:

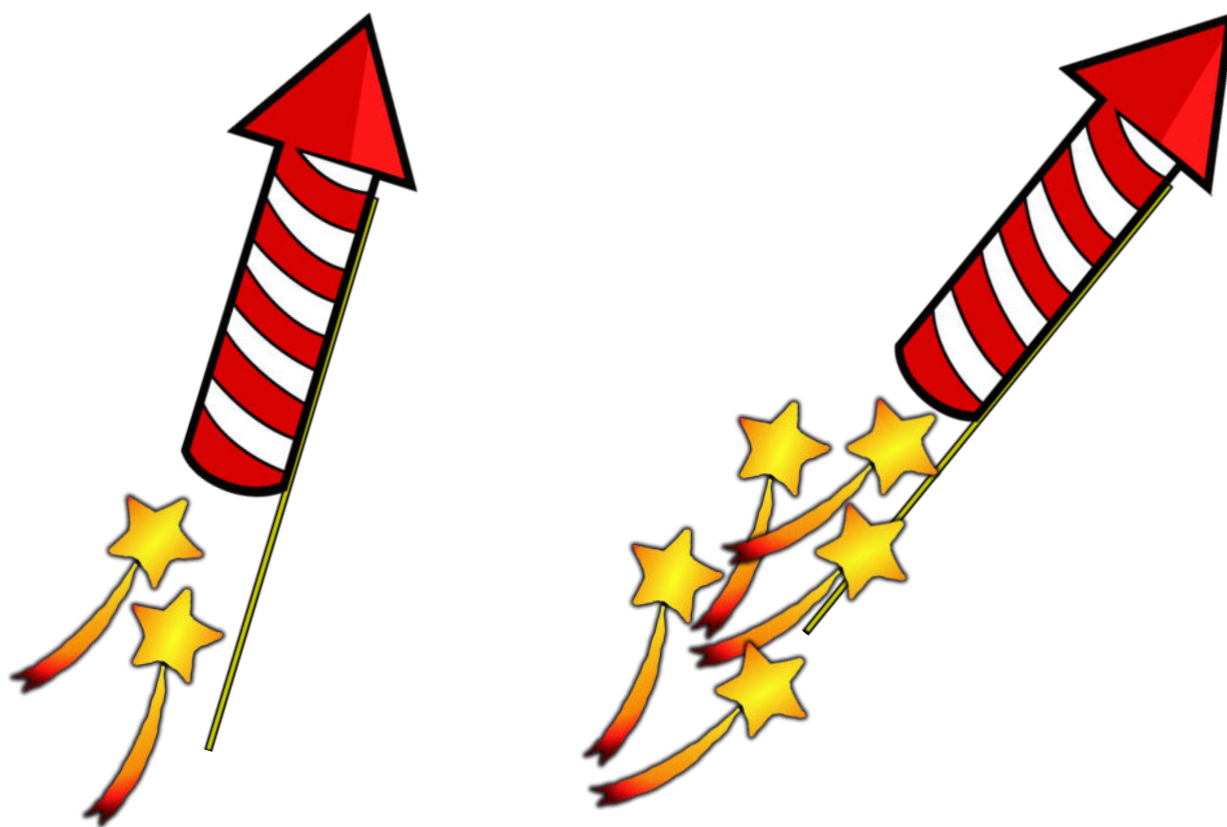
Christina had some fireworks.

Some made 2 stars.

Some made 5 stars.

Altogether, Christina's fireworks made 19 stars.

How many 2-star fireworks and 5-star fireworks did Christina light?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if Christina's fireworks made 25 stars?

Find as many answers as you can.

BACK

Fireworks

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Counters

Sample Solutions:

- 3 five-star fireworks + 2 two-star fireworks
- 1 five-star firework + 7 two-star fireworks



Notes:

#7: Sally the Snake

N1, N9

Problem:

Sally the Snake has up to 20 eggs.

She counted her eggs by twos and she had 1 left over.

She counted her eggs by fives and she had 4 left over.

How many eggs does Sally have?



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Extension:

Can you find another answer?

BACK

Sally the Snake

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
 - creating and solving problems that involve addition and subtraction
 - using the commutative property of addition (the order in which numbers are added does not affect the sum)
 - using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
 - explaining that the order in which numbers are subtracted may affect the difference.
-

Material Suggestions:

- Counters
-

Sample Solutions:

- 9 eggs ($5 + 4 = 9$; $2 + 2 + 2 + 2 + 1 = 9$)
 - 19 eggs ($5 + 5 + 5 + 4 = 19$; $2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 1 = 19$)
-

Notes:

#8: Stamps

N1, N9

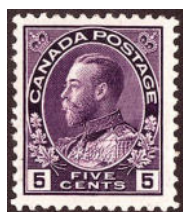
Problem:

Aidan's parcel cost 55 cents to post.

He stuck on eight stamps.

Each stamp was either 5 cents or 10 cents.

How many of each stamp did Aidan stick on his parcel?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Make up your own puzzle like this.

Ask a friend to solve it.

BACK

Stamps

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Counters
- Old 5 cent and 10 cent stamps

Sample Solution:

- three 10-cent stamps and five 5-cent stamps

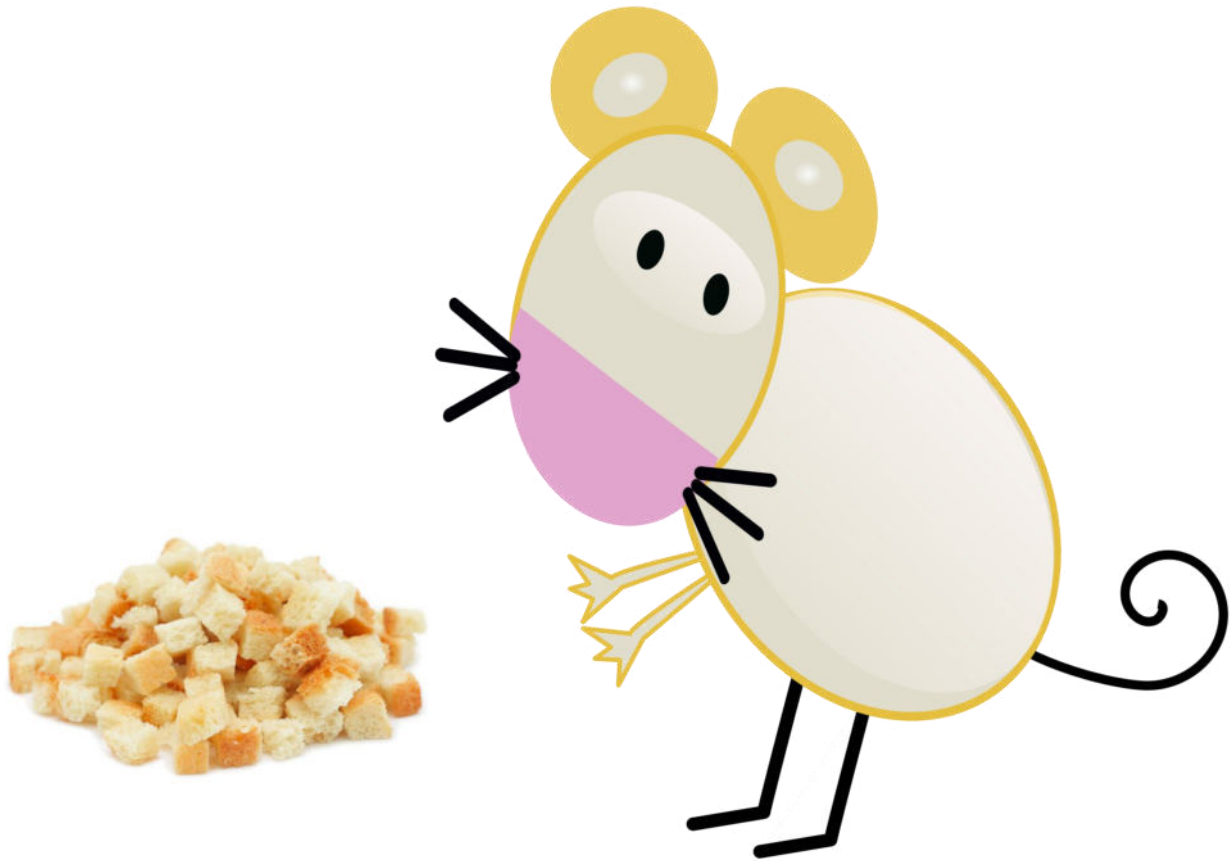


Notes:

#9: Mattie the Mouse N1, N9

Problem:

Mattie Mouse had between 30 and 50 breadcrumbs.
She counted the breadcrumbs in twos.
There were none left over.
She counted the breadcrumbs in fives.
There was 1 left over.
How many breadcrumbs did Mattie have?



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Extension:

Try to find another answer.

BACK

Mattie the Mouse

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
 - creating and solving problems that involve addition and subtraction
 - using the commutative property of addition (the order in which numbers are added does not affect the sum)
 - using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
 - explaining that the order in which numbers are subtracted may affect the difference.
-

Material Suggestions:

- Counters
-

Sample Solutions:

- 36 (18 twos = 36; 7 fives + 1 = 36)
 - 46 (23 twos = 46; 9 fives + 1 = 46)
-

Notes:

#10: Zids and Zods

N1, N9

Problem:

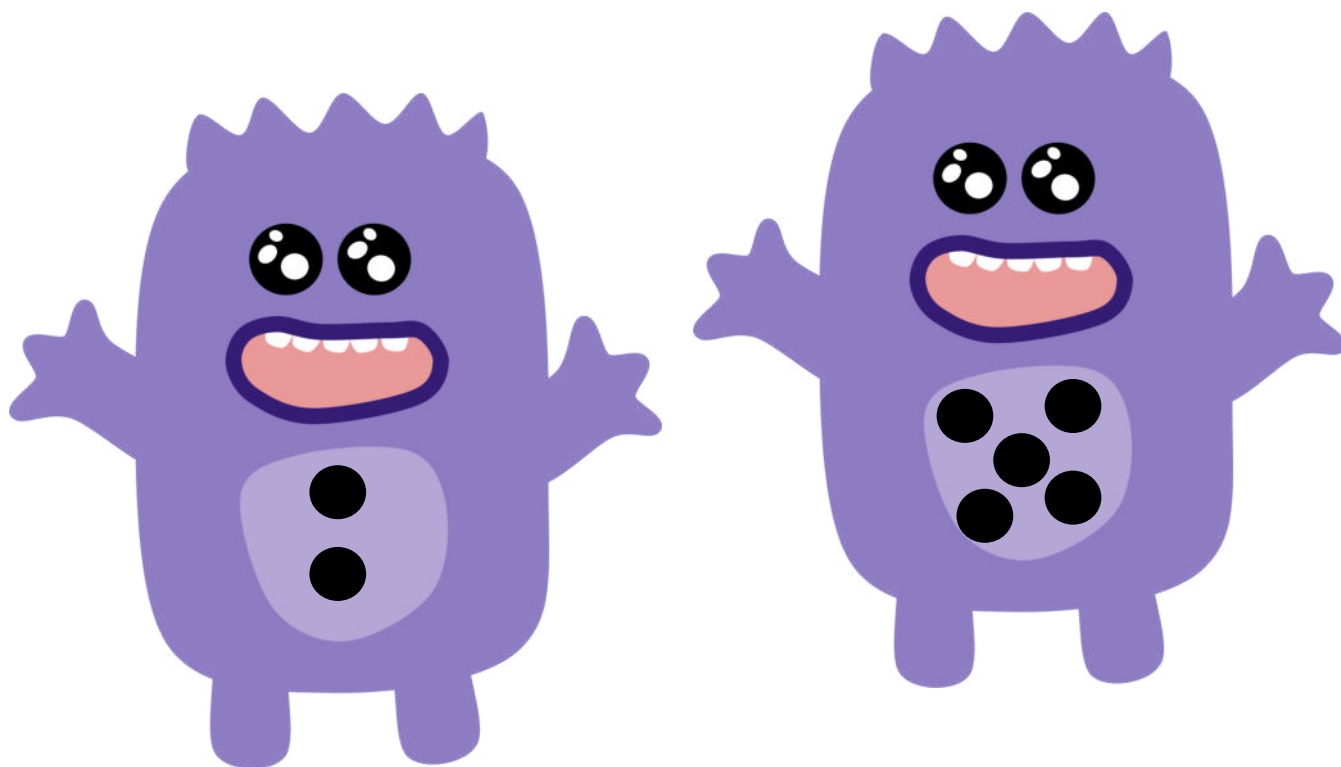
Zids have 2 spots.

Zods have 5 spots.

Altogether, some Zids and Zods have 48 spots.

How many Zids are there?

How many Zods are there?



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Extension:

Find as many solutions as you can.

BACK

Zids and Zods

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Counters

Sample Solutions:

- 4 Zids + 8 Zods
- 9 Zids + 6 Zods
- 14 Zids + 4 Zods
- 19 Zids + 2 Zods



Notes:

#11: Counting Shells

N1, N9

Problem:

Jeremiah has a lot of shells.

He has more than 50, but less than 60.

When he counts them by twos, he has one left over.

When he counts them by fives, he has none left over.

How many shells does Jeremiah have?



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Photo by Howard D. Lebowitz retrieved from <http://www.flickrriver.com/places/United+States/New+Jersey/Commercial/Shell+Pile/search/>

Extension:

How many shells does Jeremiah have (using the same criteria as above) if he has more than 60, but less than 100?

BACK

Counting Shells

N1, N9

Outcome Objectives:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
 - creating and solving problems that involve addition and subtraction
 - using the commutative property of addition (the order in which numbers are added does not affect the sum)
 - using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
 - explaining that the order in which numbers are subtracted may affect the difference.
-

Material Suggestions:

- Counters
-

Sample Solution:

- 55 (twenty-seven 2s = $54 + 1 = 55$; eleven 5s = 55)
-

Notes:

#12: Spaceship

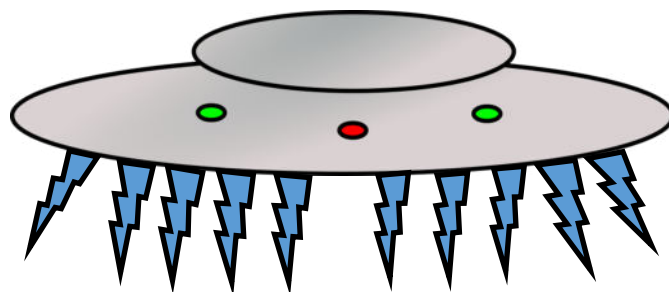
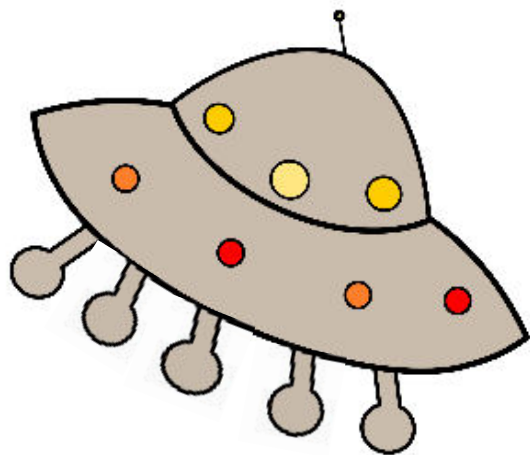
N1, N9

Problem:

Some Zaargs and Blogs have flown from Planet X and wanted to land on Earth. There were at least two of each of them.

Zaarg spaceships have 5 landing legs and Blog spaceships have ten landing legs. There were 45 landing legs altogether.

How many Zaarg and Blog ships were there?



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Extension:

What if there were at least one of each of them?
How many answers can you find?

BACK

Spaceship

N1, N9

Outcome Objective:

N1: Say the number sequence 0 to 100 by:

- 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively
- 10s, using starting points from 1 to 9
- 2s, starting from 1.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

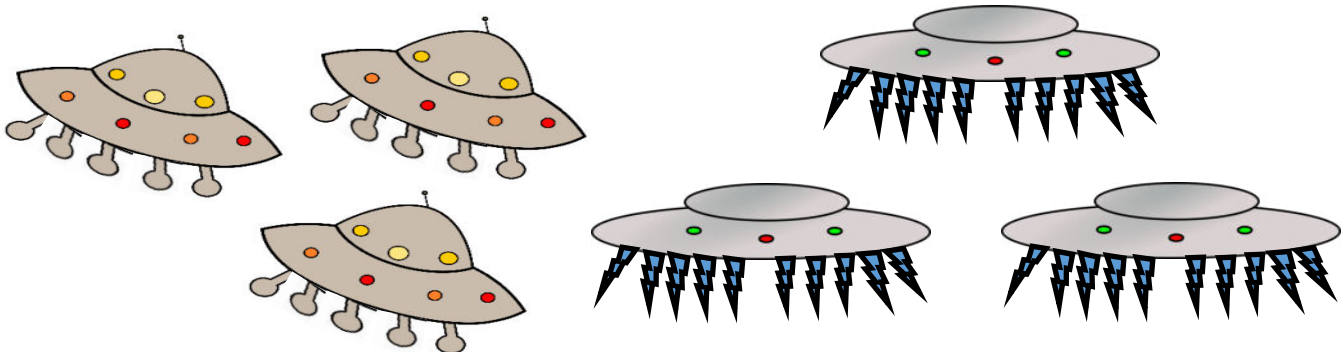
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Manipulatives/counters

Sample Solutions:

- 3 Zaarg ships + 3 Blog ships
- 5 Zaarg ships + 2 Blog ships



Notes:

#13: Birds' Eggs

N2

Problem:

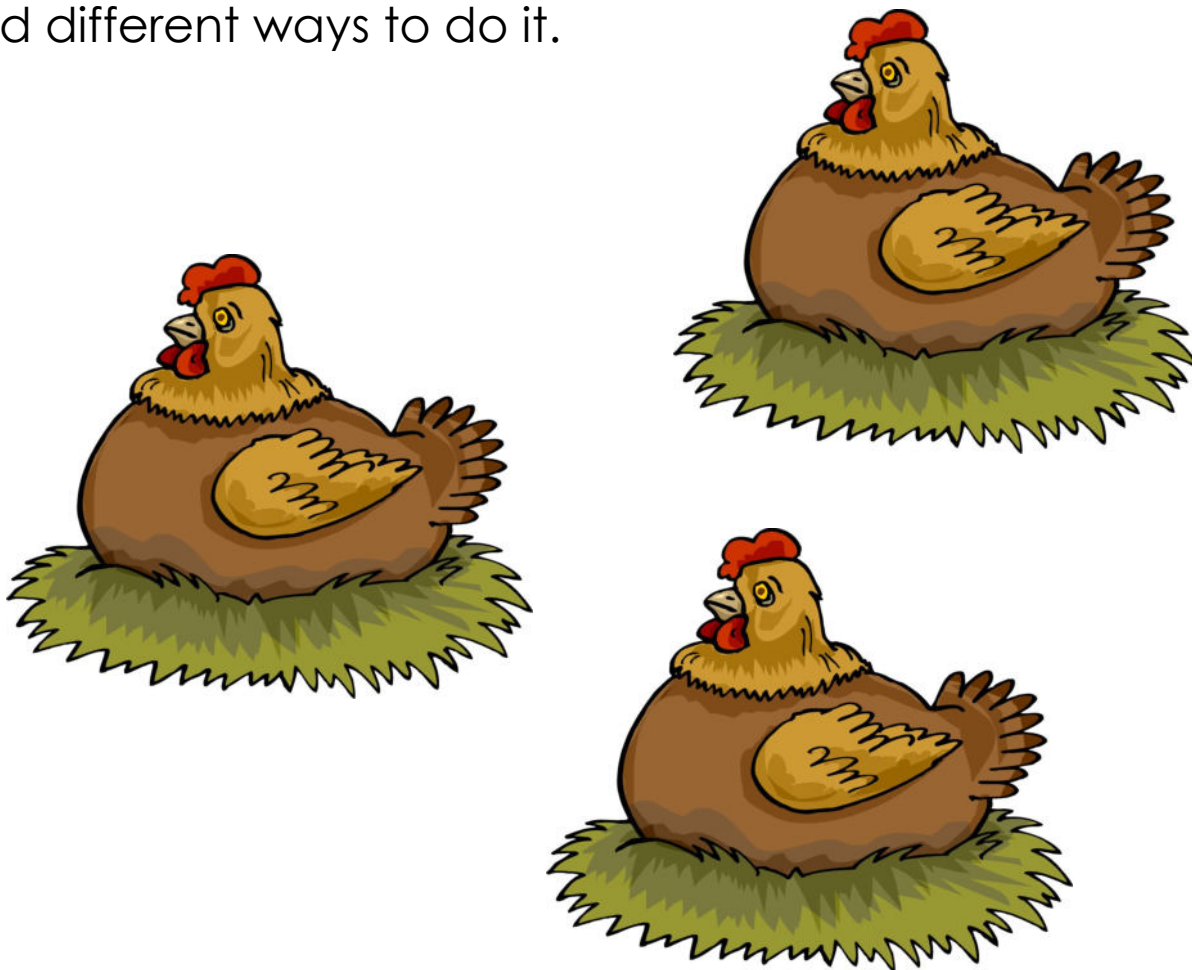
Three birds laid some eggs.

Each bird laid an odd number of eggs.

Altogether they laid 19 eggs.

How many eggs did each bird lay?

Find different ways to do it.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if altogether they laid 27 eggs?

BACK

Birds' Eggs

N2

Outcome Objective:

MN2. Demonstrate if a number (up to 100) is even or odd.

Material Suggestions:

- Counters
-

Sample Solutions:

- 1, 1, 17
- 1, 3, 15
- 1, 5, 13
- 1, 7, 11
- 1, 9, 9
- 1, 13, 5
- 1, 15, 3
- 3, 3, 13
- 3, 5, 11
- 3, 7, 9
- 5, 7, 7
- 5, 9, 5
- 5, 11, 3



Notes:

#14: Three Monkeys

N2

Problem:

Three monkeys ate a total of 25 nuts.

Each of them ate a different odd number of nuts.

How many nuts did each of the monkeys eat?

Find as many different answers as you can.



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Extension:

What if there were just two monkeys and 24 nuts, and they each had to eat a different even number of nuts. Find as many different answers as you can.

BACK

Three Monkeys

N2

Outcome Objective:

N2. Demonstrate if a number (up to 100) is even or odd.

Material Suggestions:

- Counters
-

Sample Solutions:

- 1, 3, 21
- 1, 5, 19
- 1, 7, 17
- 1, 9, 15
- 1, 11, 13
- 3, 5, 17
- 3, 7, 15
- 3, 9, 13
- 5, 7, 13
- 5, 9, 11
- 5, 13, 7
- Etc.

Sample Extension Solutions:

- 2, 22
 - 4, 20
 - 6, 18
 - 8, 16
 - 10, 14
-

Notes:

#15: Odds and Evens

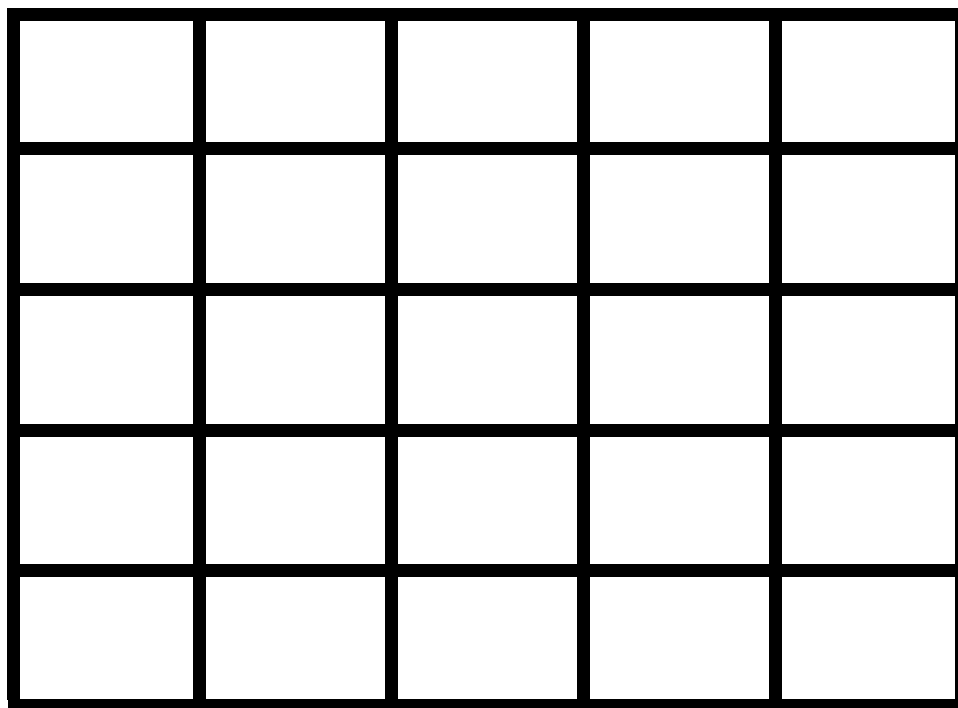
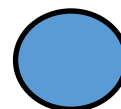
N2

Problem:

Draw a 5 by 5 grid.

You will put counters on it.

You can put only one counter in each space.



1. Place 13 counters.

Get an **odd** number of them in each row and column.

2. Place 10 counters.

Get an **even** number of them in each row and column.

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Extension:

Try to do this keeping the two main diagonals in mind, as well.

BACK

Odds and Evens

N2

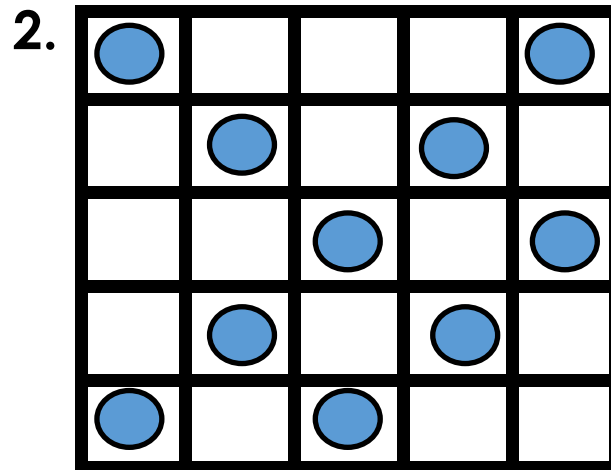
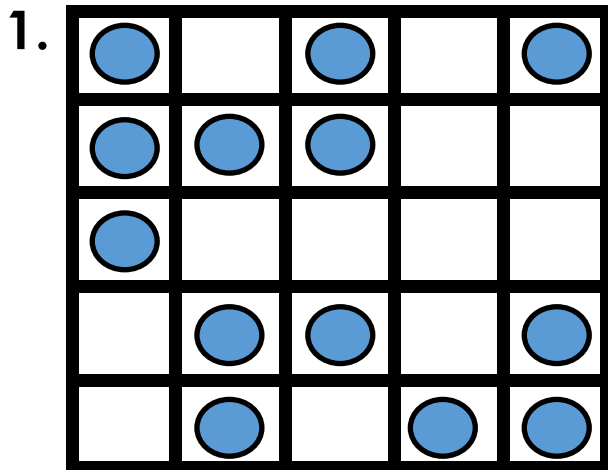
Outcome Objective:

N2. Demonstrate if a number (up to 100) is even or odd.

Material Suggestions:

- Counters
- Copies of 5 by 5 grids

Sample Solutions:



Notes:

#16: Darren the Detective

N2, N5

Problem:

Darren the detective looked for a number.
 He found an even two-digit number less than 50.
 The sum of its digits was 12.
 The difference of its digits was 4.
 What even number did Darren find?

10	20	30	40
11	21	31	41
12	22	32	42
13	23	33	43
14	24	34	44
15	25	35	45
16	26	36	46
17	27	37	47
18	28	38	48
19	29	39	49



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Extension:

Darren found an odd two-digit number.
 One of its digits was half the other.
 The number was greater than 50.
 What number did Darren find?
 Is there an even number that fits this criteria?

BACK

Darren the Detective N2, N5

Outcome Objective:

N2. Demonstrate if a number (up to 100) is even or odd.

N5. Compare and order numbers up to 100.

Material Suggestions:

- Counters
 - Number chart
-

Sample Solution:

- Even number: 48 ($4 + 8 = 12$ and $8 - 4 = 4$)
-

Sample Extension Solutions:

- Odd number: 63
 - Even number: 84
-

Notes:

#17: Who is Third?

N3

Problem:

Four children are lining up for lunch. Their names are Lia, Bo, Jon, and Liz. Lia is first. Bo is last. Liz is behind Lia and in front of Jon. Who is third in line?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Make up a similar problem using your friends.

BACK

Who is Third?

N3

Outcome Objective:

N3. Describe order or relative position, using ordinal numbers (up to tenth).

Material Suggestions:

- Have children try to act this out, so they can be the manipulatives
 - Or use objects
-

Sample Solutions:

- Lia (1st), Liz is behind her (2nd) and Bo is last, which makes Jon third.



Lia

First



Liz

Second



Jon

Third



Bo

Last

Notes:

#18: Dinosaur Race

N3

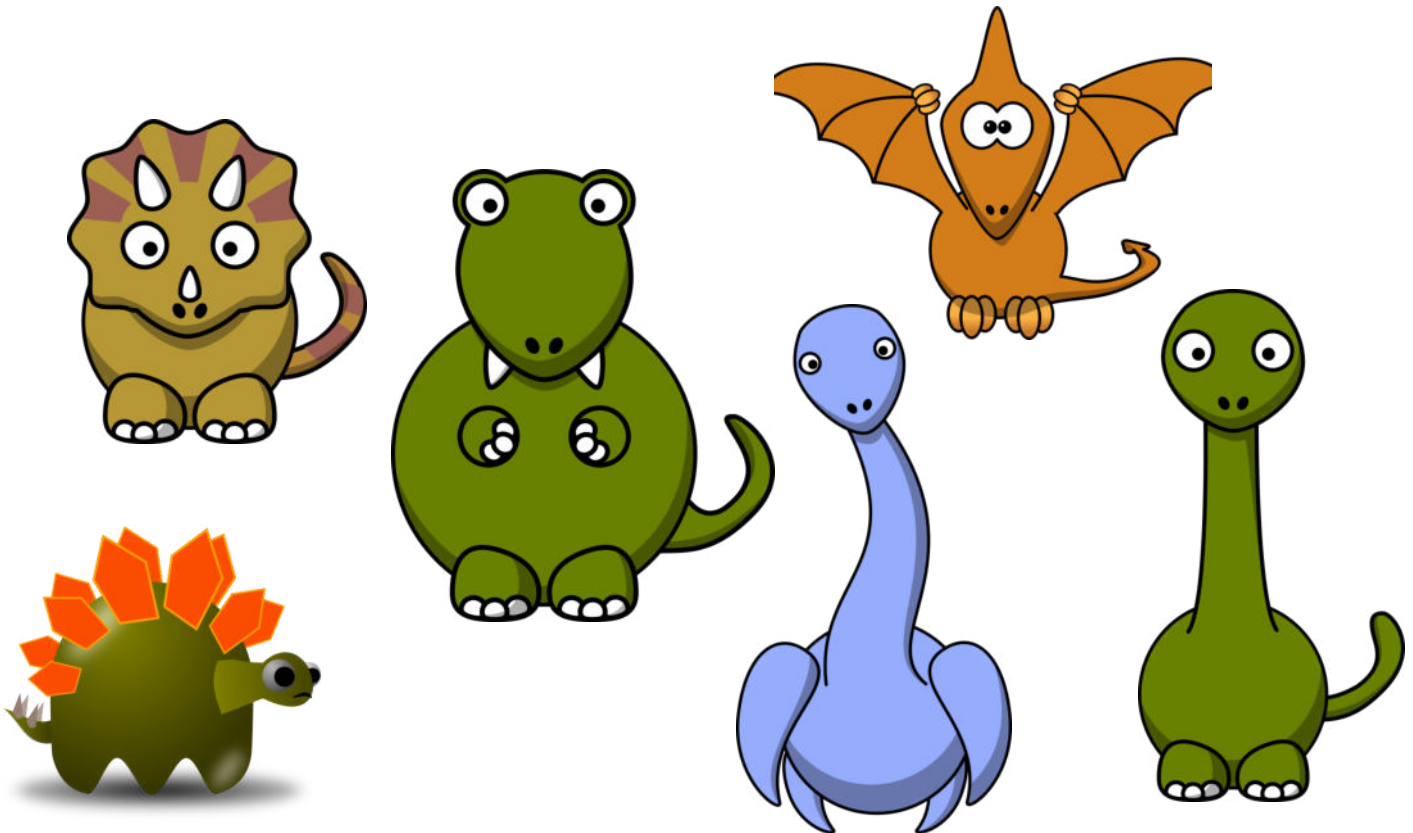
Problem:

Six dinosaurs had a race. Two dinosaurs tied for second. Speedy was one of them. Little was ahead of Goofy. Goofy beat Little Dino.

Little was ahead of Goofy. Goofy beat Little Dino.

Sleepy came in last. Steggy was beaten by only one other dinosaur. Who won the race?

Show the order in which the dinosaurs crossed the finish line.



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Create a similar problem and let your friends try to solve it.

BACK

Dinosaur Race

N3

Outcome Objective:

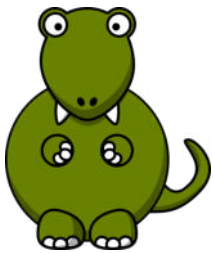
N3. Describe order or relative position, using ordinal numbers (up to tenth).

Material Suggestions:

- Toy figures
- Pattern blocks

Sample Solutions:

- First: Little T
- Second (tie): Speedy and Steggy
- Third: Goofy
- Fourth: Little Dino
- Last: Sleepy



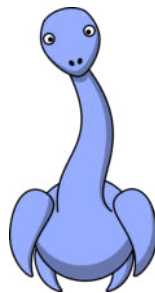
Little T
First



Speedy
Second



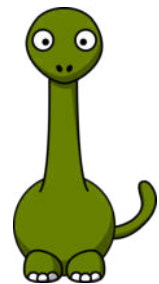
Steggy
Second



Goofy
Third



Little Dino
Fourth



Sleepy
Last

Notes:

#19: Neighbours

N3

Problem:

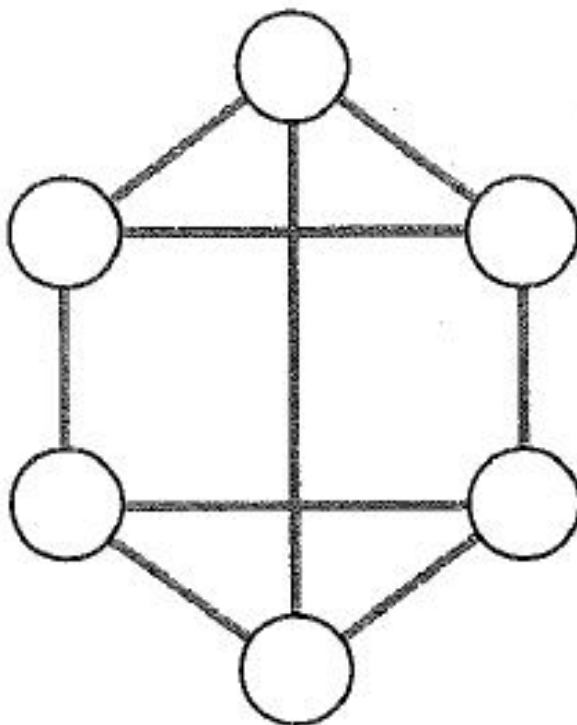
Use each of the numbers 1 to 6 once.

Write one in each circle.

Numbers next to each other must not be joined.

For example, 3 must not be joined to 2 or 4.

1 2 3 4 5 6



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

There is more than one solution. Find as many different ways as you can.

BACK

Neighbours

N3

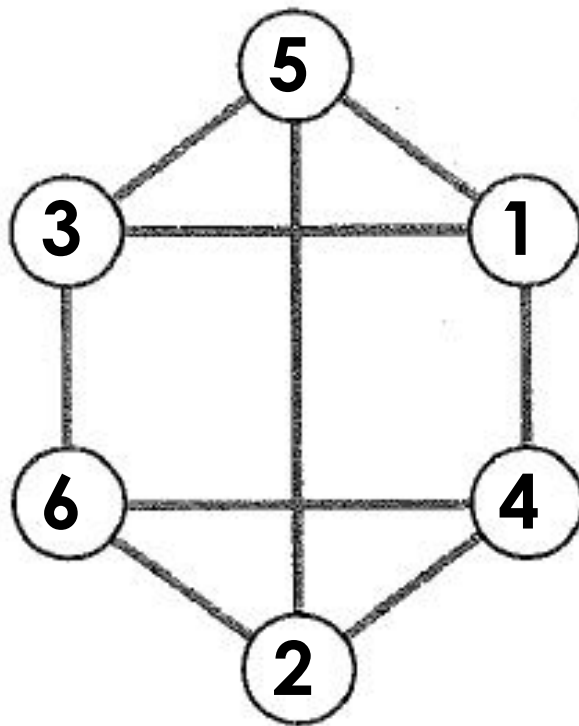
Outcome Objective:

N3. Describe order or relative position, using ordinal numbers (up to tenth).

Material Suggestions:

- Toy figures
 - Pattern blocks
-

Sample Solution:



Notes:

#20: Mr. Lincoln's Line

N3

Problem:

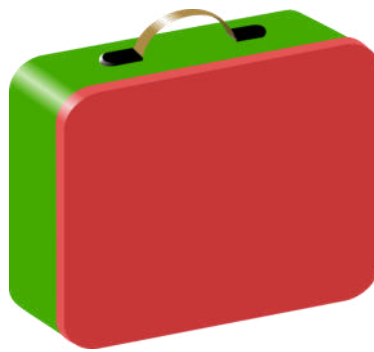
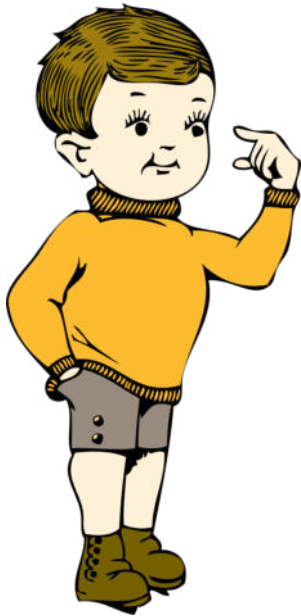
Mr. Lincoln's 32 grade two students are standing in line to go for lunch.

The 3rd child, and every 3rd child after, is a boy.

The 5th child, and every 5th child after, is wearing glasses.

The 4th child, and every 4th child after, is carrying a lunchbox.

Can you build a representation of Mr. Lincoln's line?



Credit: Adapted from: Ray, Max (2013). *Powerful Problem Solving Activities for Sense Making with the Mathematical Practices*. Portsmouth, NH: Heinemann.

Extension:

Create a similar scenario for your friends to represent.

BACK

Mr. Lincoln's Line

N3

Outcome Objective:

N3. Describe order or relative position, using ordinal numbers (up to tenth).

Material Suggestions:

- Toy figures
- Pattern blocks

Sample Solution:



Notes:

#21: The Race

N3

Problem:

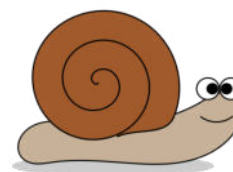
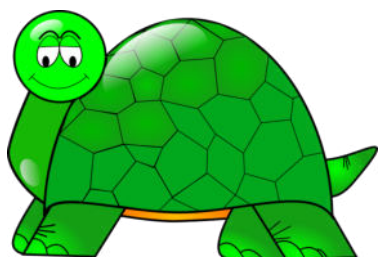
Pokey Turtle, Molasses Snake, Tardy Snail, and Slowly Groundhog had a race.

Although Pokey Turtle didn't win, he wasn't last.

Molasses Snake finished directly ahead of Pokey Turtle.

Tardy Snail finished right behind Slowly Groundhog.

Write the names in the order they finished the race.



Credit: Adapted from Laura F. Main (2013). *Problem of the Week: Grade One*. <http://www.goodreads.com/book/show/20295549-problem-of-the-week>

Groundhog image: retrieved from <https://www.dreamstime.com/illustration/cartoon-groundhog.html>

Extension:

Create a similar problem and have a classmate try to solve it.

BACK

The Race

N3

Outcome Objective:

N3. Describe order or relative position, using ordinal numbers (up to tenth).

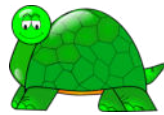
Material Suggestions:

- Toy figures
- Pattern blocks

Sample Solution:



Molasses
Snake
First



Pokey
Turtle
Second



Slowly
Ground-
hog
Third



Tardy
Snail
Last

Notes:

#22: Largest Difference N4, N5, N9

Problem:

Marissa's teacher picked the numbers 2, 5, 8, and 4. She asked her students to arrange these numbers in the spaces below and then subtract them. She wanted to see who could arrange the numbers to make the largest difference.

How should Marissa arrange the numbers to get the largest difference?

Credit: Adapted from a problem retrieved from http://www.primaryresources.co.uk/mathspdfs/IM_placeg1.pdf

Extension:

How could Marissa arrange the numbers to get the smallest difference?

Choose 4 different numbers for this problem (example: 3, 7, 2, 5).

BACK

Largest Difference N4, N5, N9

Outcome Objective:

N4. Represent and describe numbers to 100, concretely, pictorially and symbolically.

N5. Compare and order numbers up to 100.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction.

Material Suggestions:

- Manipulatives/counters
 - Number cards
 - 100 chart
-

Sample Solution:

- $85 - 24 = 61$

$$\begin{array}{r} 85 \\ - 24 \\ \hline \end{array}$$

Notes:

#23: Make 100

N5, N9

Problem:

1 2 3 4 5 6 7 8 9

Choose four of these digits.
Each one must be different.
Put one digit in each box.

This makes 2 two-digit numbers reading across and 2 two-digit numbers reading down. Add up all four of the numbers. Your target sum is 100.

In this example, the sum is 93:

$$13 + 29 + 12 + 39 = 93$$

So, keep trying.

1	3
2	9

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

How many different ways of making 100 can you find?

BACK

Make 100

N5, N9

Outcome Objective:

N5. Compare and order numbers up to 100.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction.

Material Suggestions:

- Manipulatives/counters
-

Sample Solution:

Here is one way:

$$12 + 47 + 14 + 27 = 100$$

There are others.

1	2
4	7

Notes:

#24: Coin Sort

N5, PR3

Problem:

The students each had a nickel, a dime, a penny, and a quarter.

The teacher said, "Put these coins in order from the smallest to the largest."

Students did not agree how to do this.

What are the two ways they might have ordered the coins?
Show me.



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Give students other sets of items or objects to sort.

BACK

Coin Sort

N5, PR3

Outcome Objectives:

N5. Compare and order numbers up to 100.

PR3. Sort a set of objects, using two attributes, and explain the sorting rule.

Material Suggestions:

- Plastic coins or paper representations

Sample Solutions:

- By value:



- By size (diameter)



Notes:

#25: A Lot of Legs

N6

Problem:

Jermaine said, "I think the number of legs in this room is more than a hundred."

Could this be true? Explain.

How many legs are in this classroom?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Try doing this in other places, such as the cafeteria, or the gymnasium during an assembly.

BACK

A Lot of Legs

N6

Outcome Objective:

N6. Estimate quantities to 100, using referents.

Material Suggestions:

- Counters
 - Popsicle sticks and elastics (to make bundles of 10)
 - Have the children act it out
-

Sample Solution:

- Depends on how many people are in your classroom (2 legs per person).
-

Notes:

#26: Digit Dance

N7

Problem:

You have the following digits:

7, 5, 2, 4, 6, 3

What is the largest 2-digit number you can make?

What is the next largest 2-digit number you can make with the digits that are left over?

What is the smallest 2-digit number you can make?

What is the next smallest 2-digit number you can make with the digits that are left over?

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

What about if you had the following digits?

8, 1, 9, 0, 3, 5

BACK

Digit Dance

N7

Outcome Objective:

N7. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100.

Material Suggestions:

- Base ten blocks
 - Number cards
 - 100 chart
-

Sample Solutions:

Largest: 76

Next largest: 54

76

54

Smallest: 23

Next smallest: 45

23

45

Notes:

#27: Griffin's Numbers N7, N9

Problem:

Griffin has written a list of different two-digit numbers.
The digits of each number add up to 5.
None of the digits is zero.

Here is one of Griffin's numbers:

23

Griffin has written all the numbers he can think of.
How many different numbers are there in his list?

Write all the numbers in order.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What would the list look like if the two-digit numbers added up to 6, 7, 8, or 9?

BACK

Griffin's Numbers

N7, N9

Outcome Objective:

N7. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction.

Material Suggestions:

- Number cards
 - Counters
-

Sample Solutions:

- 14, 23, 32, 41
-

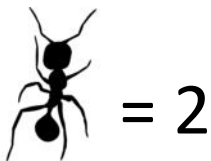
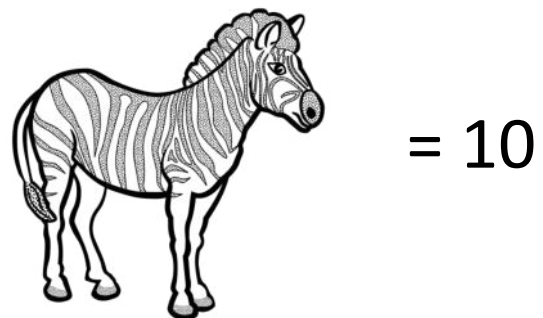
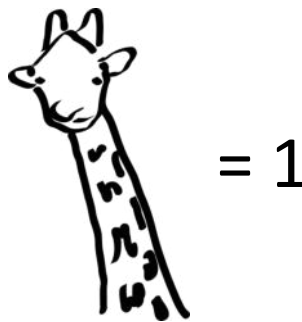
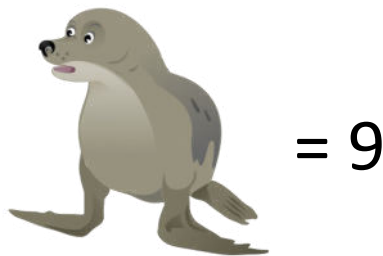
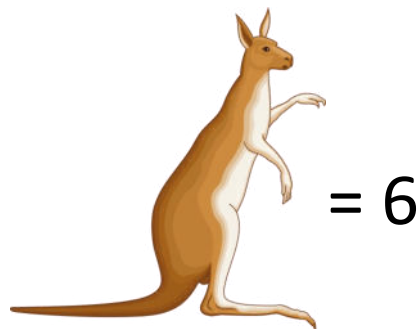
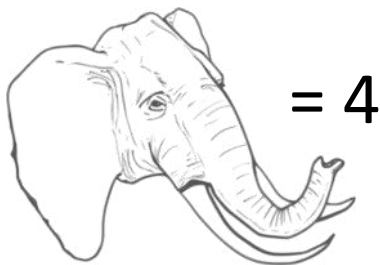
Notes:

#28: Noah's Ark

N8, PR5

Problem:

Noah wants his ark to sail along on an even keel. The ark is divided down the middle. The animals on the left need to balance the animals on the right.



Can you place the animals in the ark so that Noah's Ark stays steady?

How many different ways can you do it?

Credit: Adapted from a problem retrieved from <https://nrich.maths.org/136>

Extension:

Have students change the values of the animals or add more animals. Or, students could show non-examples.

BACK

Noah's Ark

N8, PR5

Outcome Objective:

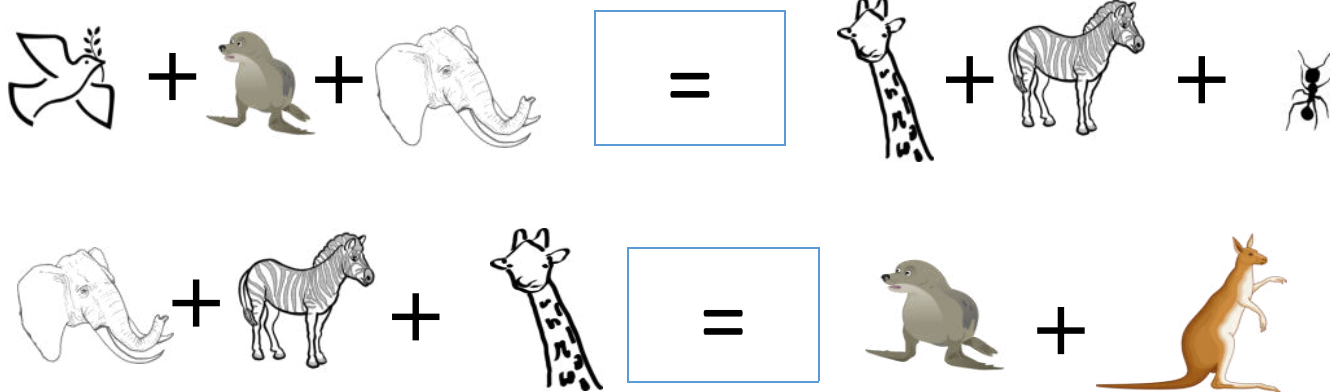
N8: Demonstrate and explain the effect of adding 0 to or subtracting 0 from any number.

PR5: Record equalities and inequalities symbolically, using the equal symbol or the not equal symbol.

Material Suggestions:

- Manipulatives for animal representation
- counters

Sample Solutions:



Notes:

#29: Balloon Puzzle

N9

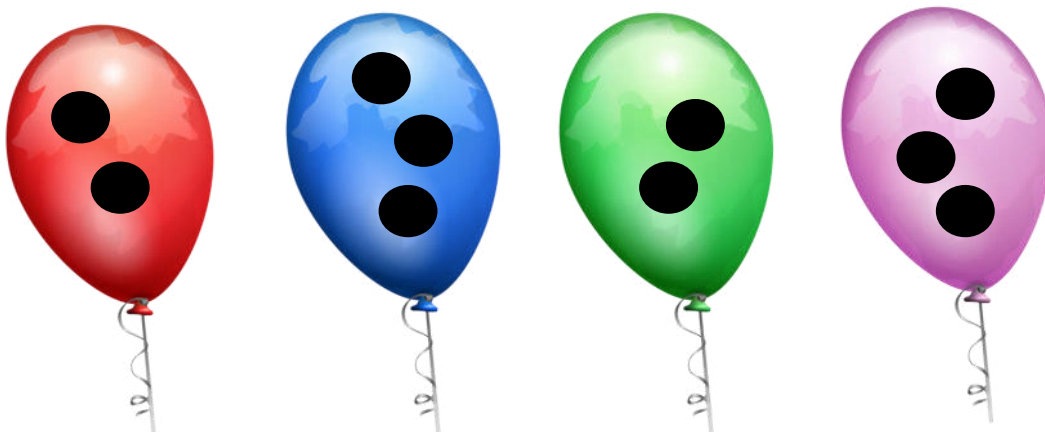
Problem:

Emma and Jake were blowing up balloons for Wyatt's Birthday. Some balloons had 2 spots on them and some had 3 spots. There were 31 spots altogether.

There were at least one of each kind of balloon.

How many balloons had 2 spots and how many balloons had 3 spots?

Are there any other possible answers?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

What if there were 24 spots?

What if there were 65 spots?

BACK

Balloon Puzzle

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

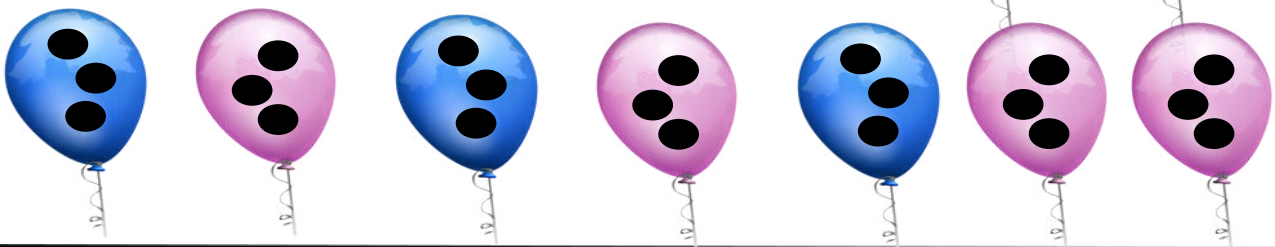
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Paper plates to represent balloons
- Counters to represent spots

Sample Solutions:

- 5 two-spot balloons + 7 three-spot balloons
- 1 two-spot balloons + 10 three-spot balloons
- 3 two-spot balloons + 8 three-spot balloons
- 8 two-spot balloons + 5 three-spot balloons
- 11 two-spot balloons + 3 three-spot balloons
- 14 two-spot balloons + 1 three-spot balloons



Notes:

#30: Zoo Puzzle

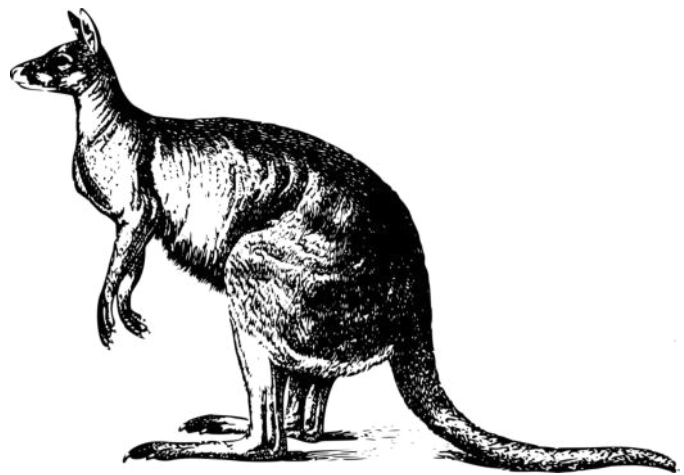
N9

Problem:

A zoo keeper was sent a delivery of Kangaroos and Koala bears from Australasia to look after. There were at least three of each. There were 28 legs altogether.

Kangaroos have 2 legs.

Koalas have 4 legs.



How many Kangaroos were there and how many Koala Bears?

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

What if there were at least one of each?

How about if there were at least two of each?

BACK

Zoo Puzzle

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Manipulatives/counters

Sample Solutions:

- 4 kangaroos + 5 koalas



- 6 kangaroos + 4 koalas
- 8 kangaroos + 3 koalas



Notes:

#31: Albert Square

N9

Problem:

36 people live in the eight houses in Albert Square.

Each house has a different number of people living in it.

Each line of three houses has 15 people living in it.

How many people live in each house?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

BACK

Albert Square

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum)
- explaining that the order in which numbers are subtracted may affect the difference.

Material Suggestions:

- Manipulatives/counters

Sample Solution:

There are many possible solutions.

3	5	7
4		2
8	1	6

Notes:

















#32: Shape Puzzle

N9

Problem:

Each shape stands for a number.

The numbers shown are the totals of the line of four numbers in the row or column.

				20
				25
				
				
			26	

Find the missing totals.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Using different shapes and values, make up a similar problem of your own and share it with a friend. Have him or her try to solve it.

BACK

Shape Puzzle

N9

Outcome Objective:

















N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Manipulatives/counters

Sample Solution:

				20
				25
				48
				14
20	36	25	26	

Notes:

#33: Chocolate Chip Cookies

N9

Problem:

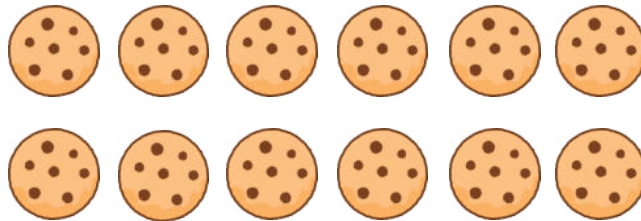
Alexa has 12 chocolate chip cookies.

She puts them on three plates.

Now there are 8 cookies in all on the first and second plates.

There are 6 cookies in all on the second and third plates.

How many cookies are on each plate?



First



Second



Third

Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 2 Teacher Resource Book* (pp. 4-5). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

What if Alexa has 21 chocolate chip cookies.

She puts them on three plates.

Now there are 15 cookies in all on the first and second plates.

There are 13 cookies in all on the second and third plates.

How many cookies are on each plate?

BACK

Chocolate Chip Cookies

N9

Outcome Objective:

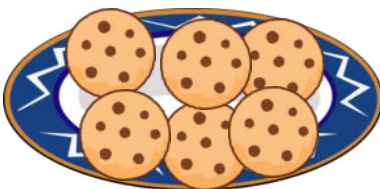
N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

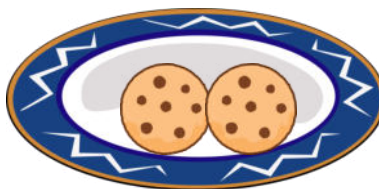
Material Suggestions:

- Manipulatives/counters
- Paper plates

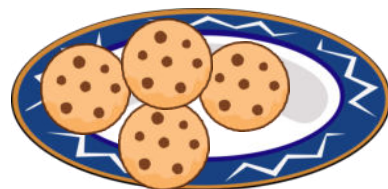
Sample Solution:



First



Second



Third

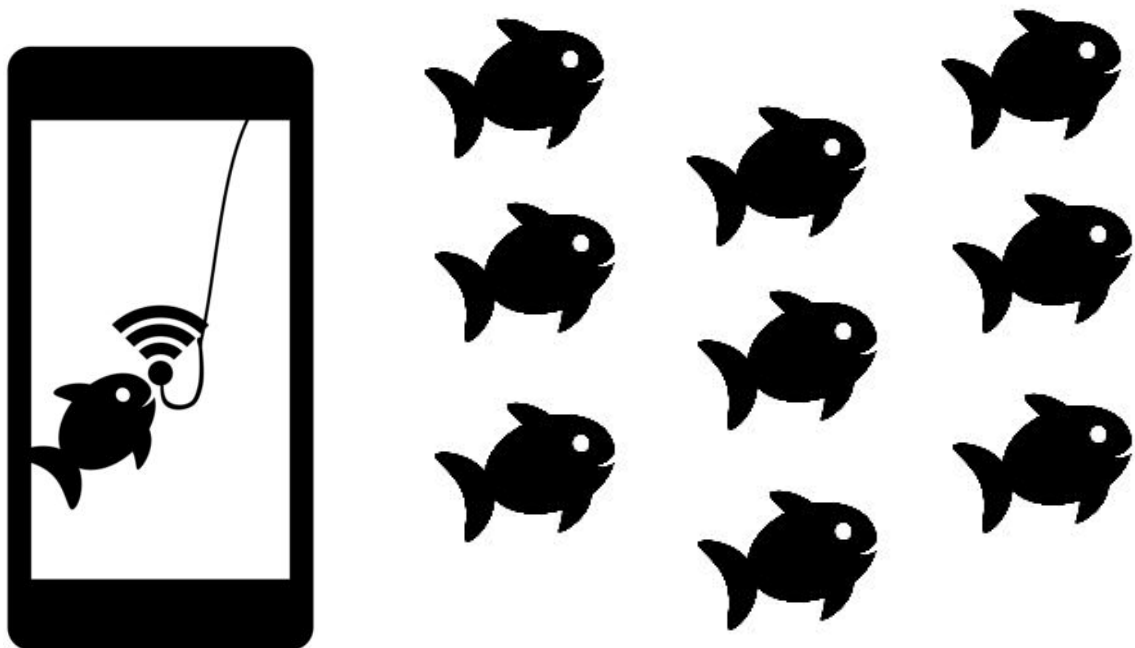
Notes:

#34: The Fishing Game

N9

Problem:

Courtenay and Brodie are playing The Fishing Game. They catch 9 fish in all. The fish are red and green. They catch 3 more red fish than green fish. How many fish of each colour do they catch?



Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 2 Teacher Resource Book* (pp. 14-15). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

What if they catch 27 fish in all. The fish are red, green, and yellow. They catch 7 more red fish than green fish and 7 more green fish than yellow fish. How many fish of each colour do they catch?

BACK

The Fishing Game

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

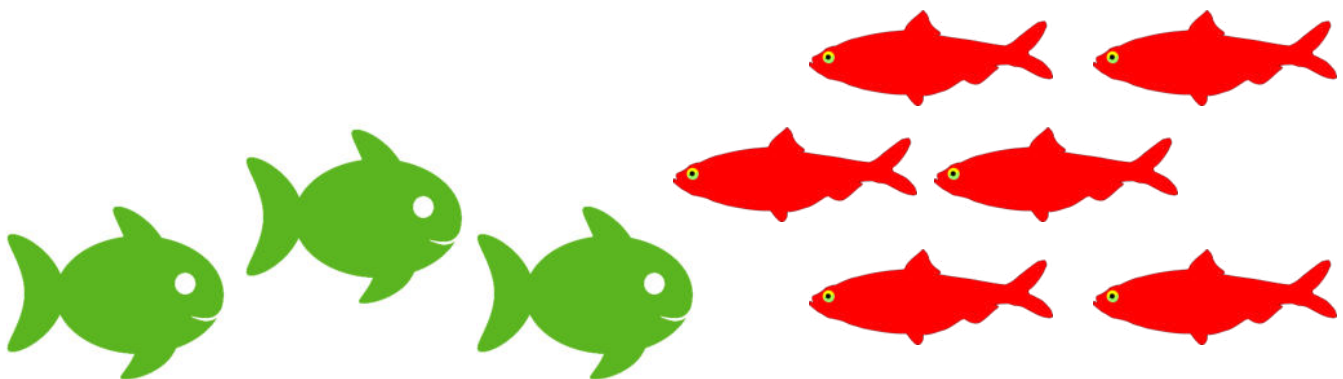
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Manipulatives/counters

Sample Solution:

- 3 green fish + 6 red fish



Notes:

#35: Mystery Square

N9

Problem:

From the table below:

- Choose a number.
- Choose a second number from a different column and row.
- Choose a third number from a different column and row.
- Choose a fourth number from a different column and row.
- Find the sum.

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Extension:

Repeat the process several times, using four different numbers each time. What do you notice?

BACK

Mystery Square

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Counters

Sample Solutions:

- $1 + 6 + 11 + 16 = 34$
- $2 + 7 + 12 + 13 = 34$
- $13 + 10 + 7 + 4 = 34$
- Many other possibilities

To discuss:

- Do you always get the same answer?
- Why?

Notes:

#36: Addition Game

N9

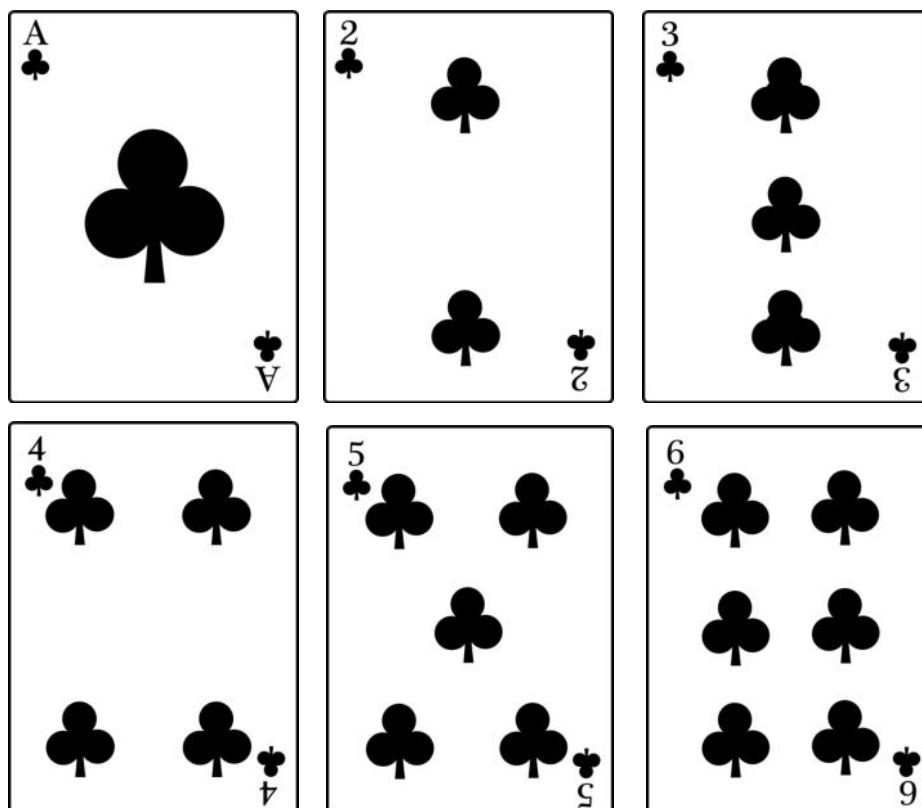
Problem:

Lincoln is playing an addition game with his brother. He must find 2 cards that show 7 clubs all together. Here are his cards.

Which pairs can he play?

If he uses all of the cards, he can go out.

Can he go out this turn?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Change the number of cards.

Change the number of hearts, clubs, diamonds, or spades.

BACK

Addition Game

N9

Outcome Objective:

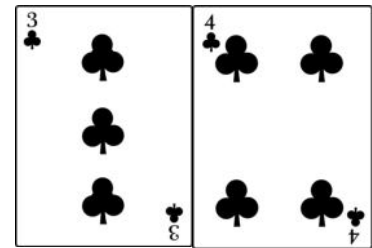
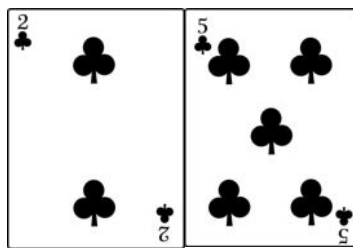
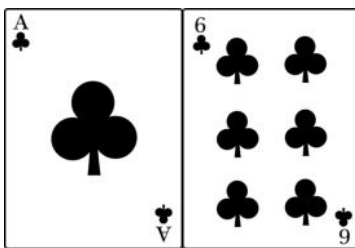
N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Playing cards
- Counters

Sample Solutions:



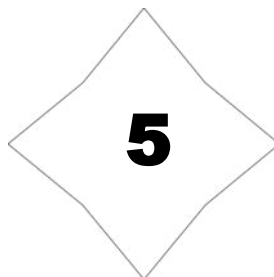
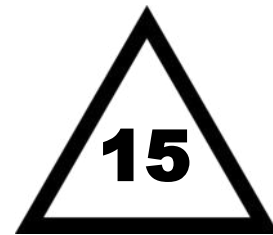
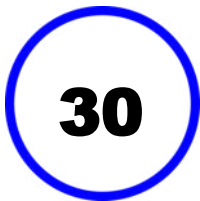
Notes:

#37: Bean Bag Toss

N9

Problem:

Lily played the Bean Bag Toss game. She could throw 2, 3, or 4 bags at a board with holes in it. Each hole was worth a different number of points. What are some ways to score 65 points to win a prize?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Have students draw shapes, put numbers in each and decide on a point total for the prize.

BACK

Bean Bag Toss

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
 - creating and solving problems that involve addition and subtraction
 - using the commutative property of addition (the order in which numbers are added does not affect the sum)
 - using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).
-

Material Suggestions:

- Hula hoops or paper with shapes and value written on
 - Bean bags or other soft object to toss at the targets
-

Sample Solution:

Triangle + Rectangle + Square + Diamond = 65 points

Heart + Square + Diamond = 65 points

Notes:

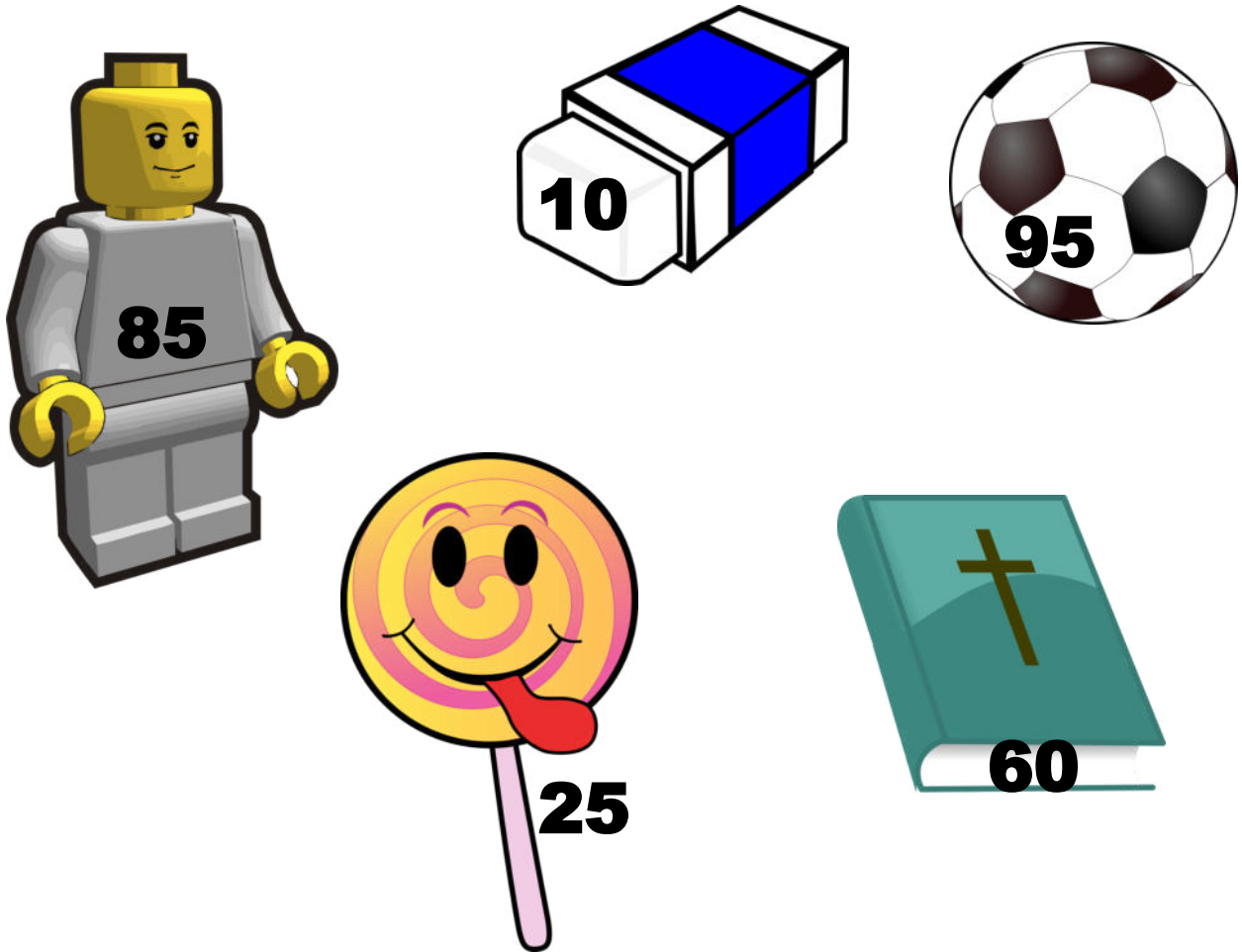
#38: Shopping Fun

N9

Problem:

Find things that cost the same amount as the ball.

Are there other possible answers?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Create a class store. Have real life items with price tags and give students a certain amount of plastic money to spend.

BACK

Shopping Fun

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

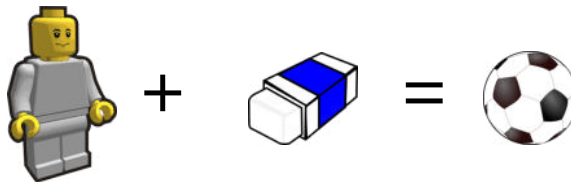
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

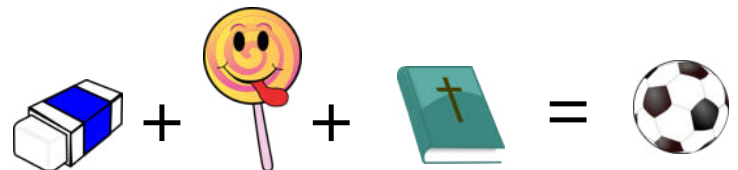
- Real life items with price tags
- Plastic money

Sample Solutions:

- Lego + Eraser = Ball



- Eraser + Lollipop + Book = Ball



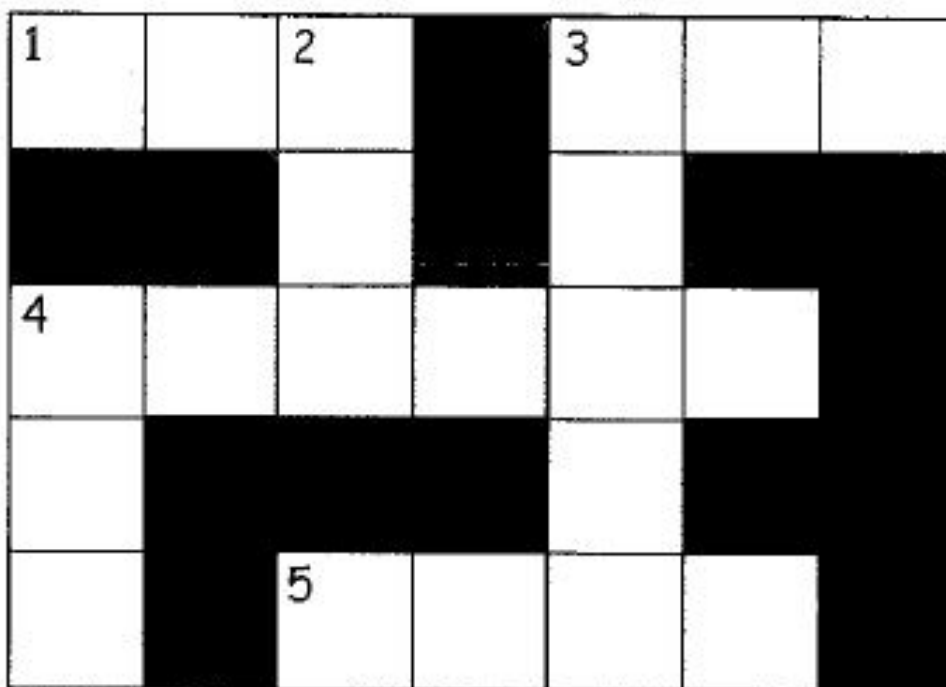
Notes:

#39: Crossword

N9

Problem:

Write the answers to this puzzle in words (capital letters):
ONE, TWO, THREE, ...



Across

1. $7 - 5$
3. $2 + 5 - 1$
4. $4 + 4 + 4$
5. $13 - 4$

Down

2. $3 + 4 - 6$
3. $9 - 2$
4. $11 - 4 + 3$

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Have students create a similar puzzle and have a friend or classmate solve it.

BACK

Crossword

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Paper copies of the puzzle
- Counters

Sample Solution:



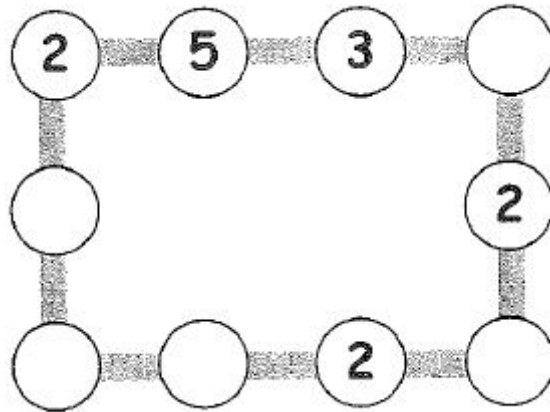
Notes:

#40: Number Lines

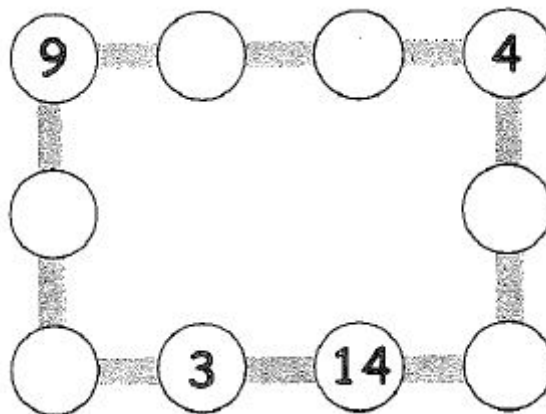
N9

Problem:

1. Make each line add up to 16.



2. Make each line add up to 20.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Make up your own puzzle like this.
Ask a friend to solve it.

BACK

Number Lines

N9

Outcome Objective:

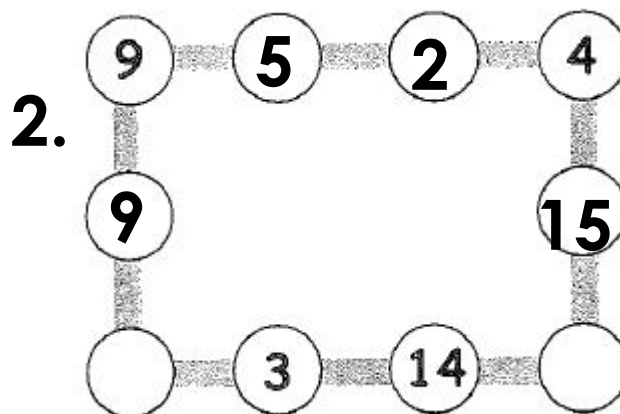
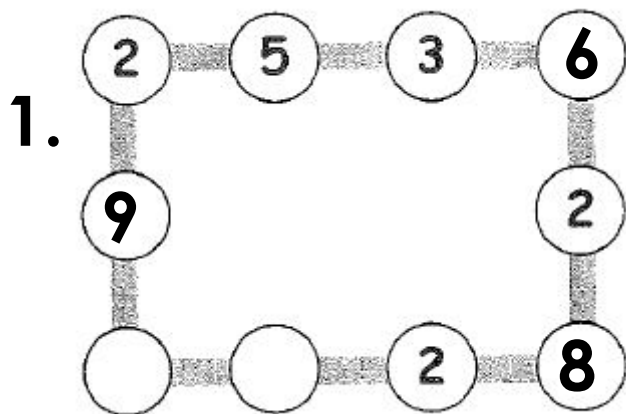
N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Paper copies of the puzzle
- Counters

Sample Solutions:



Notes:

#41: Card Sharp

N9

Problem:

Take 10 cards numbered 0 to 9.



1. Pick three cards with a total of 12.
You can do it in 10 different ways.
See if you can record them all.
2. Now pick four cards with a total of 12.
How many different ways can you do it?
3. Can you pick five cards with a total of 12?

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Do this with a different total.

BACK

Card Sharp

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Number cards
- Counters

Sample Solutions:

1.		2.		3.
0, 3, 9	2, 3, 7	0, 1, 2, 9	1, 2, 3, 6	No
0, 4, 8	2, 4, 6	0, 1, 3, 8	1, 2, 4, 5	
0, 5, 7	3, 4, 5	0, 1, 4, 7		
1, 2, 9		0, 1, 5, 6		
1, 3, 8		0, 2, 3, 7		
1, 4, 7		0, 2, 4, 6		
1, 5, 6		0, 3, 4, 5		

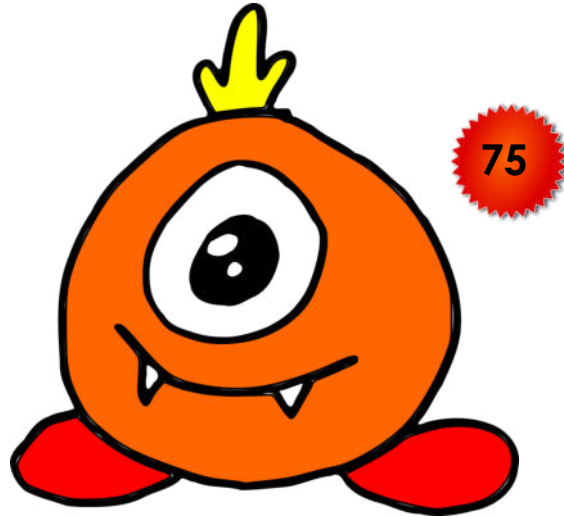
Notes:

#42: Monster

N9

Problem:

Aiyanna bought a monster using only silver coins. It cost her 75 cents.



There are different ways to pay exactly 75 cents using only silver coins.

Find as many ways to pay as you can.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if the monster cost 95 cents?

How many different ways are there to pay now?

BACK

Monster

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

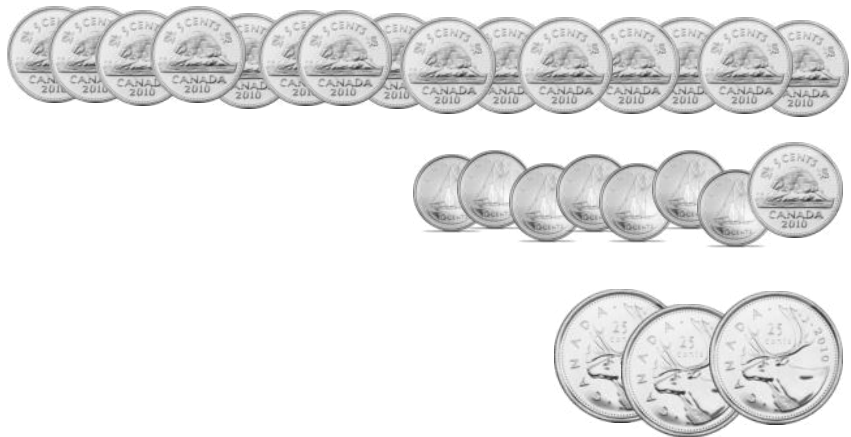
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Plastic or paper coins
- Counters

Sample Solutions:

- 15 nickels
- 10 nickels, 1 quarter
- 5 nickels, 2 quarters
- 7 dimes, 1 nickel
- 6 dimes, 3 nickels
- 5 dimes, 5 nickels
- 4 dimes, 7 nickels
- 3 dimes, 9 nickels
- 2 dimes, 11 nickels
- 1 dime, 13 nickels
- 3 quarters
- Etc.



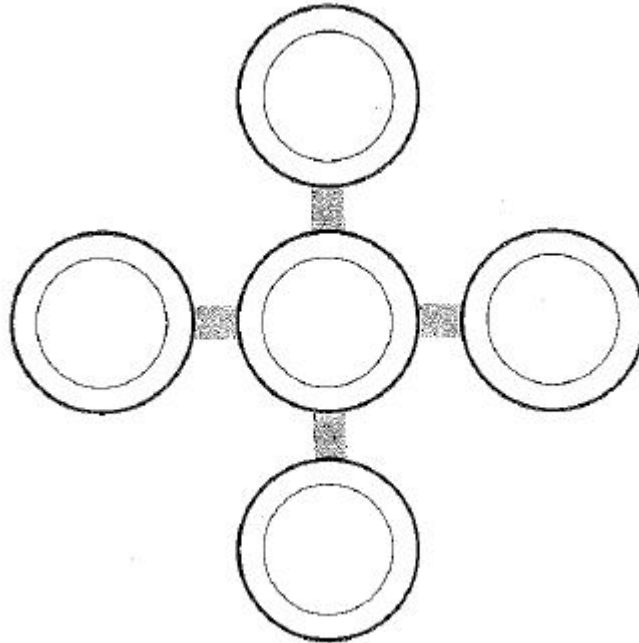
Notes:

#43: Cross-Road

N9

Problem:

You need 5 paper plates and 15 counters
Put the plates in a cross.



Use all 15 counters.
Put a different number on each plate.
Make each line add up to 10.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Do it again, but this time, make each line add up to 8.

BACK

Cross-Road

N9

Outcome Objective:

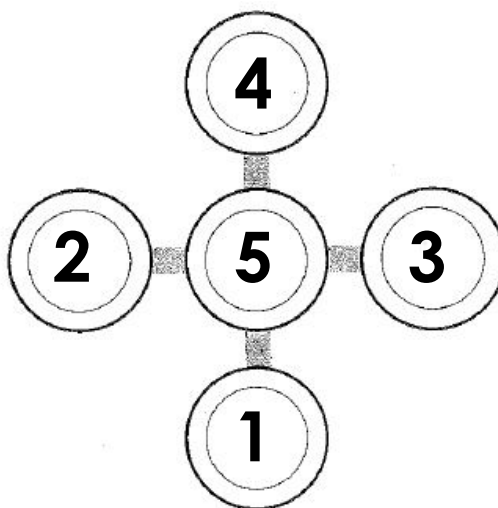
N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Paper plates
- Counters

Sample Solution:



Notes:

#44: Toy Shop

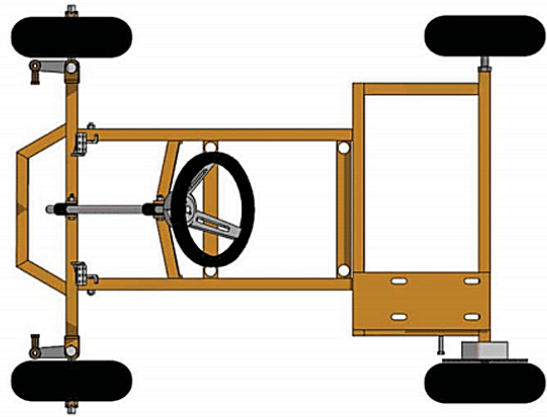
N9

Problem:

The toy shop sells tricycles and go-carts.

Tricycles have 3 wheels.

The go-carts have 5 wheels (counting the steering wheel).



Selina counted the wheels.
She counted 37 altogether.

How many tricycles are there?
How many go-carts are there?

Find two solutions.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if there were 54 wheels altogether?
How many tricycles and go-carts could there be?

BACK

Toy Shop

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

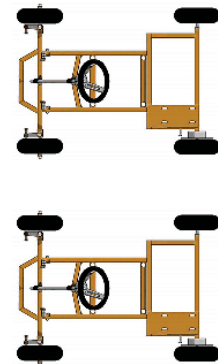
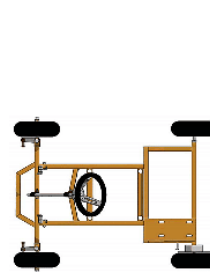
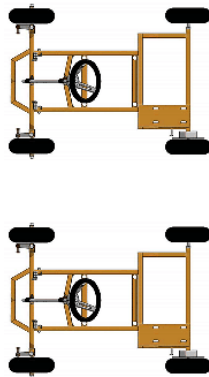
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Counters

Sample Solutions:

- 4 tricycles and 5 go-carts
- 9 tricycles and 2 go-carts



Notes:

#45: Roly Poly

N9

Problem:

The dots on opposite faces of a dice add up to 7.

1. Imagine rolling one dice.

The score is the total number of dots you can see.

You score 17.

Which number is face down?

How did you work out your answer?

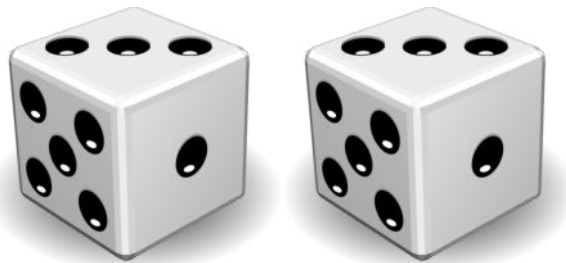


2. Imagine rolling two dice.

The dice do not touch each other.

The score is the total number of dots you can see.

Which numbers are face down to score 30?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Do this with three dice.

How about four dice?

BACK

Roly Poly

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

- using personal strategies for adding and subtracting with and without the support of manipulatives
 - creating and solving problems that involve addition and subtraction
 - using the commutative property of addition (the order in which numbers are added does not affect the sum)
 - using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).
-

Material Suggestions:

- Dice
 - Counters
-

Sample Solutions:

1. The total number of dots on the dice is 21. Of these dots, 17 dots are showing, so the face with 4 dots is face down.
 2. The total number of dots on two dice is 42, so 12 dots are hidden. The two hidden faces must each have 6 dots.
-

Notes:

#46: From Planet Zeno

N9

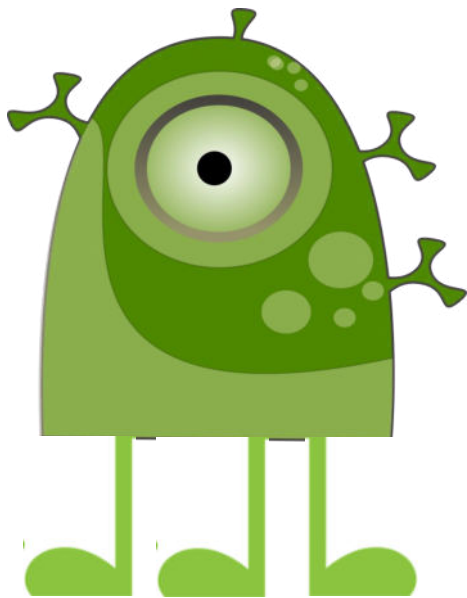
Problem:

Some Tripods and Bipods flew from planet Zeno.
There were at least two of each of them.

Tripods have 3 legs.
Bipods have 2 legs.
There were 23 legs altogether.

How many Tripods were there?
How many Bipods?

Find two different answers.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Find as many solutions as possible if there were 47 legs altogether.

Or: What if Tripods and Quadripods (4 legs) were on the spaceship? Now find two different ways to make 23 legs.

BACK

From Planet Zeno

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

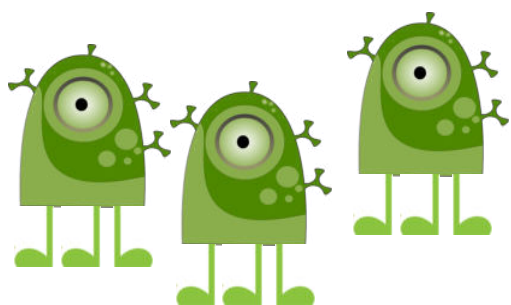
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

- Counters

Sample Solutions:

- 3 Tripods + 7 Bipods
- 5 Tripods + 4 Bipods



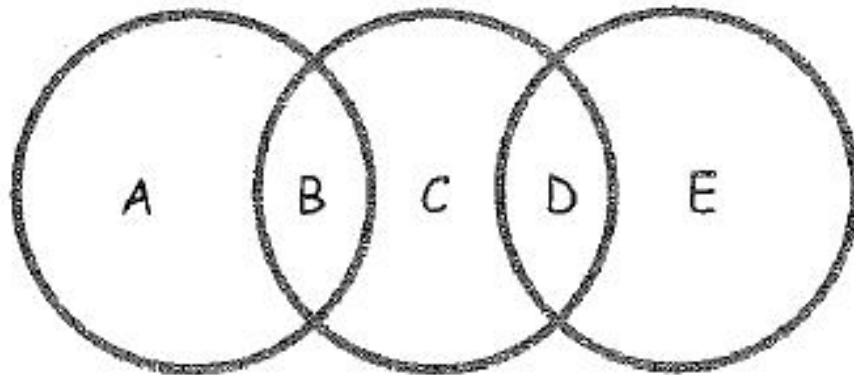
Notes:

#47: Circle Sums

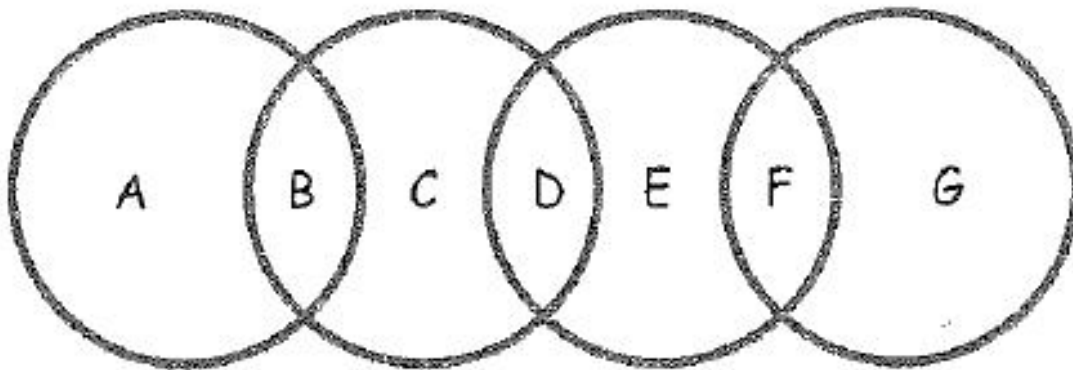
N9

Problem:

- Use each of the digits 1 to 5 once.
Replace each letter by one of the digits.
Make the total in each circle the same.



- Now use each of the digits 1 to 7 once.
Make the total in each circle the same.



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What if you used five circles and the digits 1 to 9?

BACK

Circle Sums

N9

Outcome Objective:

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:

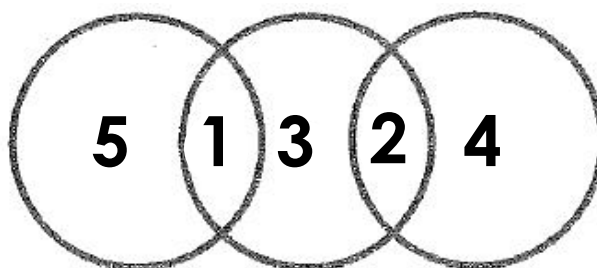
- using personal strategies for adding and subtracting with and without the support of manipulatives
- creating and solving problems that involve addition and subtraction
- using the commutative property of addition (the order in which numbers are added does not affect the sum)
- using the associative property of addition (grouping a set of numbers in different ways does not affect the sum).

Material Suggestions:

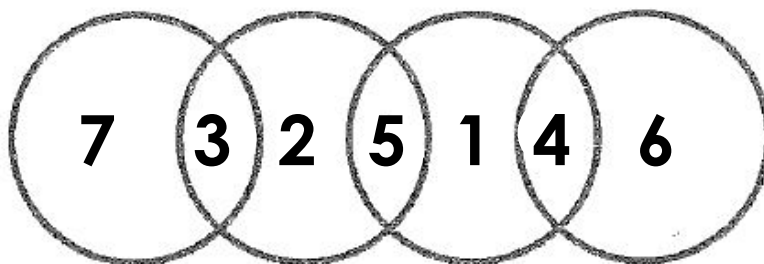
- Number cards

Sample Solutions:

1.



2.



Notes:

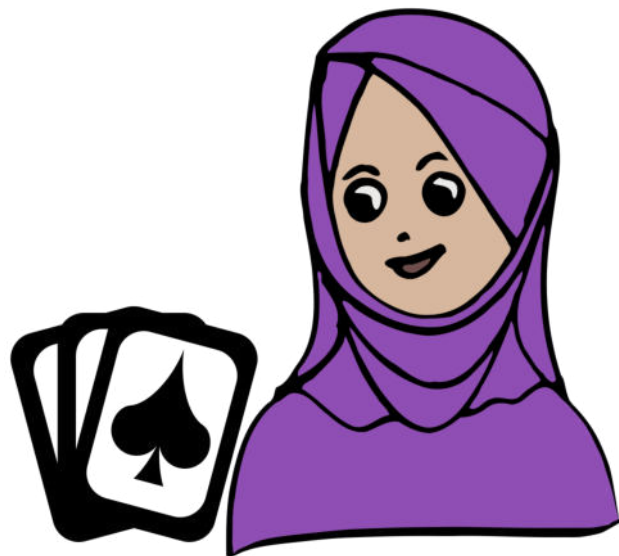
#48: Card Challenge N9, N10

Problem:

Kora's cards are all different. There is a number from one to eight on each card. Kora has chosen four cards that add up to twenty. What are they?

There are seven different possibilities. Try to find them all.

What if Kora has three cards that add up to sixteen?



Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Cards can add up to a different sum.

Use a different number of cards.

BACK

Card Challenge

N9, N10

Outcome Objective:

N9: Demonstrate an understanding of addition using the communicative properties of addition.

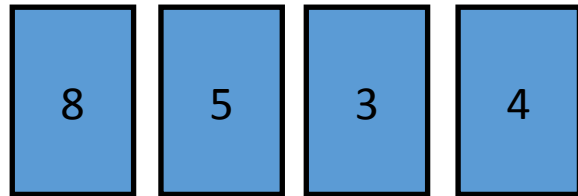
N10: Apply mental mathematics strategies for basic addition facts to 18.

Material Suggestions:

- Sticky notes can be used to represent cards.
 - Playing cards
-

Sample Solutions:

- $8 + 5 + 3 + 4 = 20$
- $7 + 1 + 8 + 4 = 20$
- $5 + 6 + 7 + 2 = 20$
- Etc.



Notes:

#49: Nature Walk

N10

Problem:

On the way to the park, Tim saw three flowers. Each flower had two leaves. On each leaf was a ladybug. Each ladybug had three spots.

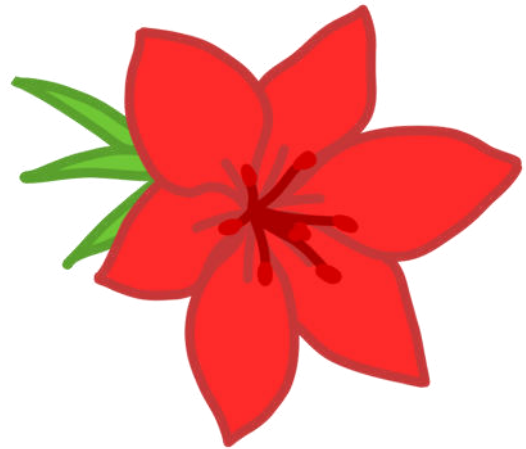
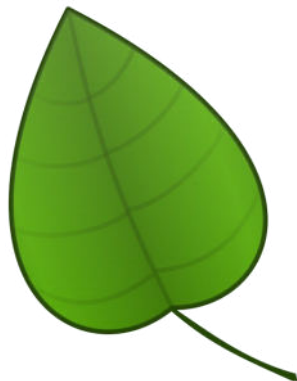
Tim saw _____ flowers.

Tim saw _____ leaves.

Tim saw _____ ladybugs.

Tim saw _____ ladybug spots.

Draw a picture to show how you found each number.



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Have students draw their own number of flowers, leaves, ladybugs and ladybug spots, then have a peer solve each.

BACK

Nature Walk

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

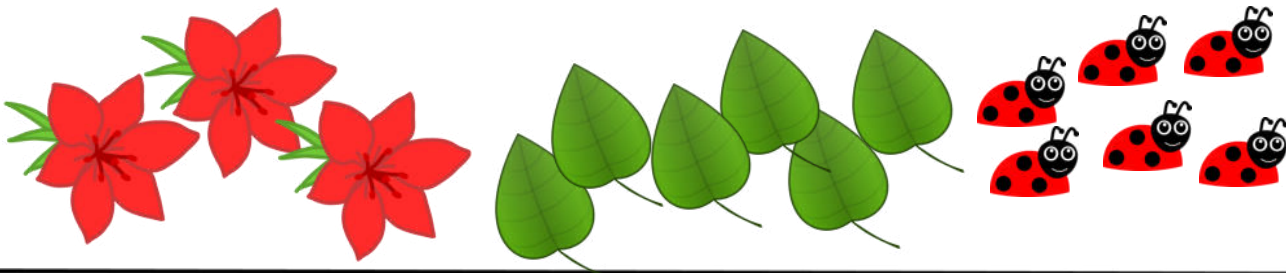
for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Drawing paper
- crayons for extension idea

Sample Solution:

3 flowers, 6 leaves, 6 ladybugs, 18 ladybug spots



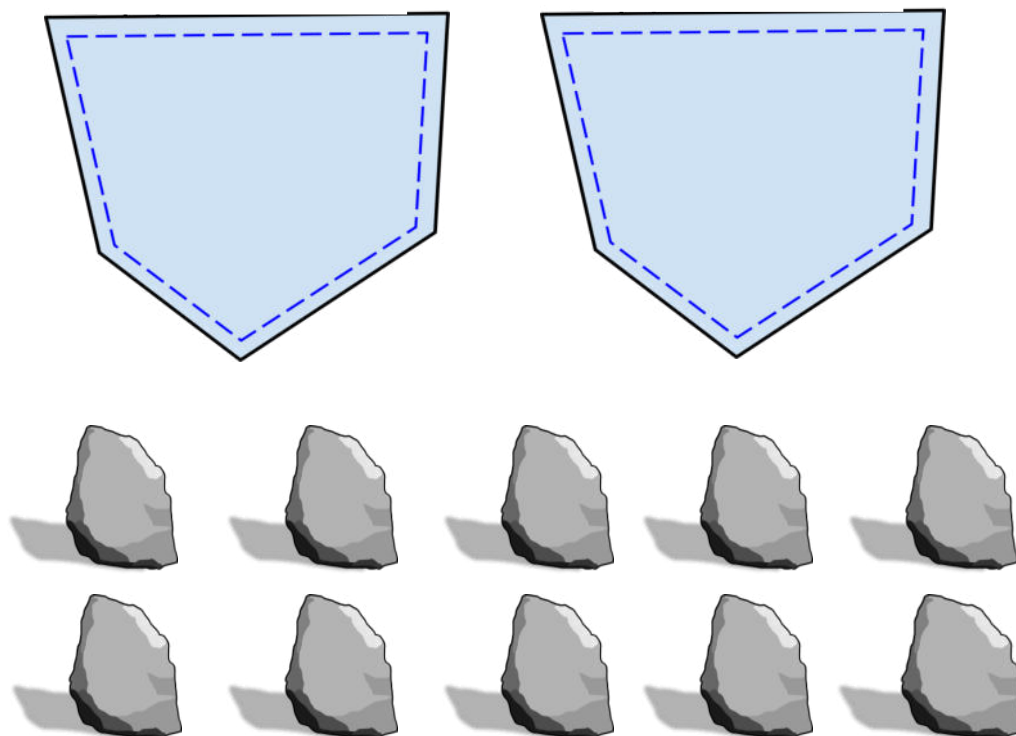
Notes:

#50: Stones

N10

Problem:

Canyon has two pockets in his pants. He puts 10 stones into his pockets. He puts at least one stone into each pocket. What are all the different ways that Canyon could put all the stones into his two pockets?



Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 2 Teacher Resource Book* (pp. 30-31). Chicago, Illinois: Wright Group/McGraw Hill.

BACK

Stones

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Manipulatives/counters

Sample Solutions:

Pocket A	1	2	3	4	5	6	7	8	9
Pocket B	9	8	7	6	5	4	3	2	1

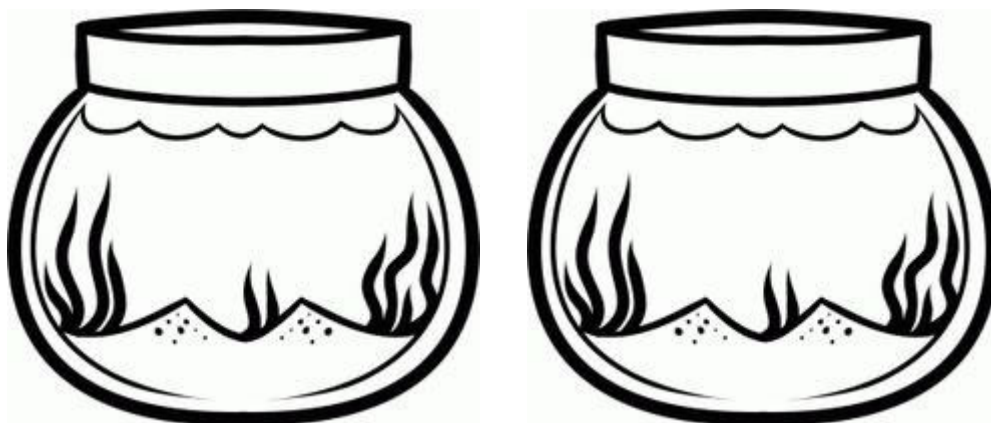
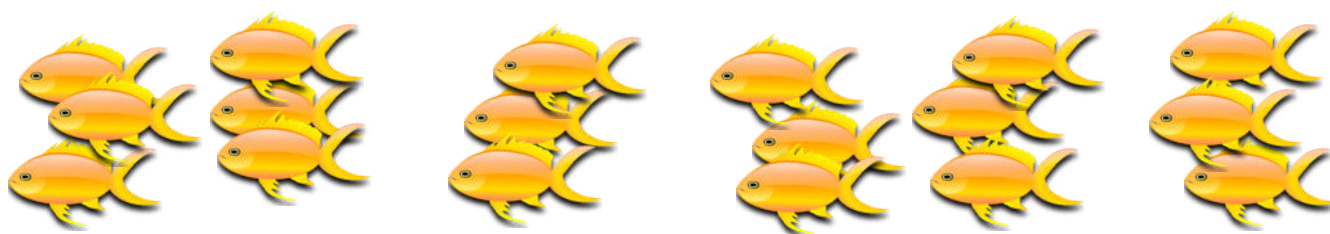
Notes:

#51: Fish Bowls

N10

Problem:

Saige has 18 fish. She is putting the fish into 2 fish bowls. She puts at least 1 fish into each bowl. How many fish did she put into each bowl?



Credit: Adapted from: Goodnow, Judy and Hoozeboom, Shirley (2004). *Problem Solver II Grade 2 Teacher Resource Book* (pp. 32-33). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

What are all the different ways that Saige could put the fish into the bowls?

BACK

Fish Bowls

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Manipulatives/counters

Sample Solutions:

Bowl A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Bowl B	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Notes:

#52: Worm

N10

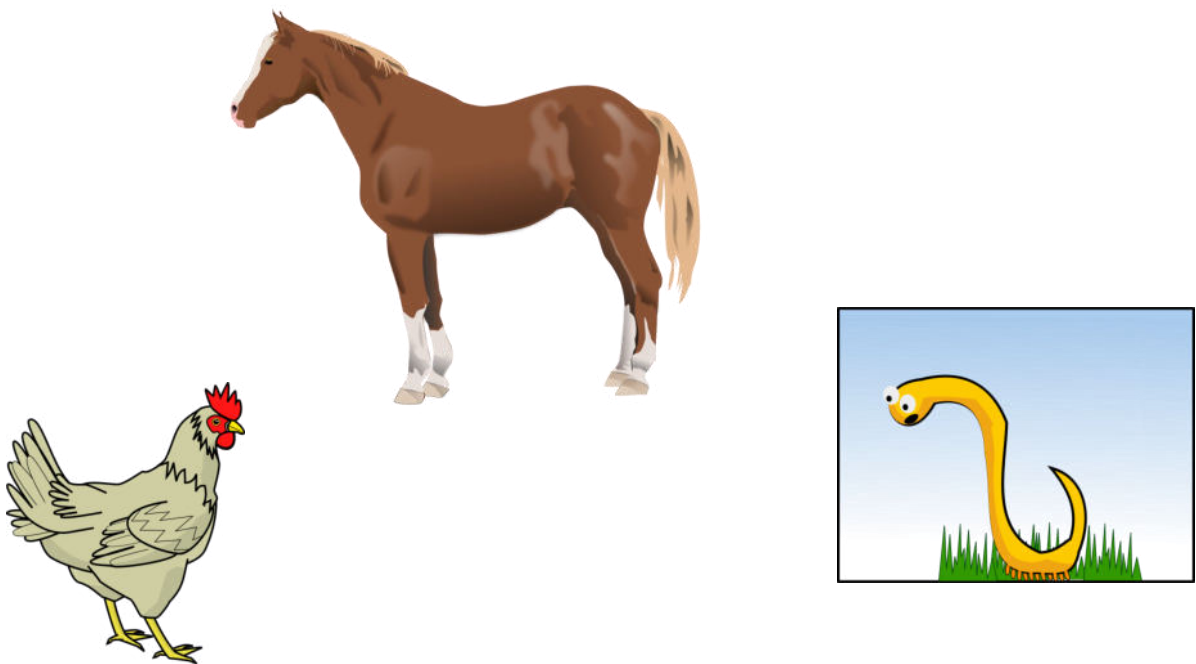
Problem:

On a farm, a worm came out of his hole.

There were some chickens and horses in the yard.

He saw 18 legs.

How many chickens and horses did he see?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Are there other possible answers?

BACK

Worm

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

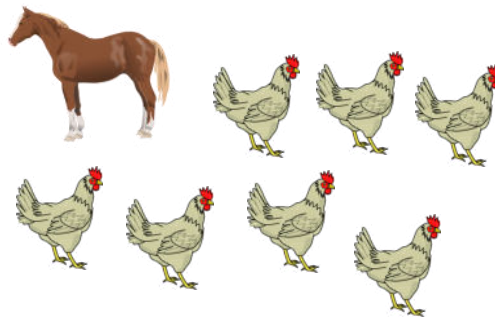
for basic addition facts and related subtraction facts to 18

Material Suggestions:

- Manipulatives/counters
-

Sample Solutions:

- 1 horse + 7 chickens
- 2 horses + 5 chickens
- 3 horses + 3 chickens
- 4 horses + 1 chicken



Notes:

#53: Snap It

N10

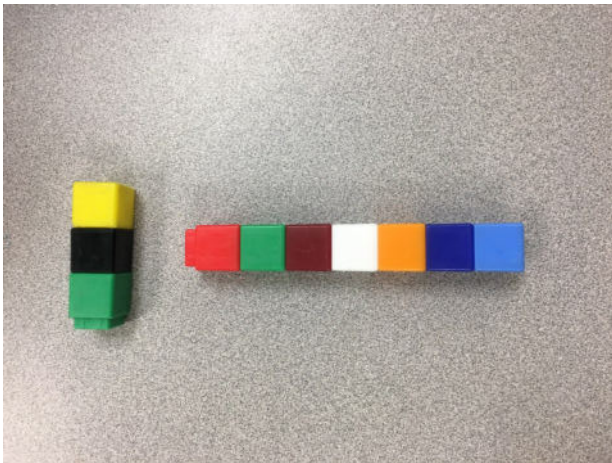
Problem:

Each child makes a train of connecting cubes of a specified number (up to 18).

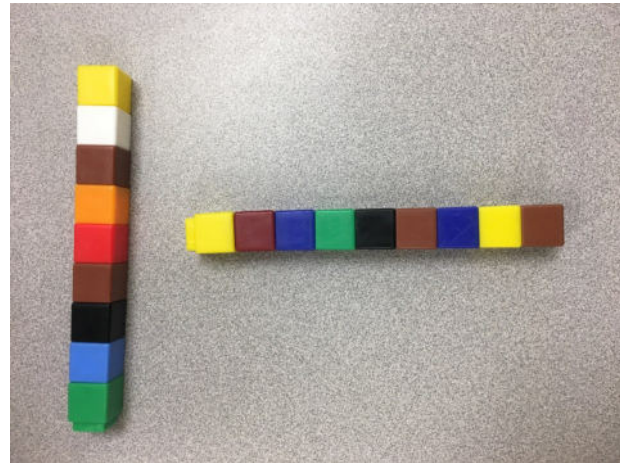
On the signal “Snap,” children break their trains into two parts and hold one hand behind their back.

Children take turns going around the circle showing their remaining cubes.

The other children work out the full number combination.



In this example, the total is 10.



In this example, the total is 18.

Credit: Adapted from a problem retrieved from <https://www.youcubed.org/task/snap-it/>

Extension:

Do this problem using a larger specified number than 18.

BACK

Snap It

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Manipulatives/counters
-

Sample Solutions: (depends on your target total)

- 10: $1 + 9$; $2 + 8$; $3 + 7$; $4 + 6$; $5 + 5$
 - 11: $1 + 10$; $2 + 9$; $3 + 8$; $4 + 7$; $5 + 6$
 - 12: $1 + 11$; $2 + 10$; $3 + 9$; $4 + 8$; $5 + 7$; $6 + 6$
 - 13: $1 + 12$; $2 + 11$; $3 + 10$; $4 + 9$; $5 + 8$; $6 + 7$
 - 14: $1 + 13$; $2 + 12$; $3 + 11$; $4 + 10$; $5 + 9$; $6 + 8$; $7 + 7$
 - Etc.
-

Notes:

#54: Bean Bag Buckets

N10

Problem:

Sawyer threw 3 bean bags. Each bag went into a bucket. More than one bag can go into a bucket.



1 point



2 points



3 points



4 points

1. What is the highest score Sawyer can get?
2. What is the lowest score Sawyer can get?
3. Find three ways to score 6.
4. Find three ways to score 9.
5. What are all the scores can Sawyer get?

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Have students create their own similar problems, changing the number of buckets and the points earned for each.

BACK

Bean Bag Buckets

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Bean bags
 - Suitable containers or buckets
-

Sample Solutions:

1. The highest possible score is 12 (all three bean bags in the '4' bucket).
 2. The lowest possible score is 3 (all three bean bags in the '1' bucket).
 3. Three ways to score 6: $1 + 2 + 3$; $1 + 1 + 4$; $2 + 2 + 2$.
 4. Three ways to score 9: $2 + 3 + 4$; $1 + 4 + 4$; $3 + 3 + 3$.
 5. Other possible scores: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.
-

Notes:

#55: Double Riddles

N10

Problem:

Solve the double riddles (add 2 same numbers, such as $2 + 2$):

1. My double is more than 16. _____
2. My double is less than 4. _____
3. My double is between 12 and 16. _____
4. Double me and get 12. _____
5. My double rhymes with gate. _____



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Have students create their own double riddles.

BACK

Double Riddles

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Hundred chart
 - Counters
-

Sample Solutions:

1. 18, 20, 22, 24, 26, 28, 30, etc.
 2. 2 ($1 + 1$)
 3. 14 ($7 + 7$)
 4. 6
 5. 8 ($4 + 4$)
 6. 5 ($5 + 5 = 10$)
-

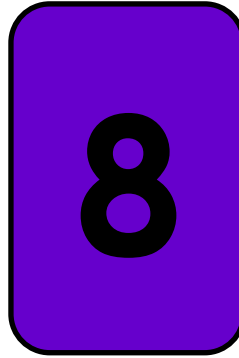
Notes:

#56: Sum Up

N10

Problem:

Choose from these four cards.



Make these totals:

- 9
- 10
- 11
- 12
- 13
- 14
- 15

What other totals can you make from the cards?

Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Have students create their own problem using a different combination of 4 numbers.

BACK

Sum Up

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Addition chart
 - Number cards
-

Sample Solutions:

- 9 (2 + 3 + 4)
 - 10 (8 + 2)
 - 11 (8 + 3)
 - 12 (8 + 4)
 - 13 (2 + 3 + 8)
 - 14 (2 + 4 + 8)
 - 15(3 + 4 + 8)
-

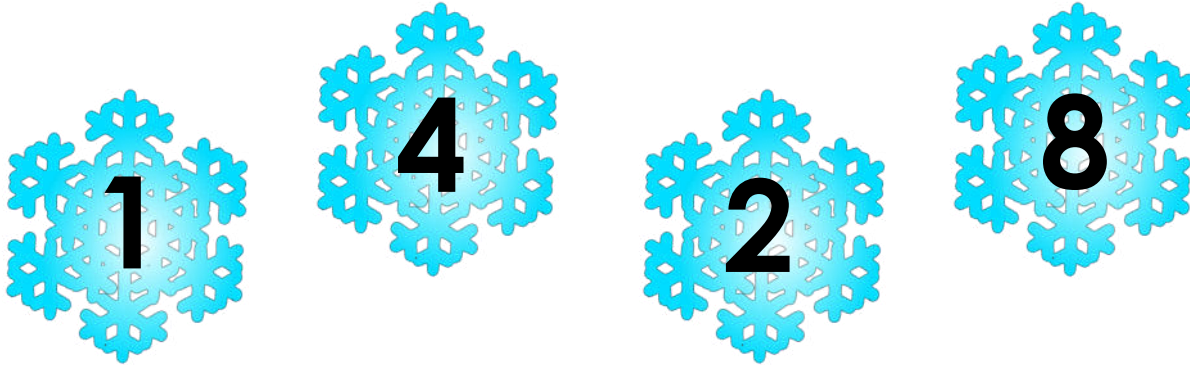
Notes:

#57: Pick a Pair

N10

Problem:

Choose from these numbers.



Pick a pair of numbers. Add them together. Write the numbers and the answers (addition sentence).

Pick a different pair of snow flakes and write the numbers and write the answer.

Keep doing this and see how many different answers you can get.

Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Have students change numbers in the snow flakes or try doing subtraction with these numbers.

BACK

Pick a Pair

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Number cards
 - Addition chart
-

Sample Solutions:

- $1 + 2 = 3$
 - $1 + 4 = 5$
 - $1 + 8 = 9$
 - $2 + 4 = 6$
 - $2 + 8 = 10$
 - $4 + 8 = 12$
-

Notes:

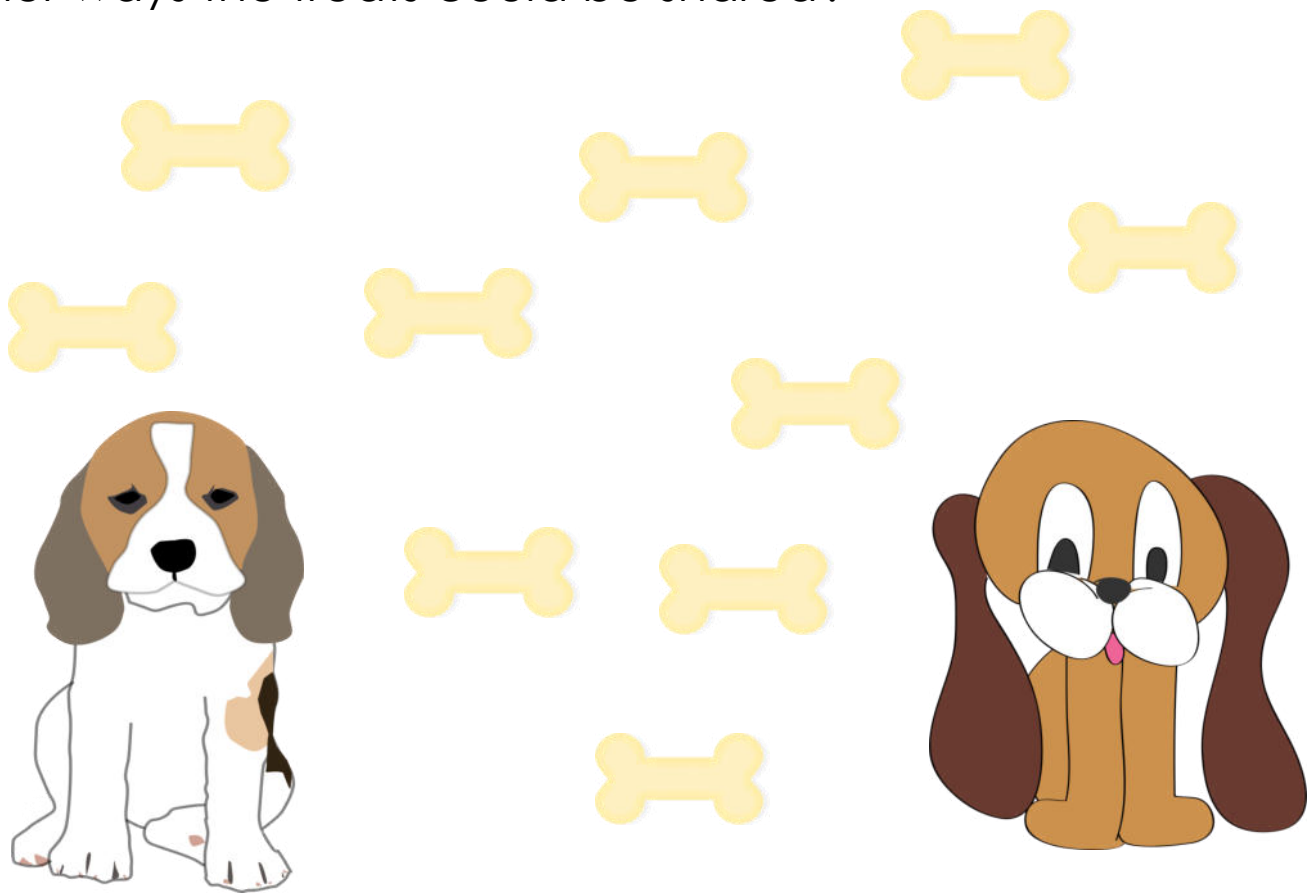
#58: Puppy Treats

N10

Problem:

Holden has two puppies and ten puppy treats to give them. How many will each puppy get if Holden passes them out equally?

If Holden doesn't pass them out equally, what are some other ways the treats could be shared?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Change the number of puppies and/or increase the number of treats.

BACK

Puppy Treats

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Counters
-

Sample Solutions:

- If the treats are given out equally, the puppies would each receive 5.
 - If the treats are given out unequally, the puppies could get the following:
1 and 9; 2 and 8; 3 and 7; 4 and 6; 6 and 4; 7 and 3; 8 and 2; or 9 and 1.
-

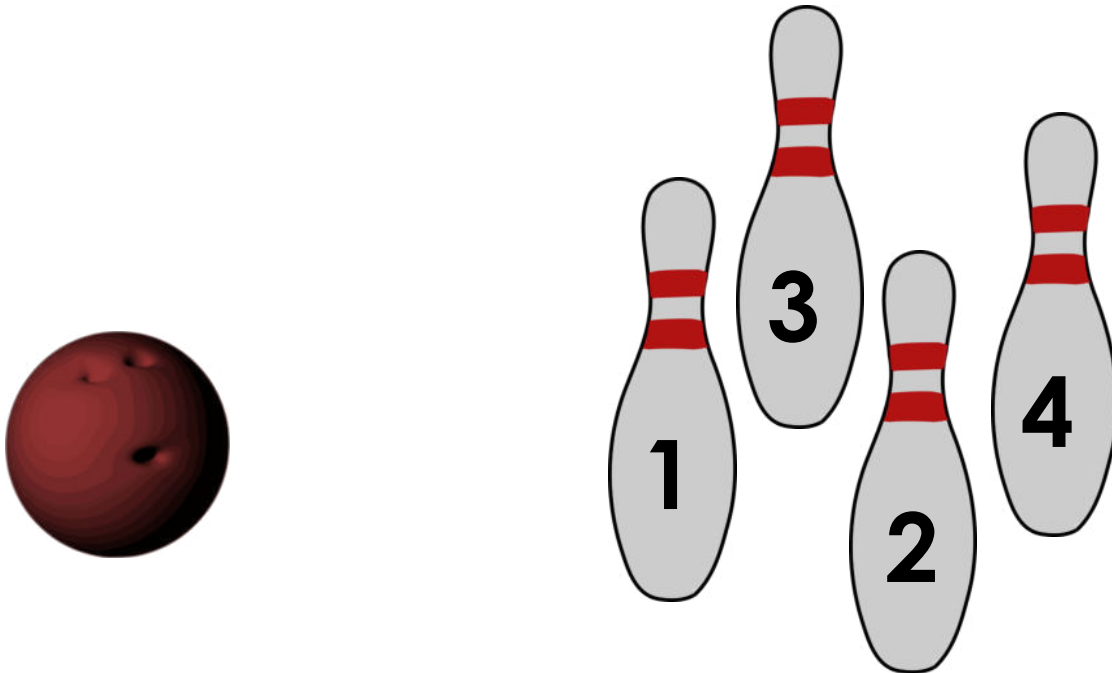
Notes:

#59: Four-Pin Bowling

N10

Problem:

Which pins must Glen knock down in order to score exactly 5?



Find 2 different ways for Glen:

1. to score 5
2. to score 6
3. to score 7.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Change the pin value and/or the number of pins.

BACK

Four-Pin Bowling

N10

Outcome Objective:

N10: Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

Material Suggestions:

- Plastic bowling pins
 - Plastic bowling balls
-

Sample Solutions:

1. Two ways to score 5: 4 and 1; 3 and 2.
 2. Two ways to score 6: 4 and 2; 3, 1 and 2.
 3. Two ways to score 7: 3 and 4; 4, 1 and 2.
-

Notes:

#60: Line Up

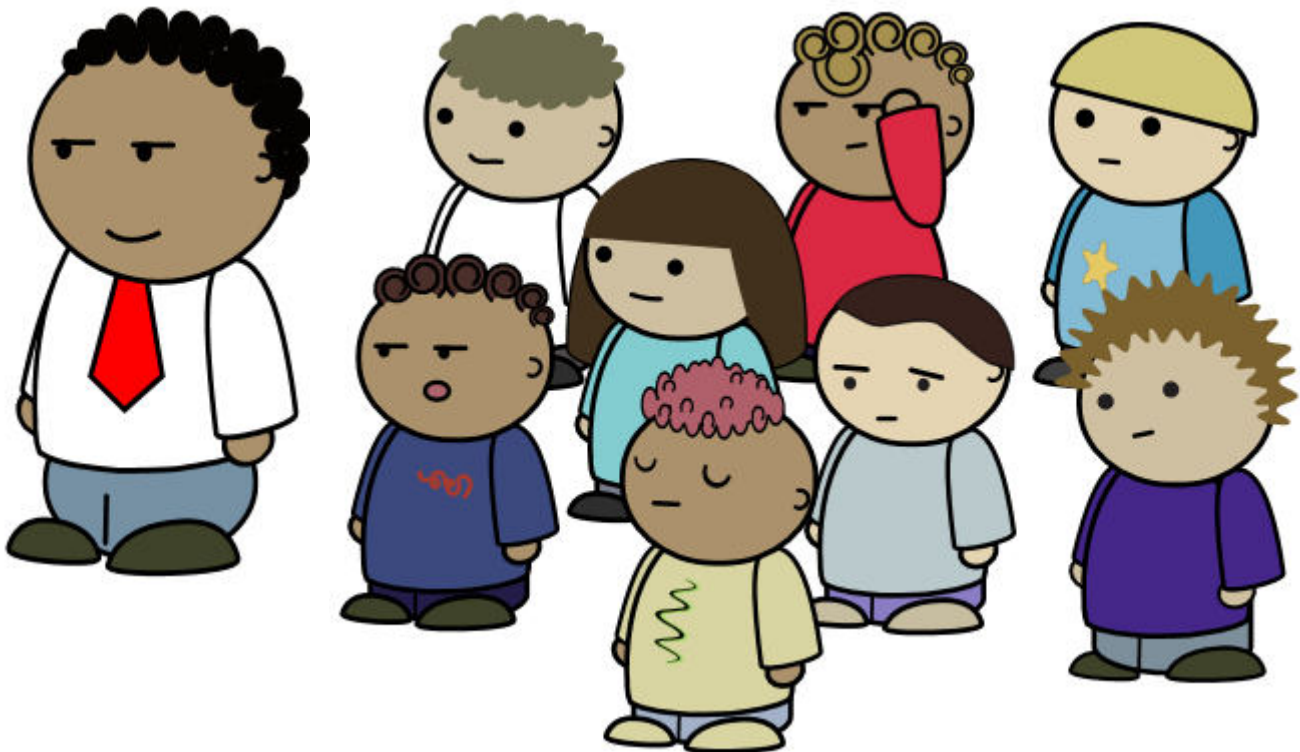
PR1

Problem:

Mr. Sutton was lining up his class to get their pictures taken. Listen to the names he called and find the pattern he used: John, Sarah, Tom, Judy, Bill, Laura.

Complete the pattern.

Write the names to show what your teacher might have said if she or he helped 10 children from your class line up using the same pattern.



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Thinking of ordinal numbers, under each name, indicate the place of each students in line from first to last.

BACK

Line Up

PR1

Outcome Objectives:

PR1. Demonstrate an understanding of repeating patterns (three to five elements) by:

- describing
- extending
- comparing
- creating

patterns using manipulatives, diagrams, sounds and actions.

Material Suggestions:

- Two differently shaped or coloured objects
 - Use students from your class to represent the pattern
-

Sample Solutions:

- This pattern is boy, girl or AB
 - In my class, I could write: Wyatt, Kaye, Matthew, Emma, Dylan, Sidni, Brody, Kaley, Jake, Emilia.
-

Notes:

#61: Number Patterns

PR2

Problem:

1. What are the next three numbers in this pattern?

88, 77, 66, 55, 44, _____, _____, _____.

What is the pattern?

2. What are the next five numbers in this pattern?

3, 8, 13, 18, 23, _____, _____, _____,
_____, _____.

What is the pattern?

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Make up some similar problems and ask your partner(s) to solve them.

BACK

Number Patterns

PR2

Outcome Objectives:

PR2. Demonstrate an understanding of increasing patterns by:

- describing
- reproducing
- extending
- creating

numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.

Material Suggestions:

- Number charts
 - Number cards
-

Sample Solutions:

1. Next three numbers in the pattern: 33, 22, 11. The pattern is: subtract 11 each time, or, continue writing the multiples of 11 in descending order.
 2. Next five number in the pattern: 28, 33, 38, 43, 48. The pattern is: add 5 each time. Encourage the students to recognize the last digits make a pattern: 3, 8, 3, 8, etc. Why is that?
-

Notes:

#62: 15th Letter

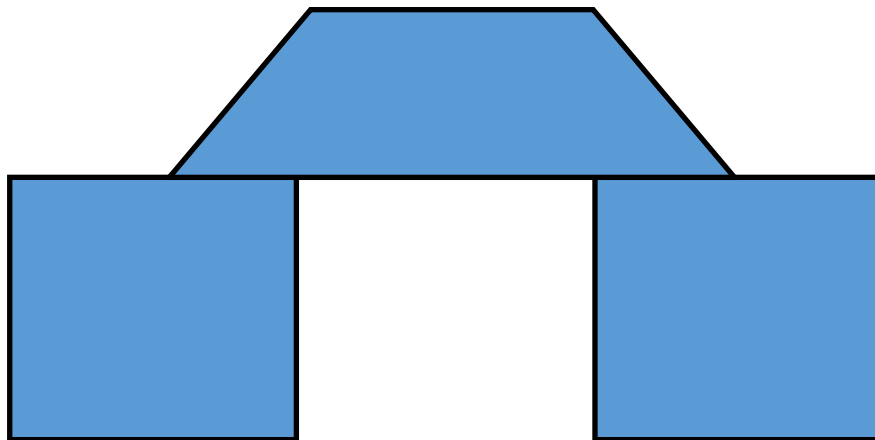
PR2

Problem:

1. What would be the 15th letter in this pattern?

ABAABAAB...

2. Arches are made with two squares and one trapezoid. If the builders have six trapezoids, how many squares do they need to make more arches? They must use up all the trapezoids.



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

BACK

15th Letter

PR2

Outcome Objectives:

PR2. Demonstrate an understanding of increasing patterns by:

- describing
- reproducing
- extending
- creating

numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.

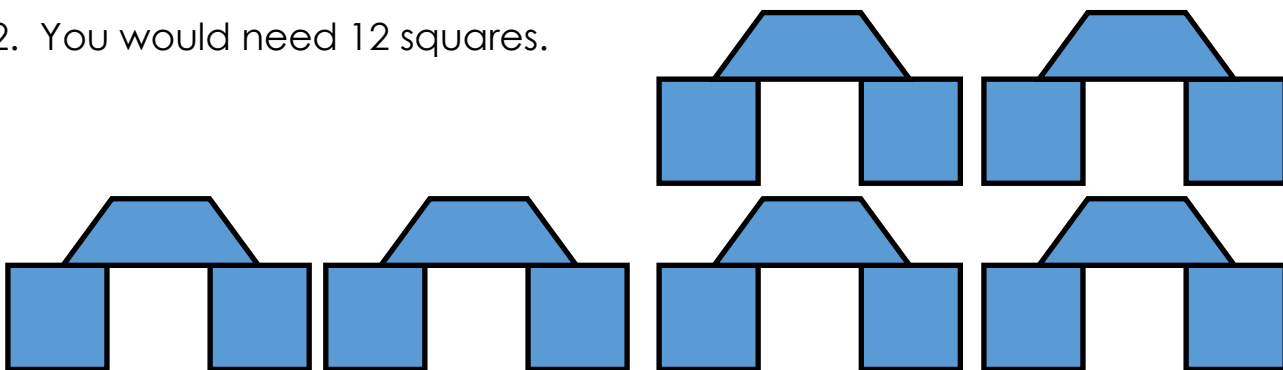
Material Suggestions:

- Paper shapes
- Pattern blocks

Sample Solutions:

1. The 15th letter would be: A
ABAABAAABAAAABA...

2. You would need 12 squares.



Notes:

#63: Count On

PR2

Problem:

Start at 5.

Count on 6 more.

What is the number?

+ 6

Count on 2 more.

What is the number?

+ 2

Count on 10 more.

What is the number?

+ 10

Count on 4 more.

What is the number?

+ 4

Do this again and write your answers at every step.

Now repeat this starting with 15.

Repeat again starting with 25.

What do you notice?

Can you keep repeating this starting with 35, 45, 55, 65, 75.

What do you notice?

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Extension:

Do this starting at 4, then 14, then 24.

What do you notice?

BACK

Count On

PR2

Outcome Objectives:

PR2. Demonstrate an understanding of increasing patterns by:

- describing
- reproducing
- extending
- creating

numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.

Material Suggestions:

- Number lines
 - Number charts
 - Number cards
-

Sample Solution:

Starting with 5: 11, 13, 23, 27

Starting with 15: 21, 23, 33, 37

Starting with 25: 31, 33, 43, 47

At this point, you should notice the pattern of the ending digits: 1, 3, 3, 7.

Starting with 35: 41, 43, 53, 57

Starting with 45: 51, 53, 63, 67

Starting with 65: 71, 73, 83, 87

Starting with 75: 81, 83, 93, 97

You notice the pattern of the ending digits stayed the same: 1, 3, 3, 7?

Notes:

#64: Squares to Stairs PR2, N9

Problem:

How do you see the pattern growing?



Figure 1

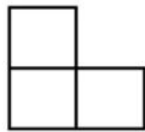


Figure 2

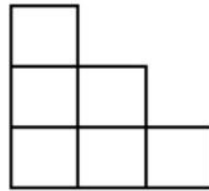


Figure 3

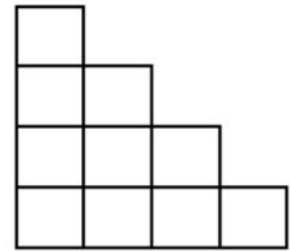


Figure 4

How many squares are in each of the figures?

If you continue the pattern, will there be a figure with 80 squares?

How can you figure out how many squares are in any figure?

Credit: Adapted from a problem retrieved from <https://www.youcubed.org/task/squares-to-stairs/>

Extension:

If you have 100 squares, can you make a stair-like structure using all of the squares?

BACK

Squares to Stairs

PR2, N9

Outcome Objectives:

PR2: Demonstrate an understanding of increasing patterns by:

- describing
- reproducing
- extending
- creating

numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction .

Material Suggestions:

- Manipulatives/counters
-

Sample Solutions:

- F1 has 1 square; F2 has 3 squares; F3 has 6 squares; F4 has 10 squares
 - You cannot complete a figure when you've used 80 squares all together, because after the twelfth figure, you've used 78, and after the thirteenth figure, you've used 91.
-

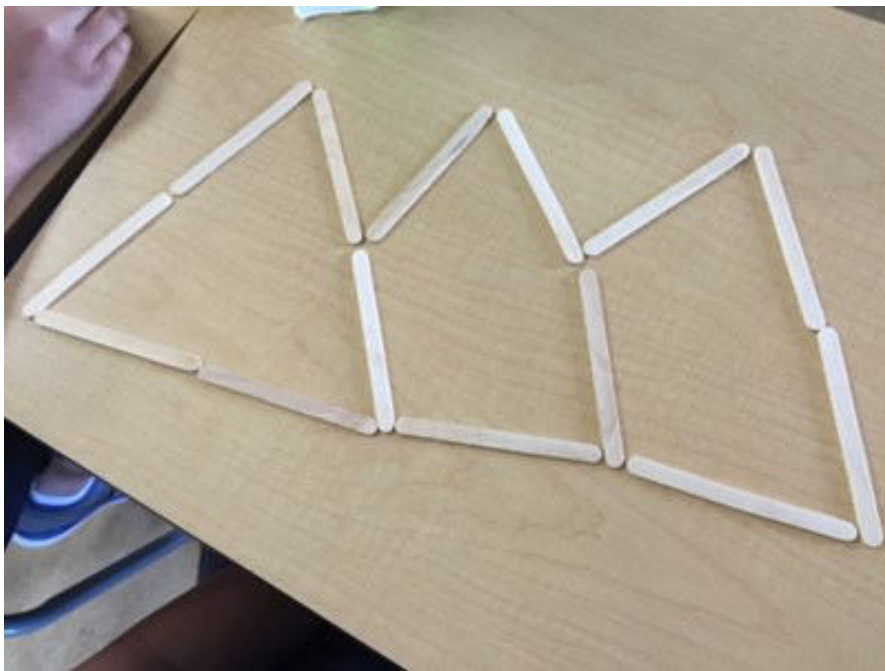
Notes:

#65: Mountain Range PR2, N9

Problem:

You are going to build a mountain range out of equilateral triangles formed by popsicle sticks.

- How many sticks would you need to make a mountain range with 5 peaks? How about 8 peaks? 10 peaks?



Credit: Alicia Burdess (<http://www.aliciaburdess.com/>)

Extension:

How many sticks would you need to build a model of a mountain range with any number of peaks. Is there a shortcut to determine how many sticks you would need?

BACK

Mountain Range

PR2, N9

Outcome Objective:

PR2: Demonstrate an understanding of increasing patterns by:

- describing
- reproducing
- extending
- creating

numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.

N9: Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction.

Material Suggestions:

- Manipulatives/counters
 - Popsicle sticks, straws, or toothpicks
-

Sample Solutions:

- 5 peak mountain range: 22 sticks
 - 8 peak mountain range: 34 sticks
 - 10 peak mountain range: 42 sticks
-

Notes:

#66: Beauty

PR3

Problem:

Beauty is trying to tell the Beast about apples.

He knows only about oranges.

What would you tell the Beast about ways an orange is like an apple and how they are different?

Give the Beast some apples and oranges and ask him to sort them.

Which attributes could the Beast use to sort them?

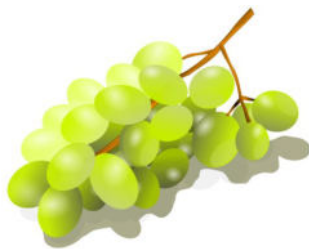


He knows about grapes, but not bananas.

Compare grapes and bananas for the Beast.

Give the Beast some grapes and bananas and ask him to sort them.

Which attributes could the Beast use to sort them?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

BACK

Beauty

PR3

Outcome Objectives:

PR3. Sort a set of objects, using two attributes, and explain the sorting rule.

Material Suggestions:

- Real fruit
 - Plastic fruit
-

Sample Solutions:

Apples and oranges are alike in that they are both edible fruit and they are both healthy.

They are different in shape, size, and colour.

Apples and oranges could be sorted using any of the following attributes: colour, shape, size, etc.

Grapes and bananas are alike in that they are both edible fruit, they are both healthy, and they both come in bunches.

They are different in shape, size, and colour.

Grapes and bananas could be sorted using any of the following attributes: colour, shape, size, etc.

Notes:

#67: Buttons

PR3

Problem:

Sloan is trying to sort a big pile of her grandma's buttons. What two attributes could she use to sort this pile of buttons?



Credit: Carrie Sutton

Image is taken from *The Reading Residence* website:

<http://www.thereadingresidence.com/button-activities-kids/>

Extension:

Try this activity using something else, such as pattern blocks.

BACK

Buttons

PR3

Outcome Objectives:

PR3. Sort a set of objects, using two attributes, and explain the sorting rule.

Material Suggestions:

- A pile of assorted buttons
 - A picture of a pile of assorted buttons
-

Sample Solutions:

These buttons could be sorted by any two of the following attributes:

- Size
 - Colour
 - Shape
 - How many holes
 - Flat or raised
 - Etc.
-

Notes:

#68: Gold Bars

PR4

Problem:

Glen is a pirate.
His gold bars are in piles.
He can move one or more bars at
a time.



He made all the piles the same height.
He did it in just two moves.

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Could Glen make eight equal piles with his gold bars?
Could he make three, or maybe five equal piles?

BACK

Gold Bars

PR4

Outcome Objective:

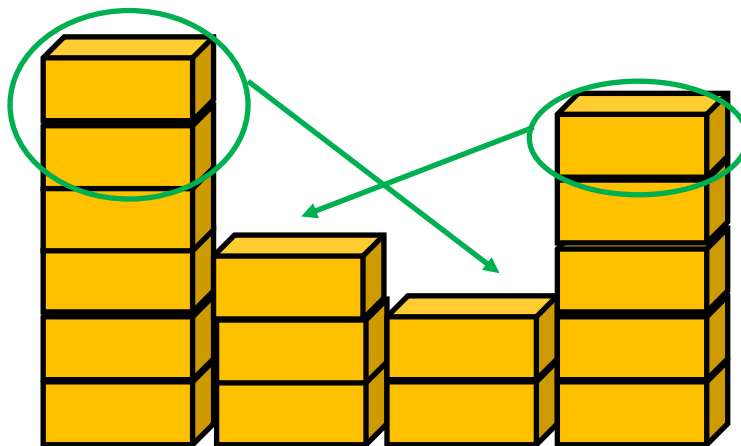
PR4. Demonstrate and explain the meaning of equality and inequality, concretely and pictorially.

Material Suggestions:

- Lego blocks
- Jenga blocks

Sample Solution:

Move two bars (together) from the first pile to the third pile.
Move one bar from the last pile to the second pile.



Notes:

#69: The Queen's Coins PR4

Problem:

Queen Ariel Rose had 20 gold coins.
She put them in four piles.



- The first pile had four more coins than the second.
- The second pile had one less coin than the third.
- The fourth pile had twice as many coins as the second.

How many gold coins did Queen Ariel Rose put in each pile?

Credit: Adapted from Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Make up a similar problem and have one of your classmates solve it.

BACK

The Queen's Coins

PR4

Outcome Objective:

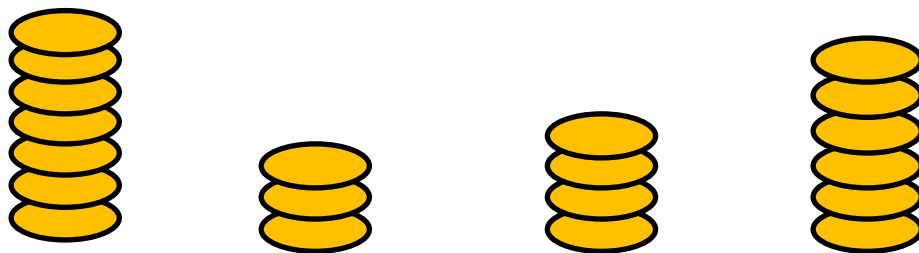
PR4. Demonstrate and explain the meaning of equality and inequality, concretely and pictorially.

Material Suggestions:

- Counters
 - Plastic gold coins
-

Sample Solution:

- The first pile had 7 gold coins.
- The second pile had 3 gold coins.
- The third pile had 4 gold coins.
- The fourth pile had 6 gold coins.



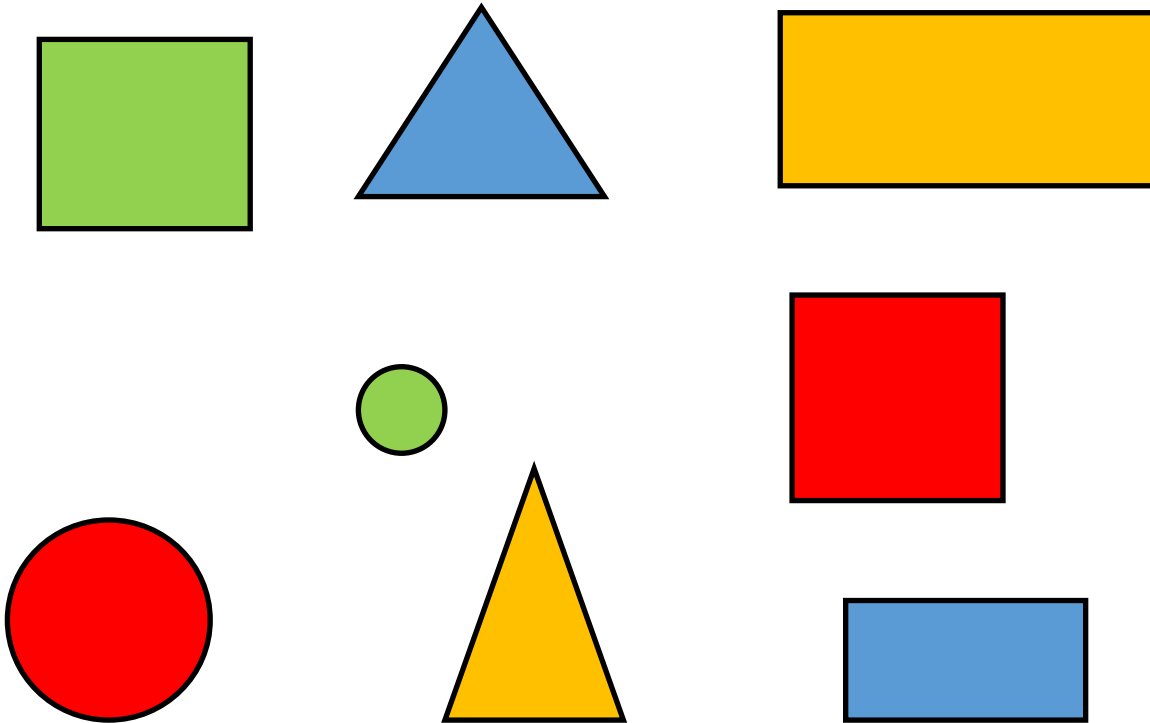
Notes:

#70: Shape Sort

PR5, SS8

Problem:

Look at these shapes.



Using an equal symbol ($=$) or a not equal symbol (\neq), compare different shapes.

You will decide whether they are equal or not equal depending on the attribute you notice.

Credit: Carrie Sutton

Extension:

Do this using shapes of different colors and sizes or different shapes.

BACK

Shape Sort

PR5, SS8

Outcome Objective:

PR5. Record equalities and inequalities symbolically, using the equal symbol or the not equal symbol.

SS8. Describe, compare and construct 2-D shapes, including:

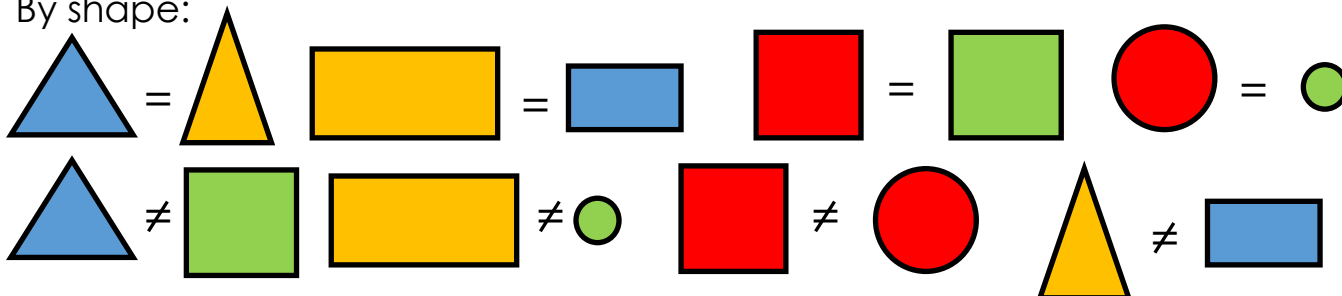
- triangles
- squares
- rectangles
- circles.

Material Suggestions:

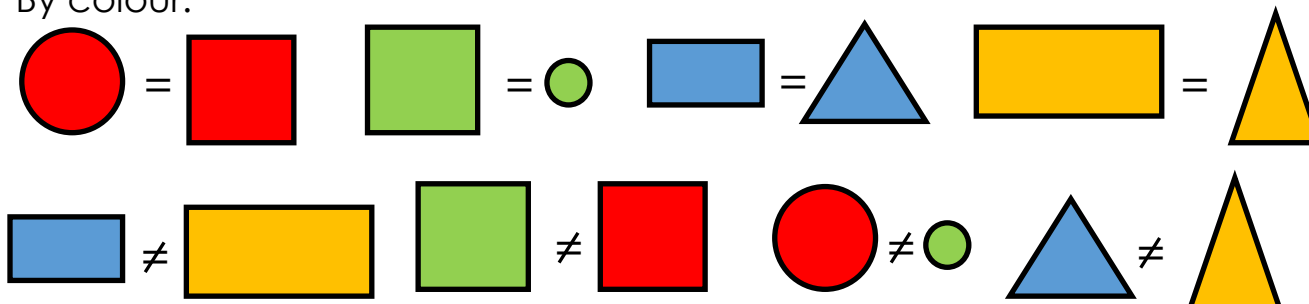
- Paper or cardboard shapes of varying shape, colour, and size

Sample Solutions:

By shape:



By colour:



Notes:

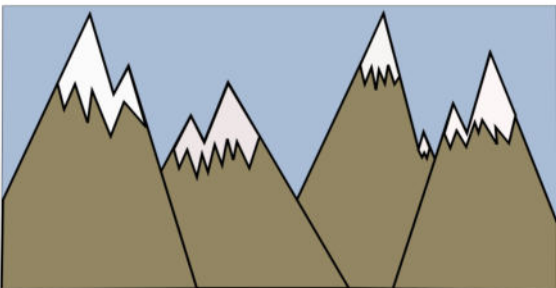
#71: Calendar Quest

SS1

Problem:

Use a calendar to answer these questions:

1. Mom goes to the store every Thursday. How many times will she go this month?
2. Dad works every Monday, Tuesday, Wednesday, and Thursday. How many days will he go to work this month?
3. The bowling alley has a "Free Game" night every second and fourth Wednesday nights. What are the dates for the "Free Game" nights this month?



Mon	Tue	Wed	Thr	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

BACK

Calendar Quest

SS1

Outcome Objective:

SS1. Relate the number of days to a week and the number of months to a year in a problem-solving context.

Material Suggestions:

- Old calendars
- Copies of a one month calendar

Sample Solutions:

All answers depend on which calendar you use.

If you use the one on the previous page:

1. Mom will go to the **store** five times this month.
2. Dad will go to **work** seventeen times this month.
3. The **bowling alley** will have “Free Game” night on the 14th and 28th this month.

Mon	Tue	Wed	Thr	Fri	Sat	Sun
			①	2	3	4
⑤	⑥	⑦	⑧	9	10	11
⑫	⑬	⑭	⑮	16	17	18
⑰	⑳	㉑	㉒	23	24	25
㉖	㉗	㉘	㉙	30		

Notes:

#72: Measuring Matters

SS2

Problem:

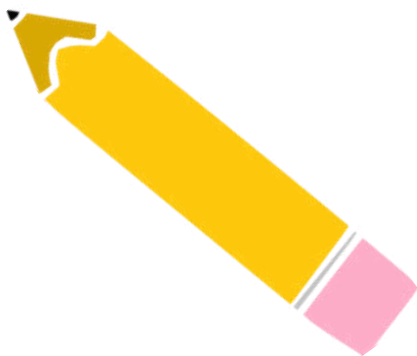
You need to measure some distances for your teacher.

You don't have a ruler or measuring tape, so you need to choose something suitable to measure with.

Once you have chosen a measuring tool, use it to measure the following:

- The height of your chair.
- The length of a dry-erase marker.
- From your classroom door to the gym door.

Possible measuring tools:



Did everyone in your class get the same answers?
Can you explain why?

Credit: Carrie Sutton

BACK

Measuring Matters

SS2

Outcome Objective:

SS2. Relate the size of a unit of measure to the number of units (limited to nonstandard units) used to measure length and mass (weight).

Material Suggestions:

- Paper clips
 - Notebooks
 - Pencils
-

Sample Solutions:

The results will depend on the measuring tool used.

Not all students will get the same answers when they use different tools to measure the distances.

Students will soon come to realize that they should choose a larger measuring tool to measure large distances and that they must use a smaller measuring tool to measure short distances.

Notes:

#73: Teacher's Desk

SS3

Problem:

Will the teacher's desk fit through the classroom door?
If we cannot move the desk from where it is, how can we find out?

Explain what you need to do, step by step.



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Are there any other doors (or double doors) in the school that the teacher's desk could fit through?

BACK

Teacher's Desk

SS3

Outcome Objective:

SS3. Compare and order objects by length, height, distance around and mass (weight), using nonstandard units, and make statements of comparison.

Material Suggestions:

- Items to measure with (can use non-standard units, such as a book, a pencil, etc.)
-

Sample Solution:

This really depends on how big your desk is and how big your door is.

In my classroom, some students determined that my desk would not fit through our door. Others determined it would (they oriented the desk so that it could go through). All students agreed that the desk could fit through the school's double doors.



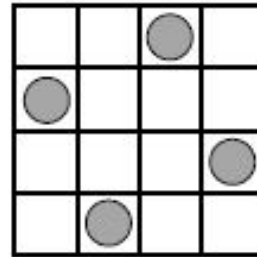
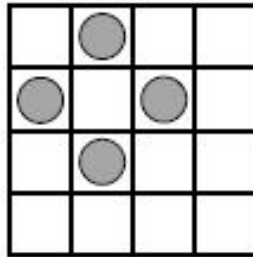
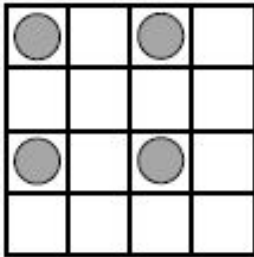
Notes:

#74: All Square

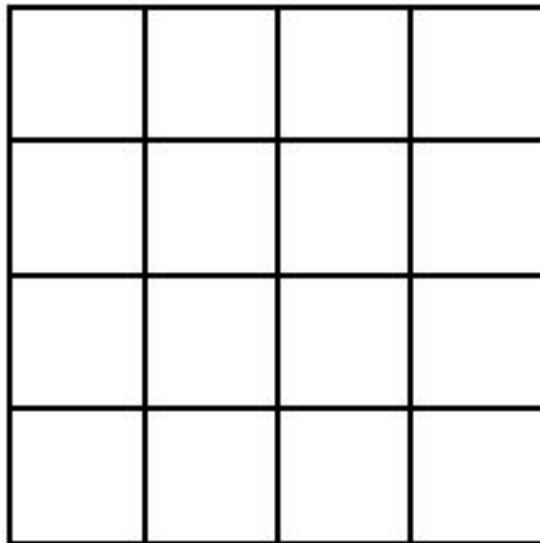
SS3, SS8

Problem:

On each of these grids, the counters lie at the four corners of a square.



What is the greatest number of counters you can place on this grid without four of them lying on the corners of a square?



Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

What is the greatest number of counters you can place on a 5 X 5 grid without four of them lying on the corners of a square? How about a 6 X 6 grid?

BACK

All Square

SS3, SS8

Outcome Objective:

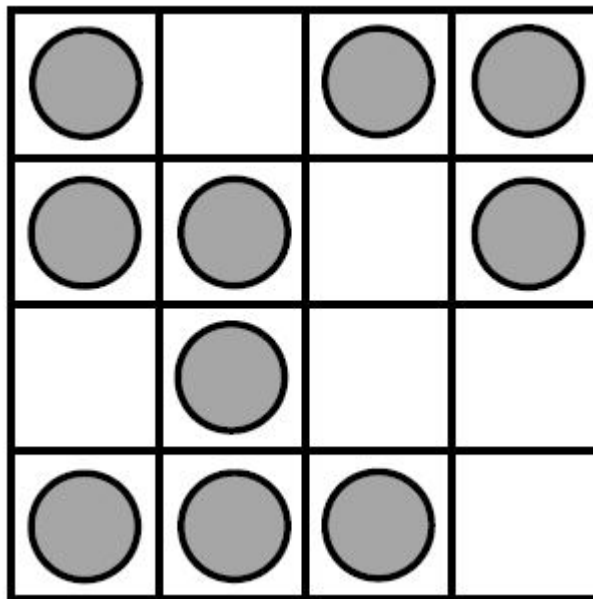
SS3. Compare and order objects by length, height, distance around and mass (weight), using nonstandard units, and make statements of comparison.

Material Suggestions:

- Copies of a 4 X 4 grid
- Counters

Sample Solution:

The maximum counters would be 10.
Of course, this example has other variations.



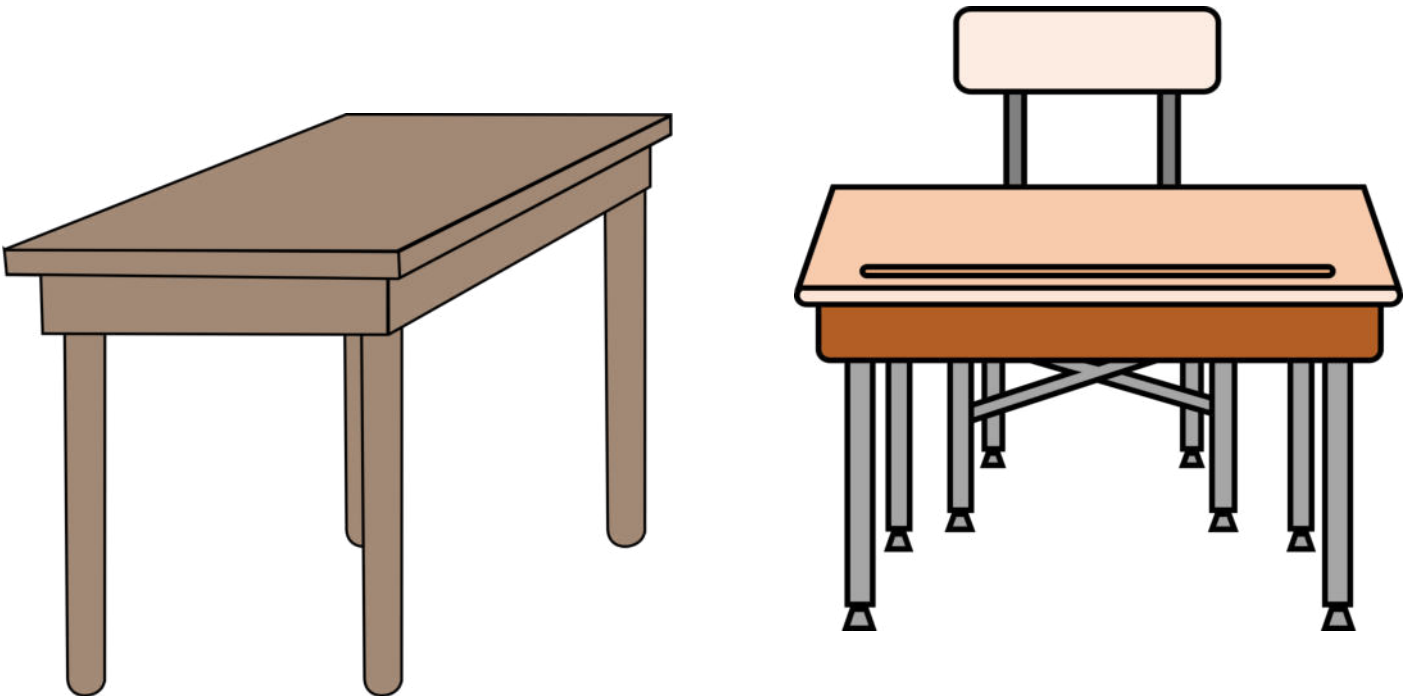
Notes:

#75: Paper Clips

SS4

Problem:

1. Measure the width of your desk or table using one paper clip. Record your answer. Do this two more times. Did you get the same answer?
2. Measure the width of your desk or table using several paper clips joined together. Record your answer. Do this two more times. Did you get the same answer?
3. Which way worked best? Why?



Credit: Carrie Sutton

Extension:

Measure other items using the above process.

BACK

Paper Clips

SS4

Outcome Objective:

SS4. Measure length to the nearest nonstandard unit by:

- using multiple copies of a unit
 - using a single copy of a unit (iteration process).
-

Material Suggestions:

- Lots of paper clips
-

Sample Solutions:

The results will depend on the size of the table or desk measured.

The students will come to notice that measuring using just one paper clip is quite difficult to do accurately.

If the students join a known number of paperclips, such as ten or twenty, they will come to understand that this allows them to measure more accurately.

Notes:

#76: Square It Up

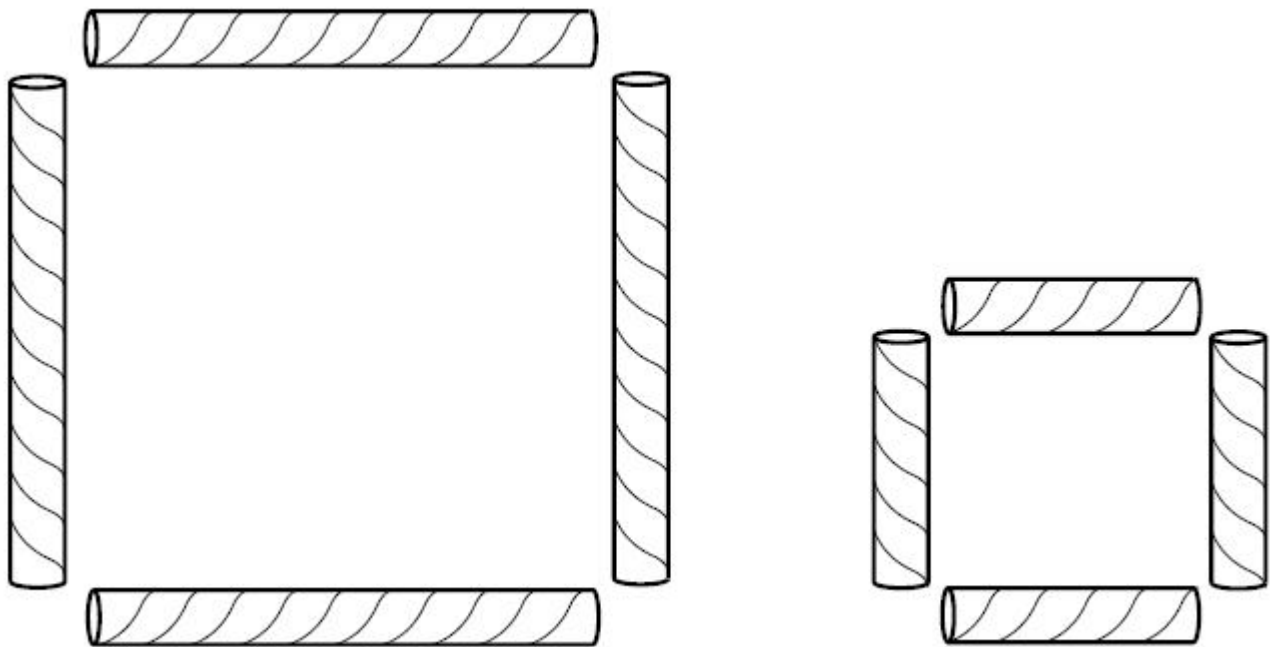
SS5, SS8

Problem:

You need six drinking straws each the same length.

Cut two of them in half.

You now have eight straws, four long and four short.



You can make 2 squares from the eight straws.

Arrange your eight straws to make 3 squares, all the same size.

Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Are there other shapes can you make from these straws?

BACK

Square It Up

SS5, SS8

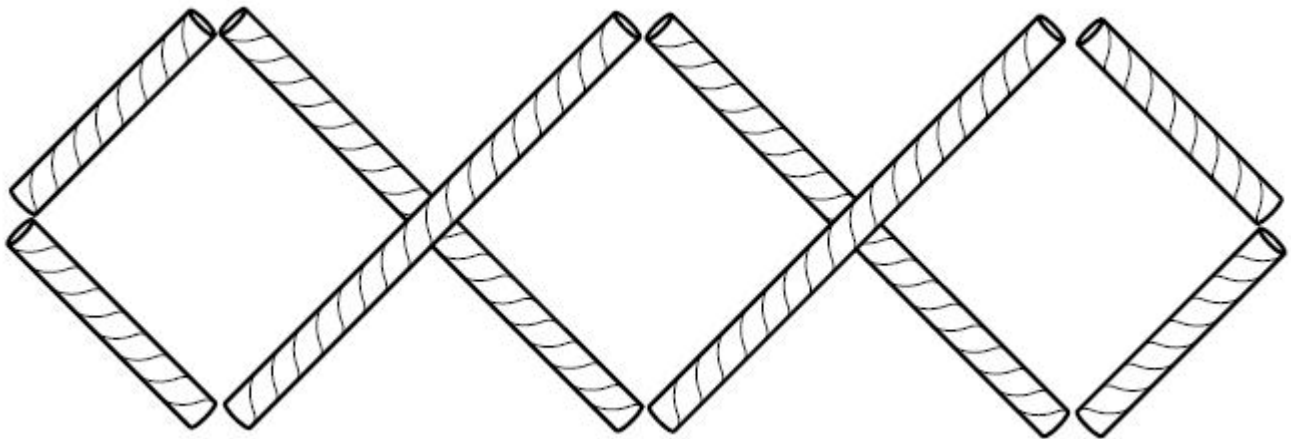
Outcome Objective:

SS5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes.

Material Suggestions:

- Drinking straws

Sample Solution:



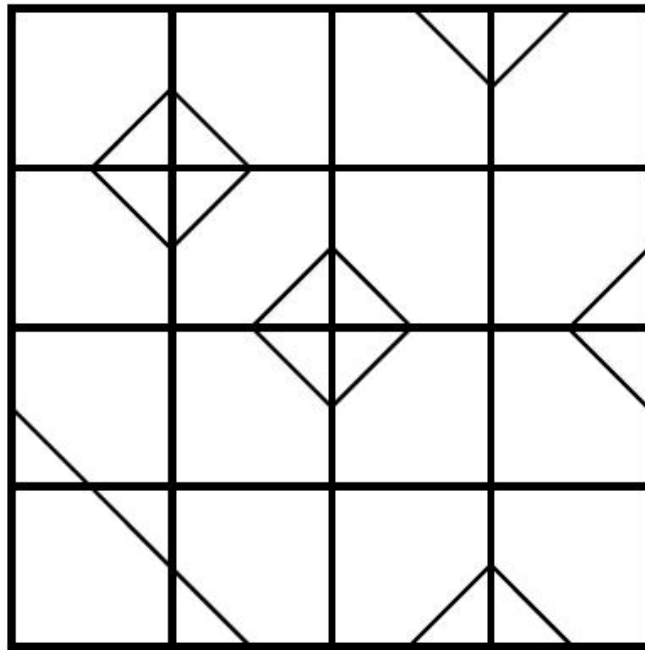
Notes:

#77: Odd One Out

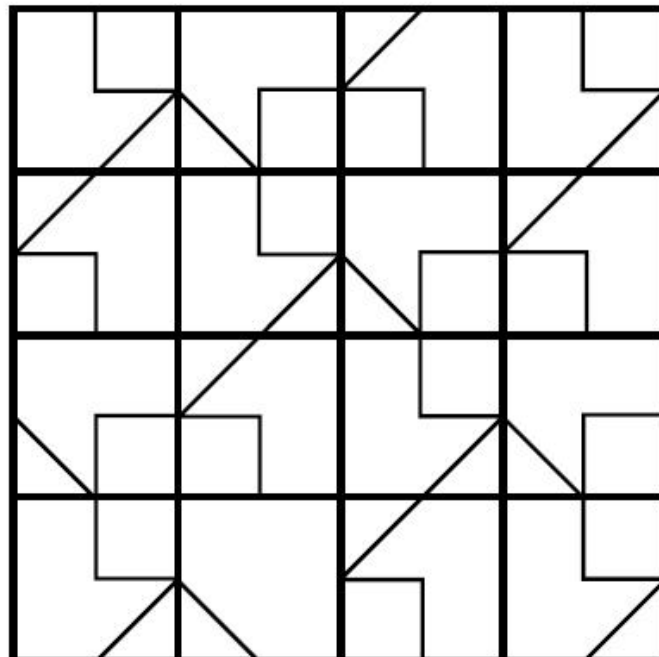
SS6, SS8

Problem:

- Here is a grid of sixteen squares.
One square is different from all the others.
Mark it on the grid.



- Now do this one.



Odd One Out

SS6, SS8

Outcome Objective:

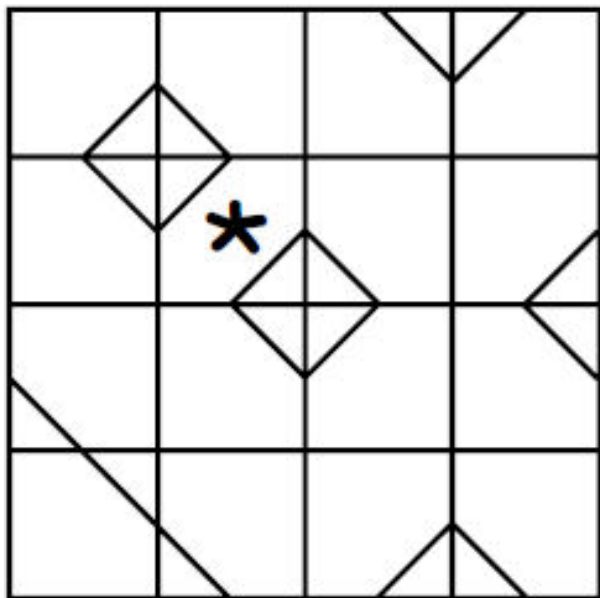
SS6. Sort 2-D shapes and 3-D objects, using two attributes, and explain the sorting rule.

Material Suggestions:

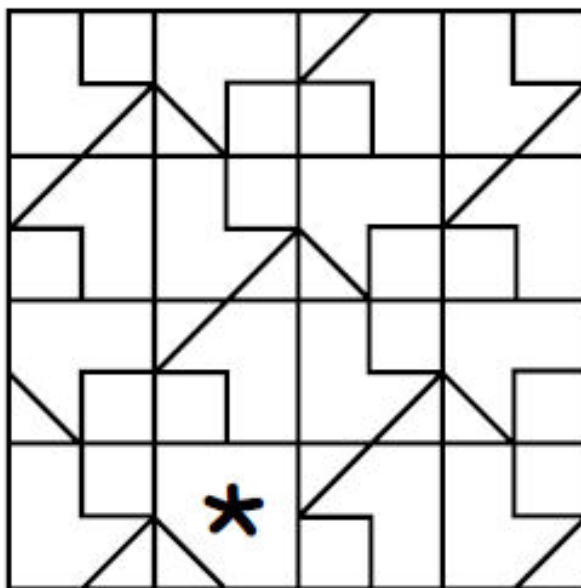
- Paper copies of the grids

Sample Solutions:

1.



2.



Notes:

#78: Stacking Shapes

SS7

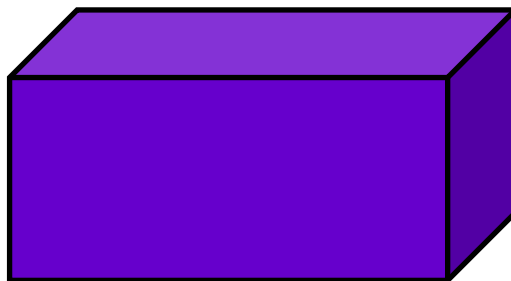
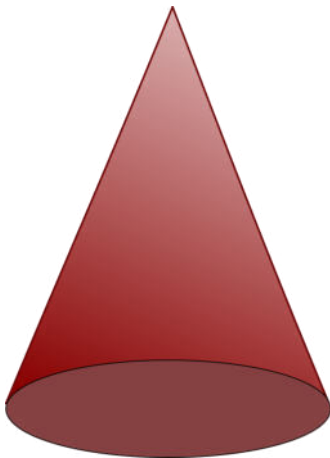
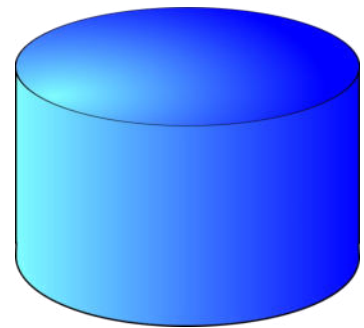
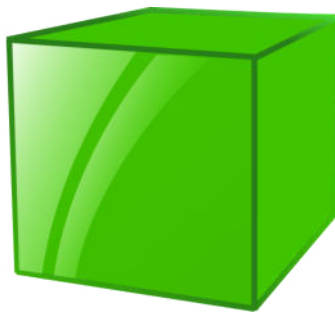
Problem:

You have a sphere, a cube, a cylinder, a cone, a rectangular prism and a pyramid.

Which shapes will stack?

Which shapes will roll?

Explain your reasons for each answer.



Credit: *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>
Pyramid clip art retrieved from <http://clipartmonk.com/pyramid-clipart>

BACK

Stacking Shapes

SS7

Outcome Objective:

SS7. Describe, compare and construct 3-D objects, including:

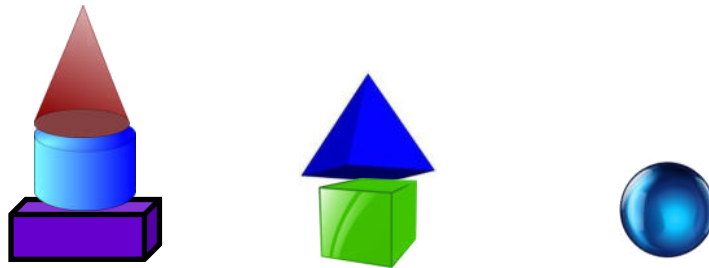
- cubes
 - spheres
 - cones
 - cylinders
 - pyramids.
-

Material Suggestions:

- 3-D shapes
-

Sample Solutions:

- Stackable: cube, cylinder, rectangular prism
- The cone and pyramid are only stackable if they are placed on the top.
- The sphere is not stackable.



- Rollable: cube, cylinder (on its side)
 - Partially rollable: cone (on its side)
-

Notes:

#79: Mystery Bag

SS7, SS8

Problem:

There are two 3-D objects in my bag.

Together they have 9 faces, 14 edges and 8 vertices.

What are the objects in my mystery bag?



Credit: Adapted from <http://www.kindergartenkindergarten.com/2010/07/this-is-a-continuation-of-my-sorting-and-attributes-unit-you-can-see-the-introduction-here-----i-am-lucky-enough-to-have-a.html>

Extension:

Students hide various 3-D objects in a bag or box. List how many faces, edges, and vertices there are in total. Have a classmate solve your problem.

BACK

Mystery Bag

SS7, SS8

Outcome Objective:

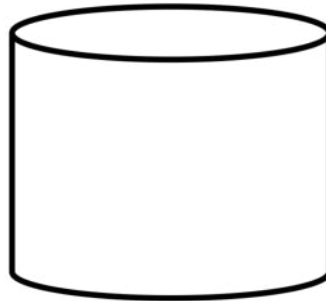
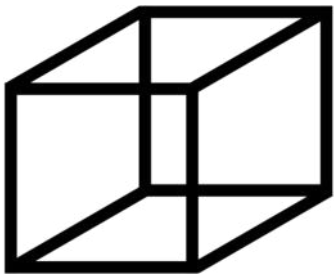
SS7: Describe and compare 3-D objects.

SS8: Describe and compare 2-D shapes.

Material Suggestions:

- An assortment of 3-D solids
 - A bag or box to hold them so they are not visible
-

Sample Solution:



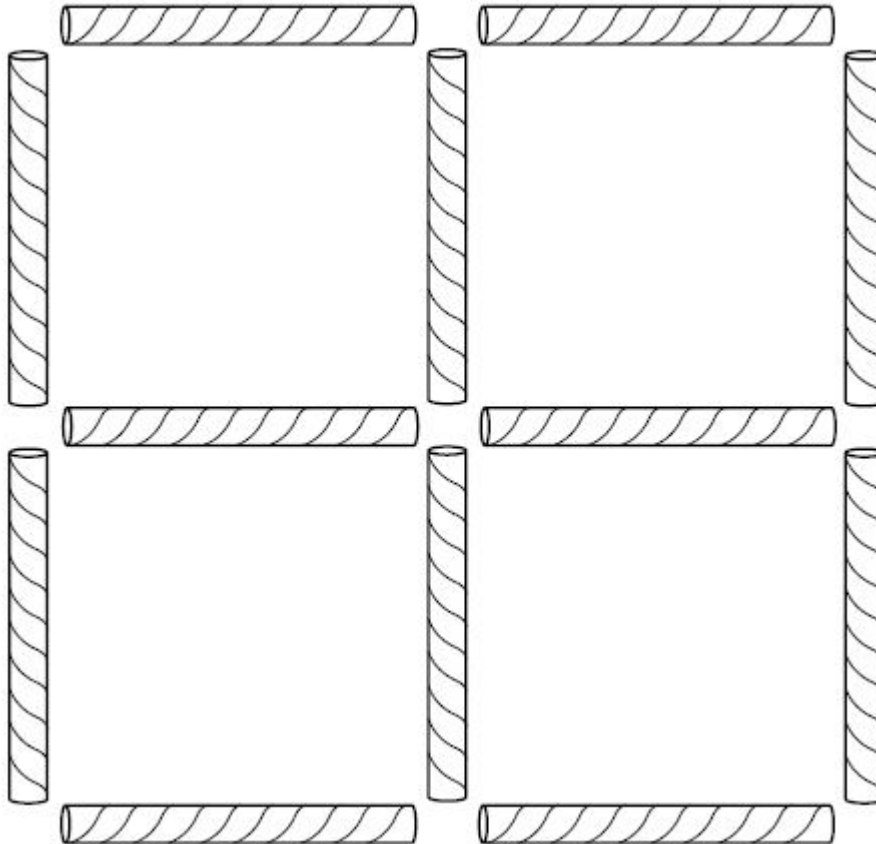
Notes:

#80: Straw Squares

SS8

Problem:

There are twelve straws in this pattern of five squares.



Take 20 straws.

Arrange them to make as many squares as you can.

Don't bend or break the straws.

How many squares did you make?

Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

See how many squares you can make with 30 straws.

How about 40, or 50 straws?

BACK

Straw Squares

SS8

Outcome Objective:

SS8. Describe, compare and construct 2-D shapes, including:

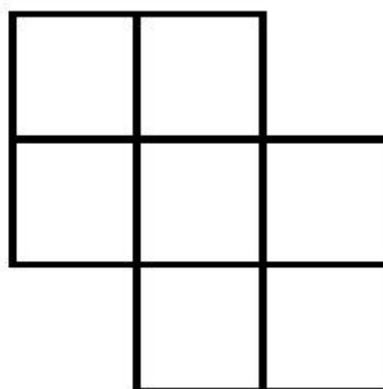
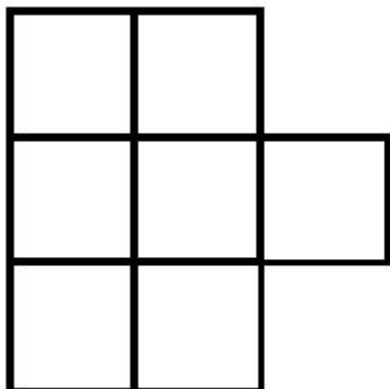
- triangles
- squares
- rectangles
- circles.

Material Suggestions:

- 20 straws of equal length per group of students

Sample Solutions:

- You can make a maximum of 7 squares with 20 straws. There are two ways to do it.



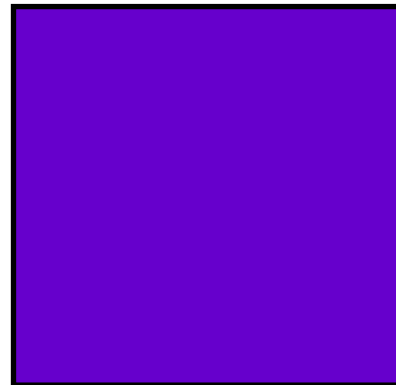
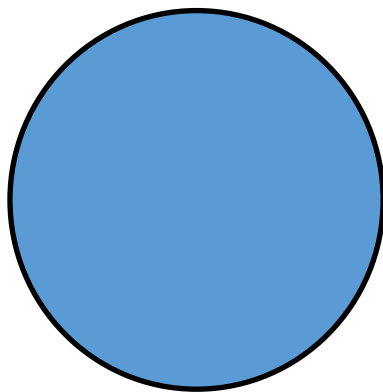
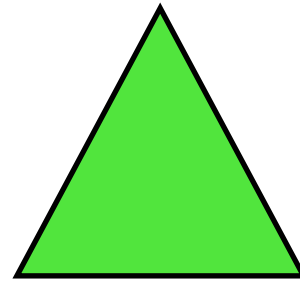
Notes:

#81: Fallen Shapes

SS8

Problem:

A bag of shapes fell behind a chair. There were triangles, circles, squares, and rectangles. When Grace reached behind the chair, she felt two shapes that had no corners. She felt some other shapes that had corners. If there was a total of 26 corners, what shapes do you think Grace found?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Add in some other shapes, such as pentagons, hexagons, etc. and increase the total number of corners found. Do this with 3-D shapes.

BACK

Fallen Shapes

SS8

Outcome Objective:

SS8. Describe, compare and construct 2-D shapes, including:

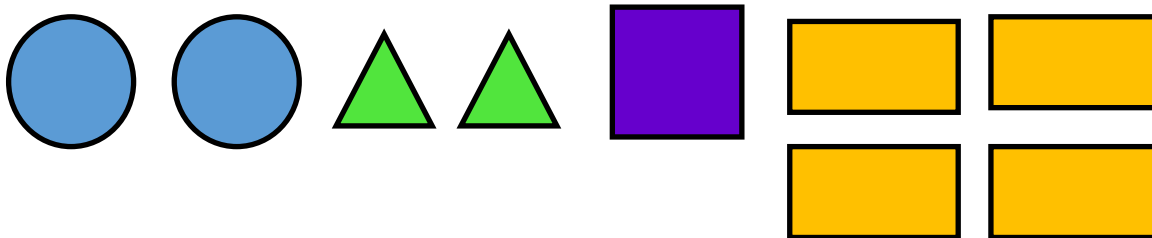
- triangles
- squares
- rectangles
- circles.

Material Suggestions:

- Cardboard copies of circles, triangles, squares, and rectangles
- A bag to hold them

Sample Solutions:

- Two circles, two triangles, one square, and four rectangles.
- Two circles, two triangles, two squares, and three rectangles.
- Two circles, two triangles, three squares, and two rectangles.
- Two circles, two triangles, four squares, and one rectangle.
- Two circles, six triangles, one square, and one rectangle.
- Etc.



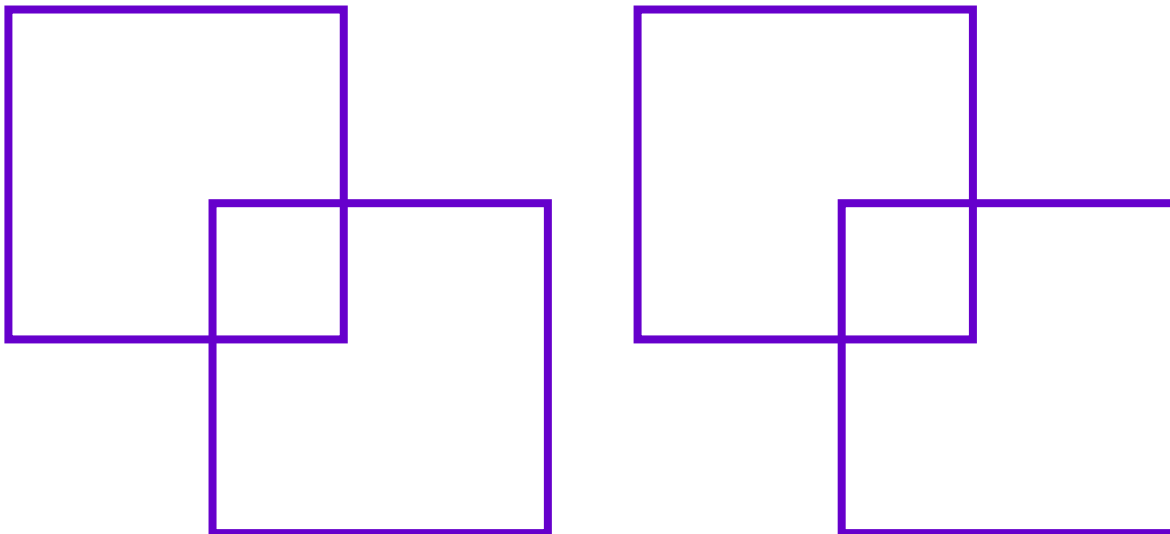
Notes:

#82: Seeing Shapes

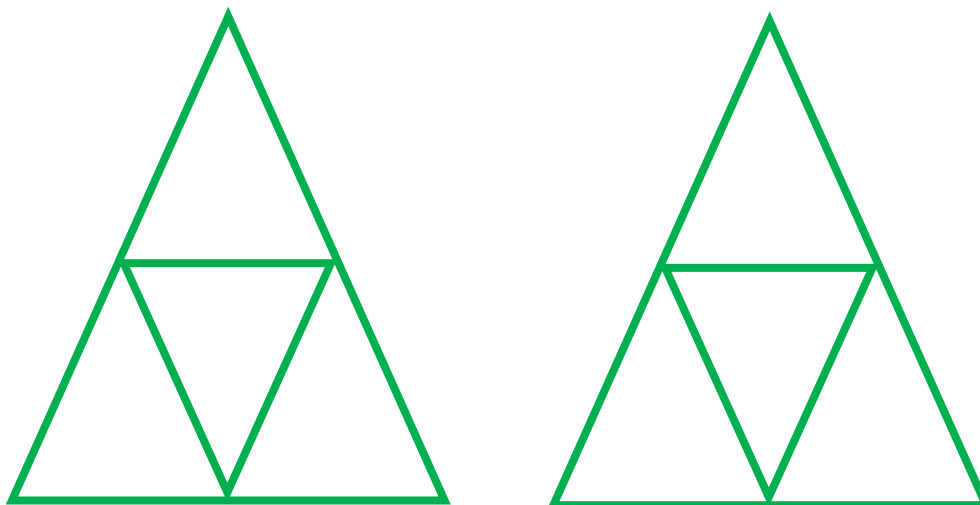
SS8

Problem:

1. How many squares do you see?



2. How many triangles do you see?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Have students make their own puzzles like this out of 2-D shapes.

BACK

Seeing Shapes

SS8

Outcome Objective:

SS8. Describe, compare and construct 2-D shapes, including:

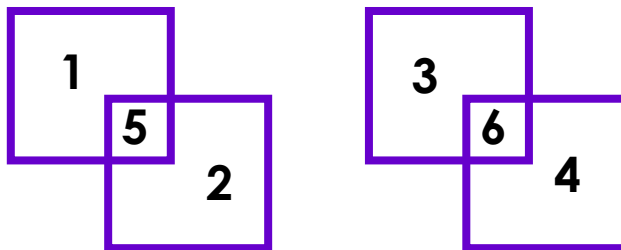
- triangles
- squares
- rectangles
- circles.

Material Suggestions:

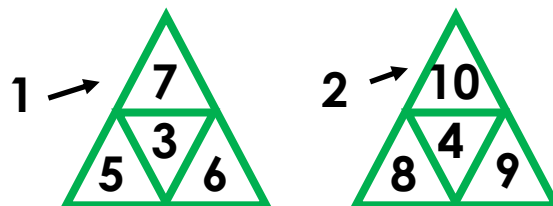
- Paper or cardboard copies of the figures

Sample Solutions:

1. You may see 4 squares or 6 squares.



2. You may see 2, 4, or 10 triangles.



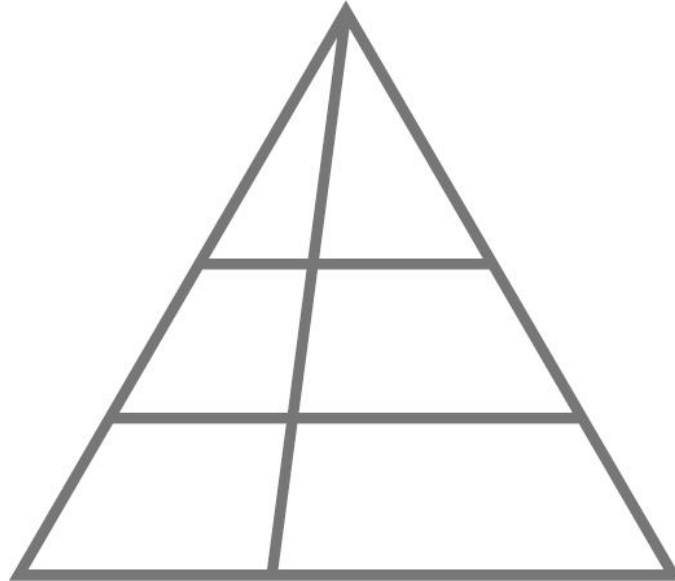
Notes:

#83: Spot the Shapes 1

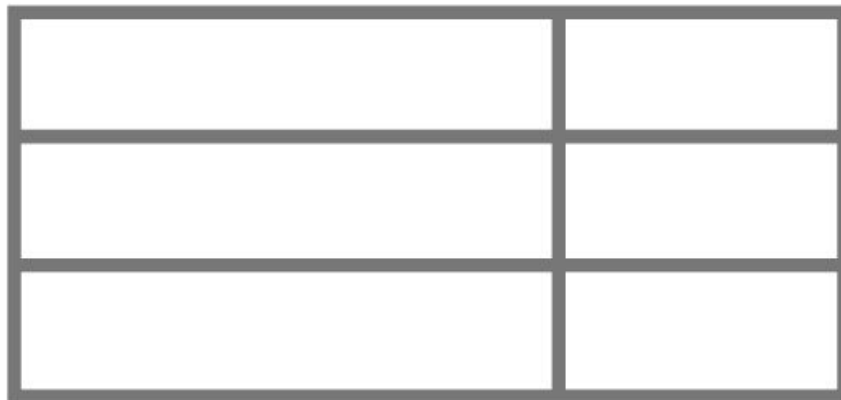
SS8

Problem:

1. How many triangles can you count?



2. How many rectangles can you count?



Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Draw your own diagram to count triangles.

How many can a friend find? Can you find more?

Try it with a different shape.

BACK

Spot the Shapes 1

SS8

Outcome Objective:

SS8. Describe, compare and construct 2-D shapes, including:

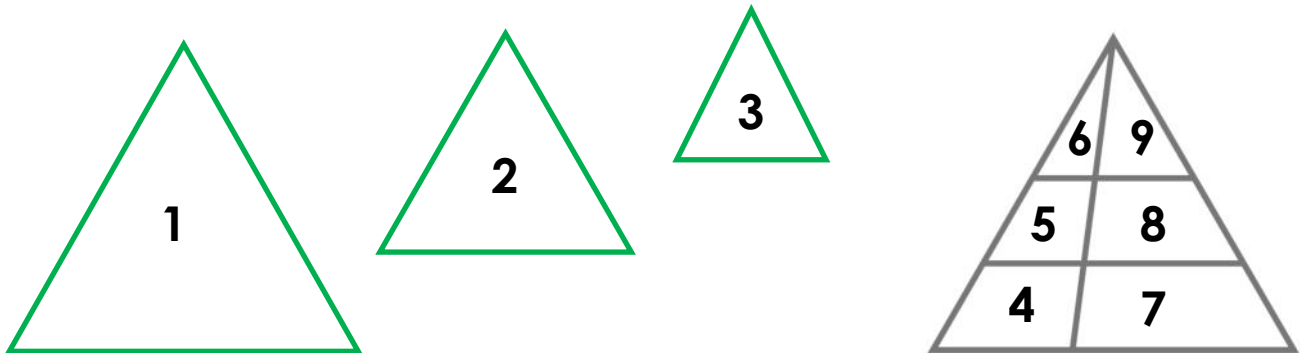
- triangles
- squares
- rectangles
- circles.

Material Suggestions:

- Paper copies of the figures
- Counters

Sample Solutions:

1. There are 9 triangles.



2. There are 18 rectangles.

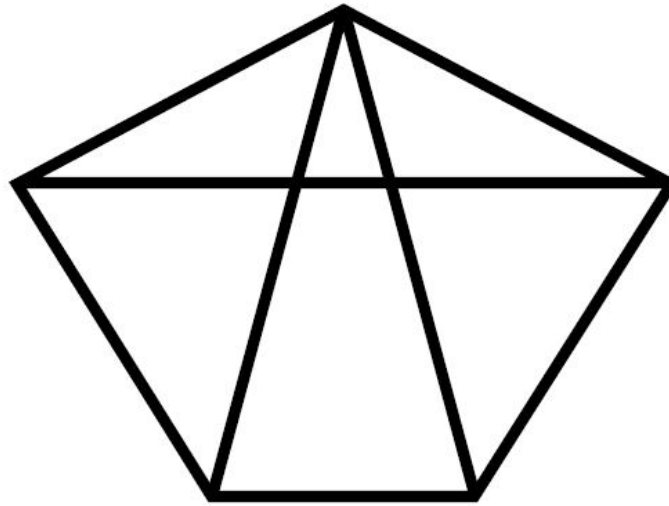
Notes:

#84: Spot the Shapes 2

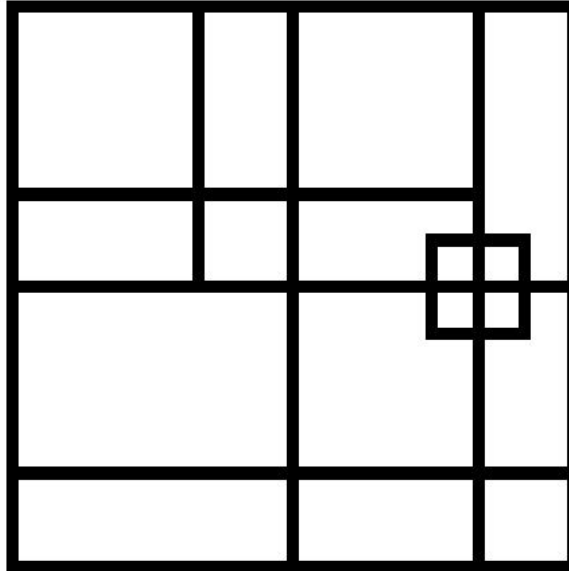
SS8

Problem:

1. How many triangles can you count?



2. How many rectangles can you count?



Credit: Crown copyright, 2000, *Mathematical Problems for Able Pupils.pdf* retrieved from <https://www.egfl.org.uk/sites/default/files/maths%20puzzles%20all.pdf>

Extension:

Draw your own diagram to count triangles. Don't use too many lines. How many can a friend find? Can you find more? Try it with a different shape.

BACK

Spot the Shapes 2

SS8

Outcome Objective:

SS8. Describe, compare and construct 2-D shapes, including:

- triangles
 - squares
 - rectangles
 - circles.
-

Material Suggestions:

- Multiple paper copies of the figures
-

Sample Solutions:

1. There are 11 triangles.
 2. There are 17 squares. Some of the shapes in this figure are rectangles, and therefore, do not count as squares.
-

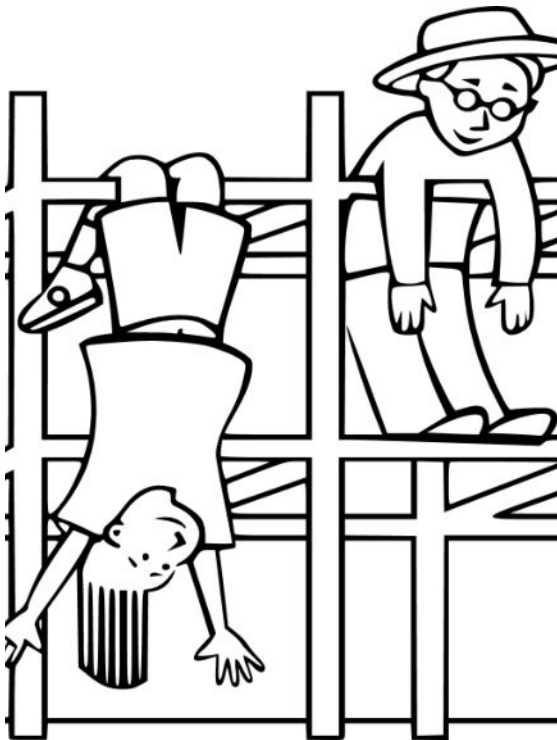
Notes:

#85: Shape Detectives

SS9

Problem:

Choose a space for your students to explore and become shape detectives. Students must find the 3-D objects in the environment and identify the 2-D shape(s) that is (are) part of it.



Credit: Cheryl Snoble and Kim Henry

Extension:

Have students build a house out of 3-D solids and then identify the 2-D shapes that are part of their 3-D house.

BACK

Shape Detectives

SS9

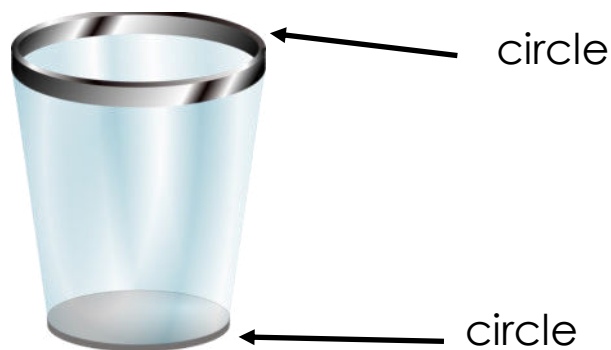
Outcome Objective:

SS9: Identify 2-D shapes as part of 3-D objects in the environment.

Material Suggestions:

- Clip boards
 - paper to record and illustrate their discoveries
 - pencils
-

Sample Solution:



Notes:

#86: 3-D Objects

SS9

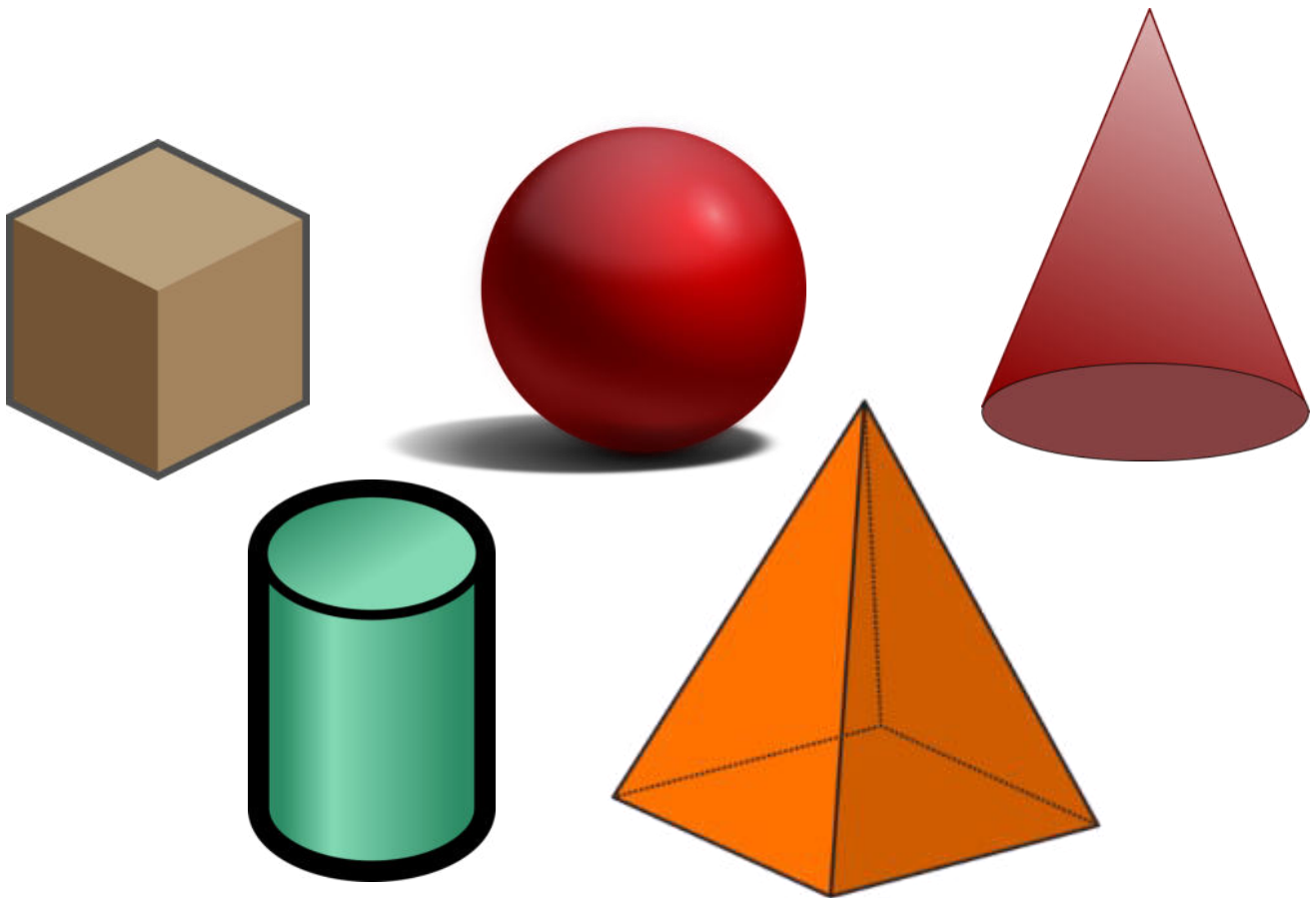
Problem:

Liz had a bag of 3-D shapes.

There were cubes, spheres, cones, cylinders, and pyramids.

As Liz pulls out each shape, she notices that each face of the 3-D shapes made a 2-D shape.

Which 2-D shapes can you see in each of these 3-D objects?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Add in some other 3-D shapes, such as pentagons, hexagons, etc. and increase the total number of corners found.

Do this with 2-D shapes.

BACK

3-D Objects

SS9

Outcome Objective:

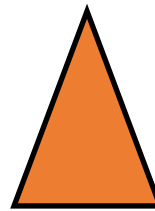
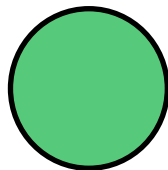
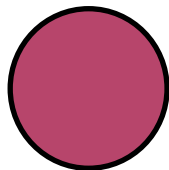
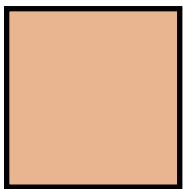
SS9: Identify 2-D shapes as part of 3-D objects in the environment.

Material Suggestions:

- An assortment of 3-D solids (cubes, spheres, cones, cylinders, and pyramids)
- A bag to hold them

Sample Solutions:

- The cube has 6 squares.
- The sphere does not have any flat faces, so therefore, no 2-D shapes.
- The base of the cone is a circle.
- The end faces (top and bottom) of the cylinder are circles.
- The sides of the pyramid is made up of triangles, and the base is a square.



Notes:

#87: Get to School

SP1

Problem:

You are going to gather data about how your classmates get to school.

You will ask every person in your class the following question:
How do you get to school?

Record their answers in an organized fashion.
Here is an example:

How do you get to school?				
Walk	Get a Ride	Bus	Bike	Other

Credit: Carrie Sutton

Extension:

What do you want to know about your classmates? Do your own survey to gather the data.

BACK

Get to School

SP1

Outcome Objective:

SP1. Gather and record data about self and others to answer questions.

Material Suggestions:

- Clipboards
 - Paper
 - Pencils
-

Sample Solutions:

Varies from classroom to classroom.

Notes:

The problem may just be figuring out how to organize the data in a logical manner. If this is your goal, do not show the students the sample chart.

#88: Most Popular Flavour SP1

Problem:

You are going to gather data about your classmates' favourite ice cream flavour.

You will ask every person in your class the following question:

Which ice cream flavour is your favourite between vanilla, strawberry, and chocolate?

Record their answers in an organized fashion.

Here is an example:

Favourite Ice Cream Flavour		
Vanilla	Strawberry	Chocolate

Credit: Carrie Sutton

Extension:

What do you want to know about your classmates' favourites? Do your own survey to gather the data. Ideas: favourite sport, favourite pet, favourite hobby, etc.

BACK

Most Popular Flavour

SP1

Outcome Objective:

SP1. Gather and record data about self and others to answer questions.

Material Suggestions:

- Clipboards
 - Paper
 - Pencils
-

Sample Solutions:

Varies from classroom to classroom.

Notes:

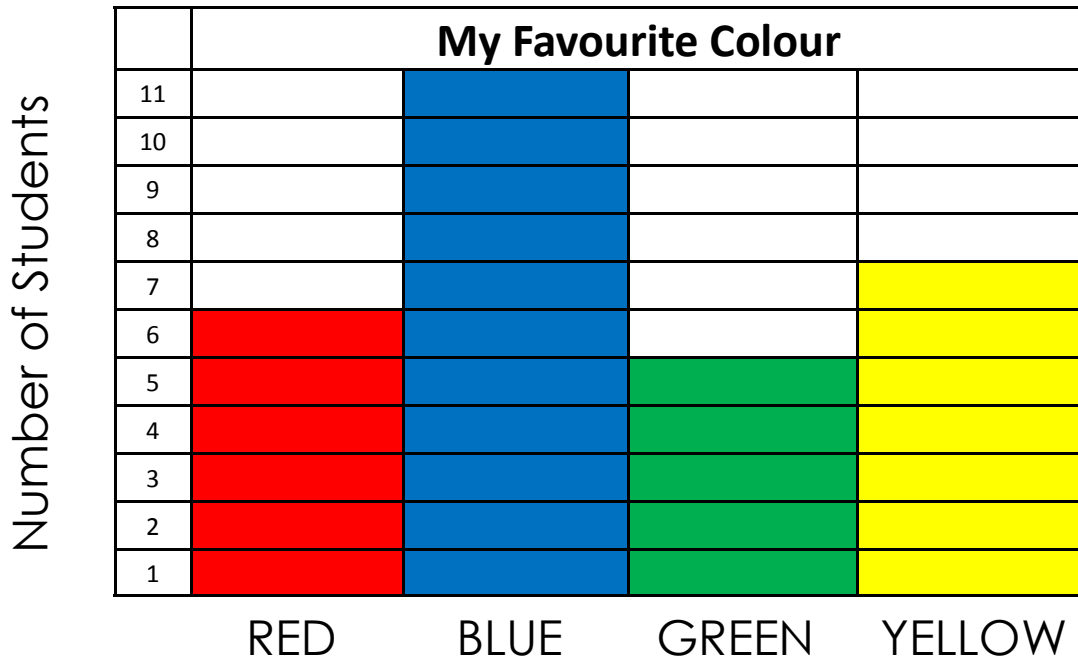
The problem may just be figuring out how to organize the data in a logical manner. If this is your goal, do not show the students the sample chart.

#89: Favourite Colour

SP2

Problem:

Use this graph to answer the questions below:



1. What do the numbers on the side of this graph mean?
2. Explain what the colours mean.
3. How many children are in this class?
4. What is the favourite colour for this class?
5. What is the least favourite colour for this class?
6. What other information can you get from this graph?

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Do a survey to find out which is the favourite colour in your class. Create a graph to show the results.

BACK

Favourite Colour

SP2

Outcome Objective:

SP2. Construct and interpret concrete graphs and pictographs to solve problems.

Material Suggestions:

- Clip boards
 - Paper
 - Pencils
 - Crayons
-

Sample Solutions:

1. The numbers on the side of the graph mean the number of students who chose each flavour.
 2. The colours refer to the colour choices each student could choose from.
 3. There are 29 students in this class.
 4. The favourite colour for this class is blue.
 5. The least favourite colour for this class is green.
 6. Other information I can get from this graph:
 - More students choose red than green in this class.
 - Yellow was the second favourite colour in this class.
 - Etc.
-

Notes:

#90: Birthdays

SP2

Problem:

Some students have birthdays in these months:

- 4 in March
- 5 in April
- 3 in May
- 1 in June.



Make a graph to show this information.

Use your graph to write questions for the following answers:

1. The answer is 8.
2. The answer is 1.

Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Do a survey to find out when students in your class have birthdays. Create a graph to show the results.

BACK

Birthdays

SP2

Outcome Objective:

SP2. Construct and interpret concrete graphs and pictographs to solve problems.

Material Suggestions:

- Clip boards
- Paper
- Pencils
- Crayons

Sample Solutions:

	Birthdays			
8				
7				
6				
5		x		
4	x	x		
3	x	x	x	
2	x	x	x	
1	x	x	x	x
	March	April	May	June

1. How many students have birthdays in April and May?
2. How many students have birthdays in June?

Notes:

#91: Grade Two Pets

SP2

Problem:

There are four grade two teachers in the school.

Ms. Remple has a rabbit and a fish.

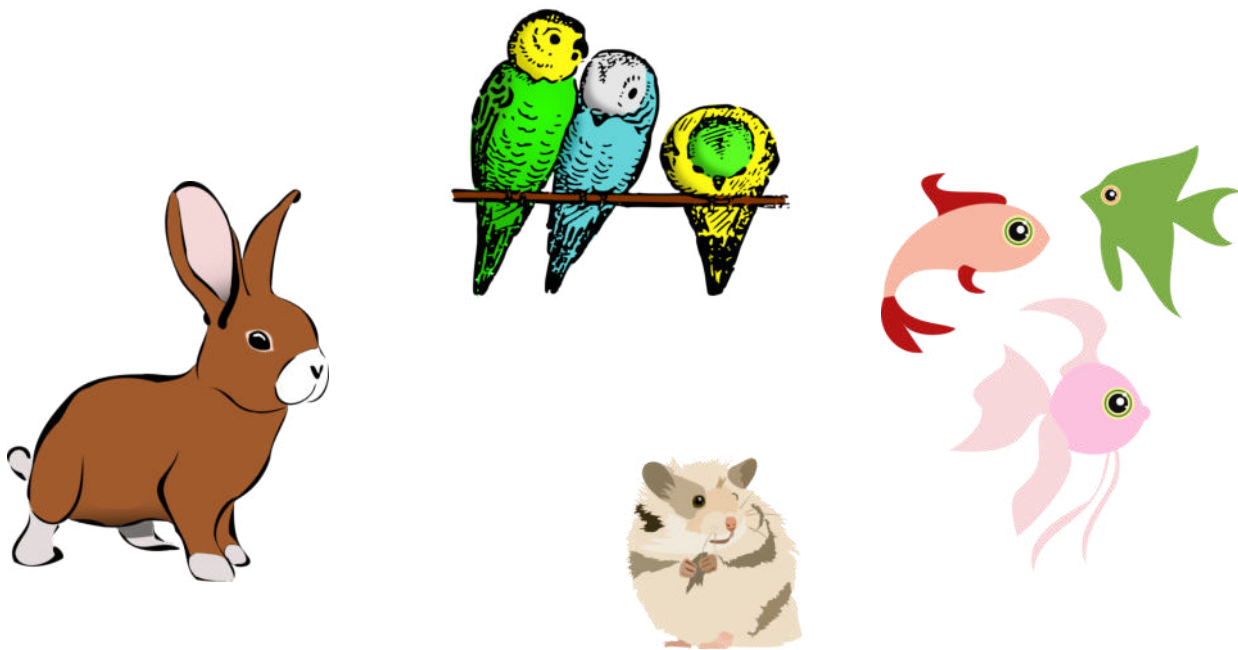
Mrs. Sherk has three hamsters.

Ms. Snoble has eight fish.

Mrs. Henry has two rabbits and six birds.

Make a graph to show the grade two pets.

What are two things you could tell from your graph?



Credit: Adapted from *Problem Solving Deck A Cards.pdf*. Retrieved from <http://maccss.ncdpi.wikispaces.net/file/view/Problem%20Solving%20Deck%20A.pdf/554108028/Problem%20Solving%20Deck%20A.pdf>

Extension:

Do a survey to find out about the pets your classmates have.

Create a graph to show the results.

BACK

Grade Two Pets

SP2

Outcome Objective:

SP2. Construct and interpret concrete graphs and pictographs to solve problems.

Material Suggestions:

- Clip boards
- Paper
- Pencils
- Crayons

Sample Solutions:

		Grade Two Pets			
Number of Pets	10				
	9		X		
	8		X		
	7		X		
	6		X		X
	5		X		X
	4		X		X
	3	X	X	X	X
	2	X	X	X	X
	1	X	X	X	X
		Rabbits	Fish	Hamsters	Birds

Two things I can tell from this graph are:

The most common pet in grade two are fish.

Birds are the second most common pet in grade two.




Notes:

#92: Favourite Fruit

SP2

Problem:

Use this graph to answer the questions below:

Fruit	Number of Girls and Boys
Apple	
Orange	
Banana	



Miss Smyth's class voted for their favourite kinds of fruit. The graph shows how many children voted for each fruit.

- One more girl than boy voted for Tyler's favourite fruit.
- The same number of girls as boys voted for Carrie's favourite fruit.
- Two more boys than girls voted for Lori's favourite fruit.

Which fruits did Tyler, Carrie, and Lori vote for?

Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 2 Teacher Resource Book* (pp. 46-47). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

Do a survey to find out which is the favourite fruit in your class. Create a graph to show the results. Create clues about favourite fruits.

BACK

Favourite Fruit

SP2

Outcome Objective:

SP2. Construct and interpret concrete graphs and pictographs to solve problems.

Material Suggestions:

- Paper
 - Pencils
 - Crayons
-

Sample Solutions:

- Tyler's favourite fruit is bananas.
 - Carrie's favourite fruit is oranges.
 - Lori's favourite fruit is apples.
-

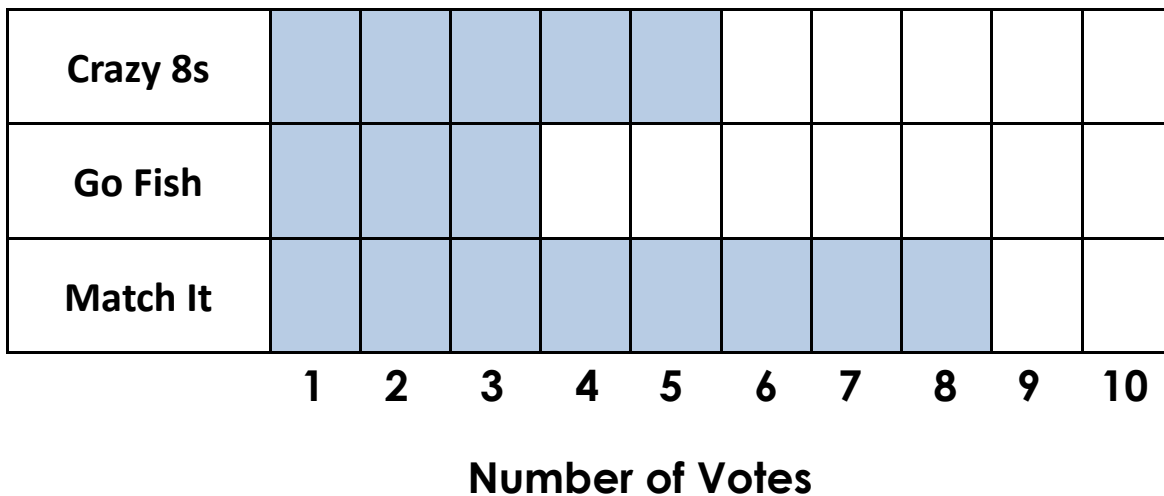
Notes:

#93: Favourite Card Game SP2

Problem:

Use this graph to answer the questions below:

Our Favourite Card Games



Mrs. James asked her class which card game they like best. The graph shows how many students voted for each game.

- Joey likes the game that got more votes than Crazy 8s.
- Maria likes the game that got fewer votes than Crazy 8s.
- Beth likes the game that got an even number of votes.

Which card games do Joey, Maria, and Beth like best?
What other information does the graph give you?

Credit: Adapted from: Goodnow, Judy and Hoogeboom, Shirley (2004). *Problem Solver II Grade 2 Teacher Resource Book* (pp. 48-49). Chicago, Illinois: Wright Group/McGraw Hill.

Extension:

Do a survey to find out which is the favourite card game in your class. Create a graph to show the results. Create clues about the

BACK

Favourite Card Game

SP2

Outcome Objective:

SP2. Construct and interpret concrete graphs and pictographs to solve problems.

Material Suggestions:

- Paper
 - Pencils
 - Crayons
-

Sample Solutions:

- Joey likes Match It.
- Maria likes Go Fish.
- Beth likes Match It.

Other information:

- Most popular game: Match It
 - Least popular game: Go Fish
 - Etc.
-

Notes:

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