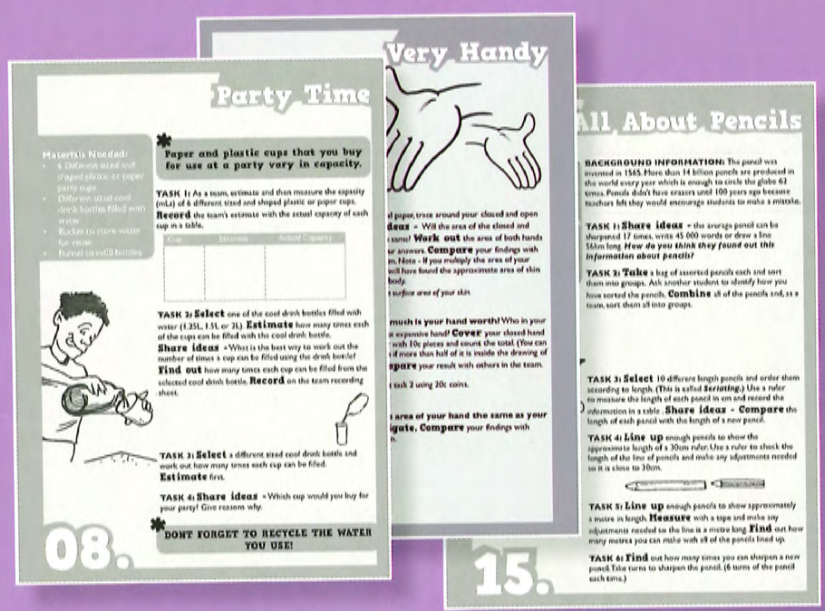
+ - x ÷

Managing Maths

Activity Sessions

Ages 8+

+ - x ÷



IDEAS & ACTIVITIES SUITABLE FOR MATHS ACTIVITY SESSIONS

LINKED TO THE AUSTRALIAN CURRICULUM

PAUL SWAN & KELLEE WILLIAMS

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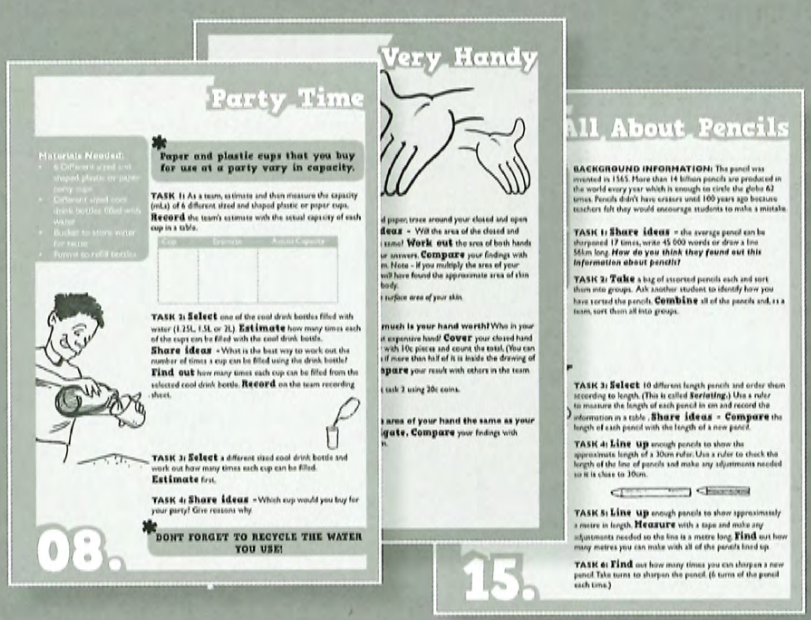

IDEAS & ACTIVITIES SUITABLE FOR - MATHS ACTIVITY SESSIONS
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PAUL SWAN & KELLEE WILLIAMS

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Managing Maths Activity Sessions

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Copies of this book may be obtained from the Mathematical Association of Western Australia Inc.:

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Authors: Paul Swan and Kellee Williams.

Maths Activity Sessions

What kind of mathematical activities will ensure successful maths activity sessions?

Activities that are:

 # Challenging
 # Interesting
 # Involve the use of manipulative materials
 # Self explanatory
 # Completed in 20-25 minutes.

The tasks should encourage discussion about maths concepts and ideas and promote a positive attitude towards mathematics. Hands-on activities are popular with students. Students should experience success with tasks and the activities given should cater for all ability levels.

How do students benefit from working on maths tasks at work stations?

The activities provide students with the opportunity to:

- *Work collaboratively to solve problems.*
- *Share their ideas and listen to the ideas of others.*
  Explore different ways to solve problems and complete given tasks.
- *Try new ideas and persist with tasks for longer periods of time.*
- *Develop their mathematical literacy.*
- *Ask questions about the problems or tasks given, to clarify their understanding.*
- *Reflect upon and discuss successful and unsuccessful mathematical strategies and ideas explored.*
- *Describe and justify their mathematical processes and conclusions.*

How could the activity sessions be organised?

Weekly Maths Activity Session (Duration: 1 Hour)

In your classroom you can set up work stations each with a different maths task to complete. The students rotate around to each of the work stations. In the 1 hour session, the students would be able to complete tasks at two of the work stations. You could run 1-2 maths activity sessions a week. The activities are only changed when students have rotated through all the stations.

Maths Activity Morning
(Duration: 2 Hours)

You may consider having a maths activity morning which will give students the opportunity to rotate through more of the work stations in one session. A 2 hour session is ideal for a maths activity morning for older students. The students should rotate to a new station every 20 minutes. Allow 10 minutes for the students to reflect on the task they have completed before moving to the next station. Students do not need to complete all the tasks on the activity card before moving to the next station. You may want to plan a catch up session where students can revisit stations to complete all the tasks on the activity card.

Possible Timetable:

9.20 - 9.40 First station
9.40 - 9.50 Reflection on task
9.50 - 10.10 Second station
10.10 - 10.20 Reflection on task
10.20 - 10.40 Third station
10.40 - 10.50 Reflection on task
10.50 - 11.10 Fourth station
11.10 - 11.20 Reflection on task

Teams Established

Students should be organised into teams with mixed abilities. Teams of 4-5 are ideal. They remain in these teams as they rotate between the work stations. The team of students working at the work station can work on a task:

Individually;
In pairs;
As a whole team;
Or a combination, depending on the task.

If they complete the task as a team, there is the danger that all students wont equally contribute to the task, so many of the activities involve the students working with others collaboratively and individually. Students need to be encouraged to share their ideas and listen to the ideas of others.

Work Stations

Each work station should be clearly numbered. Several instruction cards outlining the task need to be left on the desk. All materials needed to complete the task can be stored in a basket on the desk.
To ensure that each team knows the order in which they visit the work stations it is recommended they are given a card that has this information.

Eg. RED TEAM
3 5 6 2

The Red Team will start at work station 3 and then move to 5, then 6 and finish at 2.

Activity Cards

The instructions on the activity cards have been designed with the intention that students read and follow instructions with little adult input needed. The cards list the materials needed, outline the tasks, provide helpful tips if needed and include diagrams if appropriate. There are a range of activities that cover all of the strands of mathematics. Possible answers for the tasks have been included, separated from the instruction cards.

Supervision of students

Parents can be invited to assist with the supervision of students at the work stations and provide guidance if requested from students. The amount of assistance needed will depend on the age of the students. Parents will need to be familiar with the tasks they are supervising and possible answers. Adult input with the tasks needs to be kept to a minimum. Parents would benefit from attending the activity sessions as it will give them an insight into the type of maths tasks that help students develop an understanding of key maths concepts.

Assessing Student Learning:

You can gain an insight into student achievement by observing them working on tasks and asking questions. This will enable you to gain a sense of what students are thinking about the maths ideas presented. The observations made can be used to plan further activities to address specific needs of individual students or groups of students, related to a specific learning target.

Questions to Guide your Observations:

You may target individuals or small groups when making observations.

1. How do students approach the problem?
2. Are they able to suggest strategies or do they reply on others to guide them?
3. Are the strategies used valid or efficient? Are they able to identify more than one strategy to solve the problem? What do they reveal about their mathematical understanding?
4. How effectively do students use materials/manipulatives to help them solve problems or complete tasks?
5. Are they able to keep track of and record the processes they have used in an organised manner?
6. Are they using appropriate mathematical language to share their observations and findings? Are they confident in sharing their findings?

You could consider giving students a self assessment rubric on occasions to give them the opportunity to make judgements and decisions about their own work and ability to work with others to solve problems.

Record of Student Learning:

Students could be given an exercise book to use as a reflective journal. A list of the activities at the work stations can be kept in the book so that the completed activities can be ticked off. Students can be encouraged to reflect on their learning, after completing the task at each station, in written or pictorial form.

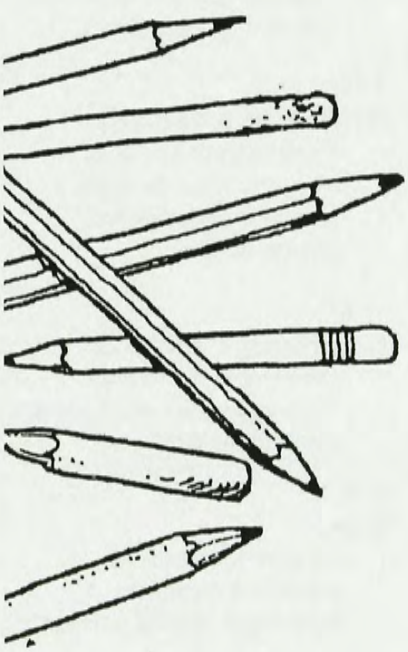
Eg. "21.03.07 MAKING HEXAGONS
I didn't realise that there are many ways to make hexagons with just two different pattern blocks. I now know there are regular and irregular hexagons. If the shape you made has 6 sides it is a hexagon. We helped each other to find all the possible hexagons we could make. Here are some of the hexagons I made. (Diagrams included)"

The journal provides students with the opportunity of using appropriate mathematical language as a tool for sharing their own learning and to draw conclusions from the learning experiences given. The comments written by students in the journal provide a valuable insight into each student's mathematical understanding.

Resource list

- 1 cm cubes
- 10 sided dice
- 2 cm cubes
- 6 sided dice
- balance scales
- calculators
- coins
- compass
- counters
- digital camera
- digital scales
- funnels
- geoboards and bands
- grouping circles
- measuring cups
- measuring jugs containers
- pattern blocks
- plastic weights
- playing cards
- rulers 30 cm 1 m
- scoops
- stationery items not listed
- stop watches
- string
- tape measures
- white boards and markers

Note: Stationery items not listed.



Links to Australian Curriculum

Proficiency strands describe the actions in which students can engage when learning and using the content.

Many of the activity cards link to the following proficiency strands:

- **Problem Solving**
  Provide opportunities to -
  make choices.
  interpret.
  formulate.
  model and investigate problem situations.
  communicate solutions effectively.

- **Reasoning**
  Provide opportunities to -
  analyse.
  evaluate.
  infer.
  justify.
  generalise.

ACTIVITY	CODE	DESCRIPTION
Which Box Holds The Most?	ACMMG 290	Yr 4 Measurement & Geometry. • *Compare objects using familiar metric units if area & volume.* • *Comparing volume using centicubes.*
Making Block Letters	ACMMG 087	Yr 4 Shape. • *Compare areas of regular & irregular shapes by informal means.* Measurement & Geometry. • *Compare objects using familiar units of area and volume.*
	ACMMG 108	Yr 5 Measurement & Geometry. • *Choose appropriate units of measurement for length (perimeter), area, volume, capacity & mass.*
	ACMMG 137	Yr 6 Measurement & Geometry. • *Solve Problems involving comparison of lengths & areas using appropriate units.*
Design Paper Money	ACMMG 088	Yr 4 Shape. • *Compare & describe 2D shapes that result from combining & splitting common*

ACTIVITY	CODE	DESCRIPTION
Design Paper Money (Continued)	ACMMG 088	• *shapes, with & without use of digital technologies.*
Agents in Disguise	ACMNA 057	Yr 3 Number & Algebra. • *Represent and solve problems involving X using effecient mental & written strategies & appropriate digital technologies.*
Very Handy	ACMMG 290	Yr 4 Measurement & Geometry. • *Compare objects using familiar metric units of area & volume.* • *Compare areas using grid paper.*
	ACMMG 108	Yr 5 Measurement & Geometry. • *Choose appropriate units of measurement for length, area, volume, capacity & mass.* • *Recognise that some units of measurement are better suited for some tasks than others.*
	ACMMG 137	Yr 6 Measurement & Geometry. • *Solve problems involving comparison of lengths & areas using appropriate units.*
Make it Balance	ACMMG 061	Yr 3 Measurement & Geometry. • *Measure, order & compare objects using familiar metric units of length, mass & capacity.*
	ACMMG 084	Yr 4 Measurement & Geometry. • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
	ACMMG 136	Yr 6 Measurement & Geometry. • *Convert between common metric units of length, mass & capacity. (grams – kilograms)*
Party Time	ACMMG 061	Yr3 Measurement & Geomtry. • Measure, order & compare objects using familiar metric units of length, mass & capacity.
	ACMMG 084	Yr 4 Measurement & Geometry. • *Use scaled instruments to measure & compare lenghts, masses, capacities and temperatures.*

Managing Maths Activity Sessions

ACTIVITY	CODE	DESCRIPTION
Frame It	ACMMG 087	Yr 4 Shape. • *Compare the areas of regular & irregular shapes by informal means.*
	ACMMG 290	Measurement & Geomtry. • *Compare objects using familiar metric units of area & volume.*
	ACMMG 109	Yr 5 Measurement & Geomtry. • *Calculate the perimeter & area of rectangles using familiar metrics units.*
	ACMMG 108	• *Choose appropriate units of measurement for length, area, volume, capacity & mass.*
	ACMMG 115	Location/Transformation. • *Apply enlargement/reduction transformation to familiar 2D shapes & explore properties of resulting image compared to original.*
Packaging Stamps	ACMMG 084	Yr 4 Measurement & Geometry. • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
	ACCMG 109	Yr 5 Measurement & Geomtry. • *Calculate perimeter & area of rectangles using familiar metric units.*
	ACMMG 108	• *Choose appropriate units of measurement for length, area, volume, capacity & mass.*
	ACMMG 137	Yr 6 Measurement & Geomtry. • *Solve problems involving comparison of lengths & areas using appropriate units.*
Eureka	ACMMG 290	Yr 4 Measurement & Geometry. • *Compare objects using familiar metric units of area/volume.*
	ACMMG 084	• *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
	ACMMG 108	Yr 5 Measurement & Geomtry. • *Choose appropriate units of measurement for length, area. volume, capacity & mass.*
	ACMMG 138	Yr 6 Measurement & Geomtry. • *Connect volume & capacity & their units of measurement.*

ACTIVITY	CODE	DESCRIPTION
Eggsactly	ACMMG 061	Yr 3 Measurement & Geometry • *Measure, order & compare objects using familiar metric units of length, mass & capacity.*
	ACMMG 084	Yr 4 Measurement & Geomtry. • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
A Hand Measure	ACMMG 061	Yr 3 Measurement & Geometry. • *Measure, order & compare objects using familiar metric units of length, mass & capacity.* • *Elaboration mentions metric units are not the only units used throughout the world.* • *Recognising importance of using common units of measure.*
	ACMMG 108	Yr 5 Measurement & Geomtry. • *Choose appropriate units of measurement for length, area, volume, capacity & mass.*
All About Pencils	ACMMG 061	Yr 3 Measurement & Geometry. • *Measure, order & compare objects using familiar metric units of length, mass & capacity.*
	ACMMG 084	Yr 4 Measurement & Geomtry. • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
Making Dodecagons	ACMMG 088	Yr 4 Shape. • *Compare & describe 2D shapes that result from combining & splitting common shapes.*
Money Trail	ACMMG 084	Yr 4 • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
	ACMNA 291	Yr 5 • *Use efficient mental & written strategies & apply appropriate*

ACTIVITY	CODE	DESCRIPTION
Money Trail (Continued)		• *digital technologies to solve problems.* • *Calculators to check reasonableness of answers.*
	ACMMG 137	• *Solve problems involving comparison of lengths & areas using appropriate units.*
	ACMNA100	• *Solve problems involving X of large numbers by 1 or 2 digit numbers using effecient mental & written strategies & appropriate digital technologies.*
		Money/financial Mathematics. • *No content description to fit task.*
	ACMNA 123	Yr6 • *Select & apply effecient mental & written strategies & appropriate digital technologies to solve problems involving all 4 operations with whole numbers.*
Making Hexominoes & Discovering Pentominoes	ACMMG 063	Yr 3 Shape. • *Make models of 3D objects & describe key features.*
	ACMMG 088	Yr 4 Shape. • *Compare & describe 2D shapes that result from combining & splitting common shapes with & without the use of digital technologies.*
	ACMMG 114	Yr 5 Location & Transformation. • *Describe translations, reflections & rotations of 2D shapes.*
	ACMMG 142	Yr 6 Location & Transformation. • *Investigate combinations of translations, reflections & rotations with & without use of digital technologies.*
Tessellating Pentominoes	ACMMG 088	Yr 4 Shape. • *Compare & describe 2D shapes that result from combining & splitting common shapes with & without the use of digital technologies.*
	ACMMG 114	Yr 5 Location & Transformation. • *Describe translations, reflections & rotations of 2D shapes.*

ACTIVITY	CODE	DESCRIPTION
Tessellating Pentominoes (Continued)	ACMMG 142	Yr 6 Location & Transformation. • *Investigate combinations of translations, reflections & rotations with & without use of digital technologies.*
Hundreds Chart	ACMNA 131	Yr 6 • *Make connections between equivalent fractions, decimals & percentages.*
	ACMNA 132	Yr 6 Patterns & Algebra. • *Continue & create squences involving whole numbers, fractions & decimals. Describe rule used to create squence.*
	ACMNA 123	Number & Place Value. • *Select & apply effecient mental & written strategies & appropriate digital technologies to solve problems involving all 4 operations with whole numbers.*
	ACMNA 127	Fractions/Decimals • *Find a simple fraction of a quantity where the result is a whole number, with & without digital technologies.*
Square Numbers	ACMNA 131	Yr 4 Patterns & Algebra • *Explore/describe number patterns resulting from performing X.*
	ACMNA 291	Yr 5 • *Use effecient mental & written strategies & apply appropriate digital technologies to solve problems.*
	ACMNA 122	Yr 6 Number & Place Value. • *Identify & describe properties of prime, composite, square & triangular numbers.*
Magic Nines	ACMMG 133	Yr5 Number & Place Value. • *Use effecient mental & written strategies & apply appropriate digital technologies to solve problems.*
		Yr 6 Patterns & Algebra. • *Continue & create squences involving whole numbers, fractions & decimals. Describe rule used to create squence.*

ACTIVITY	CODE	DESCRIPTION
Playing Cards	ACMMG 066	Yr 3 Measurement & Geometry. • *Identify symmetry in the environment.*
	ACMMG 091	Yr 4 Measurement & Geometry. • *Create symmetrical patterns, pictures & shapes with & without digital technologies.*
	ACMMG 114	Yr 5 • *Identify line & rotational symmetries.*
Magic Card Trick	ACMNA 071	Yr 4 Number & Algebra. • *Investigate & use the properties of odd & even numbers.*
	ACMNA 291	Yr 5 • *Use efficient mental & written strategies & apply appropriate digital technologies to solve problems.*
You Need Glasses	ACMMG 061	Yr 3 Measurement & Geometry. • *Measure, order & compare objects using familiar metric units of length, mass & capacity.*
	ACMMG 084	Yr 4 Measurement & Geometry. • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*
	ACMMG 137	Yr 6 Measurement & Geometry. • *Solve problems involving the comparison of lengths & areas using appropriate units.*
Popcorn Packets	ACMMG 063	Yr 3 Shape. • *Make models of 3D objects & describe key features*
	ACMMG 061	Measurement & Geometry. • *Measure, order & compare objects using familiar metric units of length, mass & capacity.*
	ACMMG 084	Yr 4 Measurement & Geometry. • *Use scaled instruments to measure & compare lengths, masses, capacities & temperatures.*

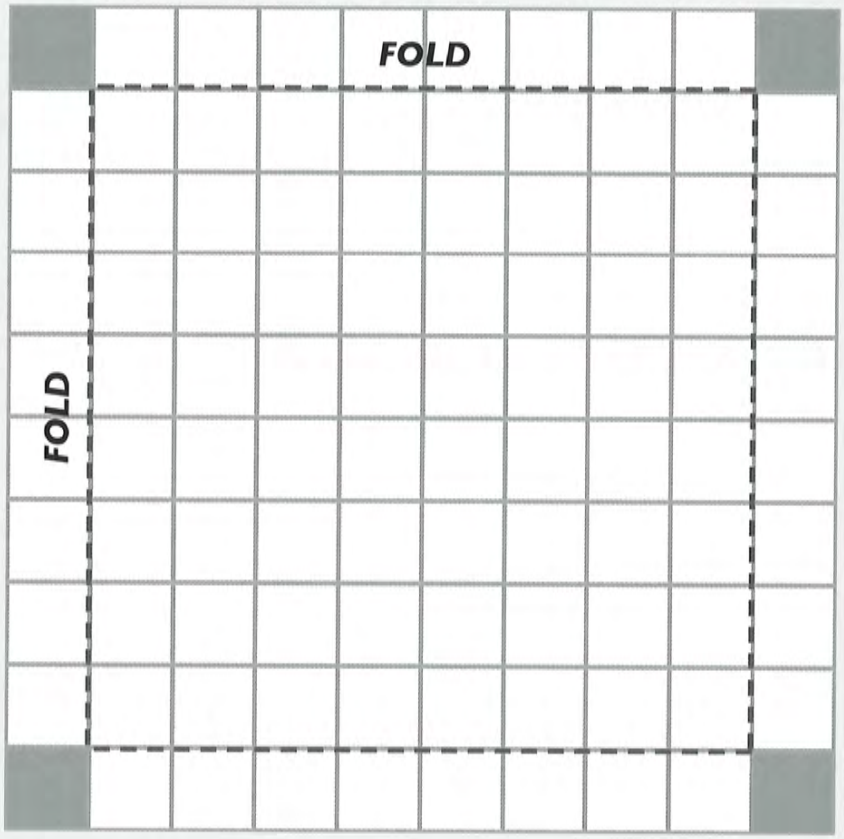
ACTIVITY	CODE	DESCRIPTION	
Popcorn Packets (Continued)	ACMNA 291	Yr 5 Number & Place Value. • *Use effecient mental & written strategies & apply appropriate digital technologies to solve problems.*	
Roll of The Dice	ACMSP 067	Yr 3 Statistics & Probability. • *Chance.* • *Conduct change experiments, identify & describe possible outcomes & recognise variation in results.*	
	ACMNA 060	Patterns & Algebra. • *Describe, continue & create number patterns resulting from performing addition or subtraction.*	
	ACMSP 095	Yr 4 Data Representaion & Interpretation. • *Select & trial methods for data collection, including survey questions & recording sheets.*	
Creating Patterns	ACMMG 091	Yr 4 Measurement & Geometry. Location/Transformation. • *Create symmetrical patterns, pictures & shapes with & without digital technologies.*	
	ACMMG 114	Yr 5 Measurement & Geometry. Location/Transformation. • *Describe translations, reflections & rotations of 2D shapes.* • *Identify line/rotational symmetries.*	
Taking A Chance	ACMSP 092	Yr 4 Statistics & Probability. • *Chance. Describe possible everyday events & order their chances of occuring.*	
Cut The Deck	ACMSP 092	Yr 3 Statistics & Probability. • *Conduct chance experiments, identify & describe possible outcomes & recognise variation in results.*	Yr 5 Statistics & Probability. • *Describe & interpret different data sets in context. (ACMSP 120)* Yr 6 Statistics & Probability. • *Conduct chance experiments with both small & large numbers of trials using appropriate digital technologies. (ACMSP 145)*
	ACMSP 069	Data Representation/ Interpretation. • Collect data, organise into catagories & create displays using lists, tables, picture graphs & simple column graphs with & without use of digital technologies.	

Which Box Holds The Most?

Materials Needed:

- 10cm Square sheets of grid paper
- Sticky tape
- Scissors
- 1cm Cubes
- 2cm Cubes
- Whiteboards and markers

TASK 1: Make a box using a 10cm square sheet of grid paper. Cut off a 1cm square from each corner of the square and then fold up the sides to make a box. Tape the box together.



TASK 2: Share Ideas

How can you find out how many 1cm cubes will fit inside the box? Record one method each on the whiteboards.

ESTIMATE how many 1cm cubes will fit in the box.
Select one method to find out how many cubes will fit in the box.
Compare with your estimate.

TASK 3: Make different sized boxes from the 10cm square sheets of grid paper by cutting different size squares from each corner of the square paper.
Eg. 2cm 3cm 4cm

TASK 4: Share ideas

Predict which box will hold the most 1cm cubes.
Give a reason for your choice.

TASK 5: As a team, **create a table** that shows the dimensions of each of the boxes (length, width, height) and how many 1cm cubes each box holds.

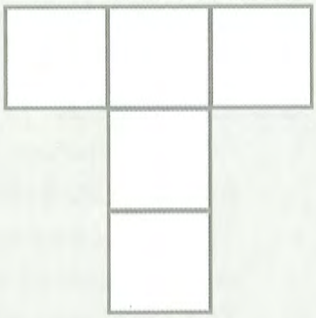
01.

Making Block Letters

Materials Needed:

- 1cm Cubes
- 2cm Cubes
- Large sheet of white paper

eg.



TASK 1: Work as a team and **create the letters of the alphabet** using 1cm or 2cm cubes.
(All team members must use the same blocks)

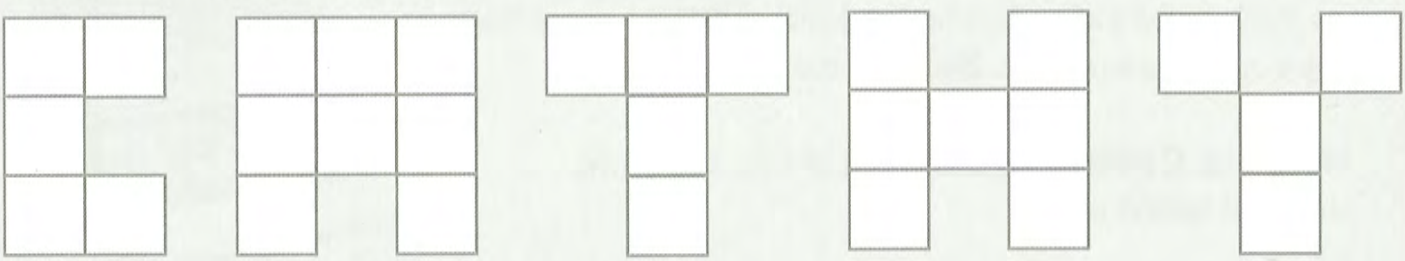
ABCDEFGHIJKLMNOPQRSTUVWXYZ

TASK 2: Predict which letter will have the largest -

- ***Perimeter***
- ***Area***

Record the perimeter and area of the letters created in a table.

TASK 3: Create your name using the 1cm or 2cm cubes. (All team members need to use the same size cubes) All letters need to be a similar size.



TASK 4: Share Ideas - predict which name will have the largest **area** and **perimeter.**

Question to discuss - *Do people with longer names have a larger area and perimeter? Justify your answers.*

TASK 5: Copy your name as block letters on grid paper. **Work out** the perimeter and area of your name. **Record. Compare** with others in the team to find out which name has the largest area and largest perimeter.

02.

Design Paper Money

Materials Needed:

- Printed Money $1.00, $2.00, $5.00, $10.00, $20.00, $50.00, $100.00
- Blindfolds
- Scissors

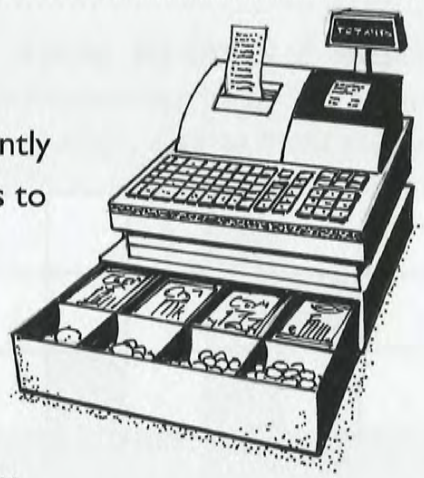
BACKGROUND INFORMATION: In an effort to assist the visually impaired citizens of a particular country, the government decided to produce a special set of notes.

GUIDELINES:

- Print 7 different denominations of paper money - $1.00 $2.00 $5.00 $10.00 $20.00 $50.00 $100.00
- The notes can only be altered by cutting a corner, or a combination of corners, off.
- The cuts must all be uniform, eg. isosceles triangles

Isosceles triangle *- has two equal sides and two equal angles.*

TASK 1: Share Ideas - Discuss suitable designs for the paper money. **Follow** the guidelines to print the 7 denominations of money. Each note will need to be cut differently so they can be easily identified by touch. **Use** the paper notes to try out different designs. **Select** the best design.



TASK 2: Create your own set of notes using the selected **team** design.

TASK 3: Blindfold team members in turn and see if they are able to identify the given notes and the cuts made to the note.

TASK 4: Share ideas - Discuss - Did the design selected ensure that the visually impaired citizens are able to identify notes? Why? Why not?
Are there any modifications you would make to the design?

TASK 5: Create your own design for each denomination using your own guidelines. **Share** your design with the rest of the team.

03.

Agents in Disguise

Materials Needed:
- Worksheet - Agents in Disguise
- Name cards of suspects
- Clue cards

BACKGROUND INFORMATION: A clever agent needs to be able to come up with a variety of disguises.

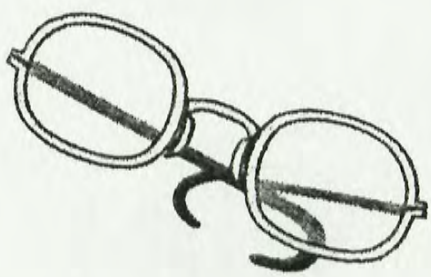
You have the following items to disguise yourself:
- **Red, black or yellow wig**
- **Moustache or beard**
- **Round or square glasses**

TASK 1: Find out how many different disguises you could create with the above items to choose from. ***You must be wearing a wig, have a moustache or a beard on and you need to be wearing glasses.*** **Record** all of the possibilities.

TASK 2: Share ideas. Discuss how you can make sure you have included all possibilities.

TASK 3: Now that you are all in disguise I have an assignment for you all.

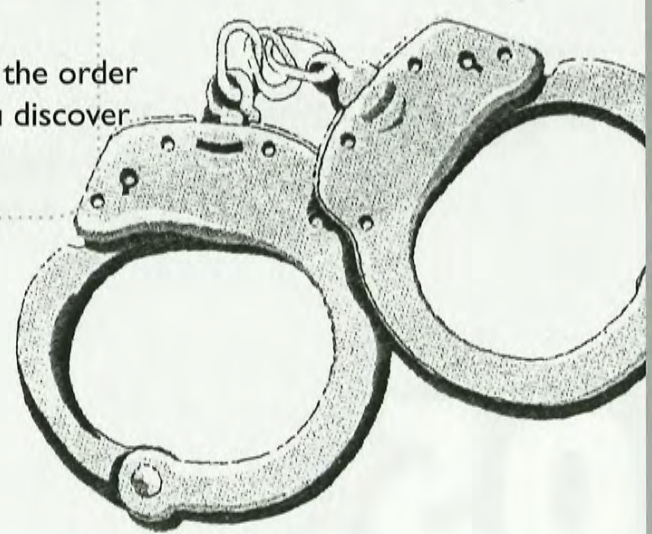
FIND OUT WHO IS GUILTY.



BACKGROUND INFORMATION: You must use logic and reason to work out the clues to solve the crime. There are 10 suspects named ***Adrian, Brin, Chris, Daniel, Ethan, Frank, Greg, Harry, Ian and Jack (find name cards for suspects).*** Share out the information cards to all team members with clues to help identify the culprit or culprits.

Eg. *Adrian is taller than Greg.*
Chris is taller than Adrian.

MAIN CLUE:
The two suspects of middle height are guilty.
Read cards aloud, one at a time, and make changes to the order of the suspects listed on the cards. Continue until you discover who the two suspects are. **CASE SOLVED.**

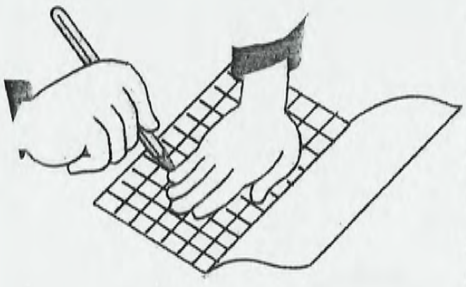


04.

Very Handy

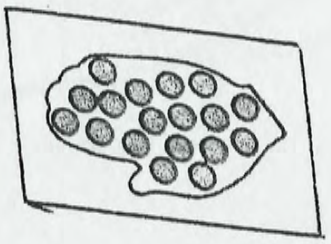
Materials Needed:

- 1cm grid paper
- 10c and 20c coins



TASK 1: On grid paper, trace around your closed and open hand. **Share ideas** - Will the area of the closed and open hand be the same? **Work out** the area of both hands and **record** your answers. **Compare** your findings with others in your team. Note - If you multiply the area of your hand by 100 you will have found the approximate area of skin that covers your body.

Work out *the surface area of your skin.*



TASK 2: How much is your hand worth? Who in your team has the most expensive hand? **Cover** your closed hand on the grid paper with 10c pieces and count the total. (You can count a 10c piece if more than half of it is inside the drawing of your hand.) **Compare** your result with others in the team.

TASK 3: Repeat task 2 using 20c coins.

TASK 4: Is the area of your hand the same as your foot? Investigate. Compare your findings with others in the team.

05.

Crack The Code

Materials Needed:

- Passages of text (reading books)
- Caesar Shift coded message cards (5)
- Beale Cipher coded message cards (5)

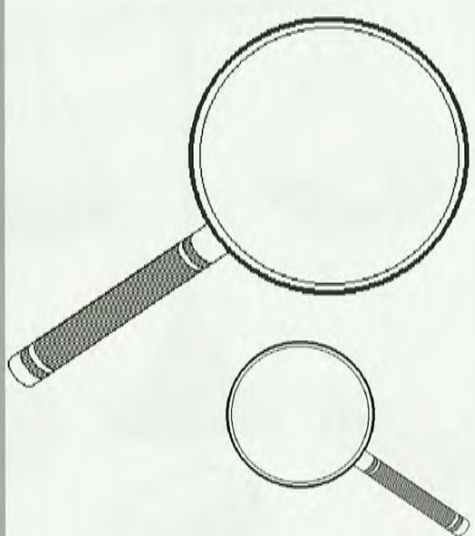
DID YOU KNOW?
Secret agents often use codes to send and receive messages.

CAESAR SHIFT

BACKGROUND INFORMATION: The Caesar Shift is a simple code system named after Julius Caesar (100-44 BC) Here is an example of a Caesar Shift:

A B C D E F G H I J K L M
e f g h i j k l m n o p q
N O P Q R S T U V W X Y Z
r s t u v w x y z a b c d

In a Caesar cipher each letter of the alphabet is shifted ahead by a certain number of letters.



TASK 1: Select the caesar coded message cards and share out the cards. **Decode** the secret messages using the key above and share them with the other agents.

TASK 2: Encode a message using the above key. Give it to another agent in your team to decode.

BEALE CIPHERS

BACKGROUND INFORMATION: *Beale ciphers rely on the use of a passage of text from a page of a book. Once a page has been identified, all you need to do is number each of the words. For example, a message might read 23, 17, 31, 6 which would be decoded by locating the 23rd word and writing down the first letter of the word. Next you would write down the first letter of the 17th word and so on until the message is completed.*

TASK 3: Select the Beale Cipher message cards and share them out. **Decode** the secret messages using the text above.

TASK 4: Select a passage of text and make up your own code ***(Number each of the words.)***

TASK 5: Encode a message for another agent to decode.

06.

Make it Balance

Materials Needed:

- Assorted classroom items in a box
- Balance scales
- Team recording sheet (A2 paper)
- Small cards
- Plastic weights

BACKGROUND INFORMATION: Hefting means to hold one item in one hand and one item in the other hand and gauge whether one item feels heavier than another.

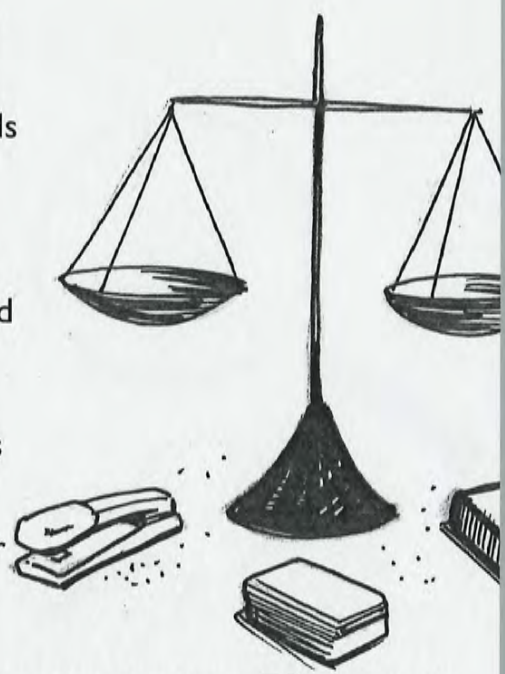
Classroom items to use: Suggestions

- stapler
- ruler
- scissors
- sticky notes
- duster
- pencils
- markers
- books
- erasers
- paper weights
- pegs
- plastic containers (empty)
- pencil cases

TASK 1: Select 5 classroom items from the box. **Draw** each item on a separate card. **Compare** the mass of each item by hefting two of the items at a time. **Set out** the cards in order from lightest to the heaviest.

TASK 2: Ask team members to check your card order by hefting the items themselves. **Share ideas** - Did the card order differ?

TASK 3: Use the balance scales to see if you have the cards in the right order. **Place** two items at a time on the scales and compare their mass. **Glue** the cards in the correct order on the team recording sheet.



TASK 4: Find out the mass of each object. **Place** each item in turn in one side of the balance scales and use the plastic weights (grams) to find out the approximate mass. **Add** weights to the empty side until the scales are balanced. **Add up** the weights recorded on the plastic weights. **Record** the mass under each item on the recording sheet.

TASK 5: Compare your ordering of the items using the balance scales to the actual mass of the items. **Share** your findings with your other team members.

07.

Party Time

Materials Needed:

- 6 Different sized and shaped plastic or paper party cups
- Different sized cool drink bottles filled with water
- Bucket to store water for reuse
- Funnel to refill bottles
- Measuring jugs

Paper and plastic cups that you buy for use at a party vary in capacity.

TASK 1: As a team, estimate and then measure the capacity (mLs) of 6 different sized and shaped plastic or paper cups. **Record** the team's estimate with the actual capacity of each cup in a table.

Cup	Estimate	Actual Capacity

TASK 2: Select one of the cool drink bottles filled with water (1.25L, 1.5L or 2L). **Estimate** how many times each of the cups can be filled with the cool drink bottle.

Share ideas - What is the best way to work out the number of times a cup can be filled using the drink bottle?

Find out how many times each cup can be filled from the selected cool drink bottle. **Record** on the team recording sheet.

TASK 3: Select a different sized cool drink bottle and work out how many times each cup can be filled.

Estimate first.

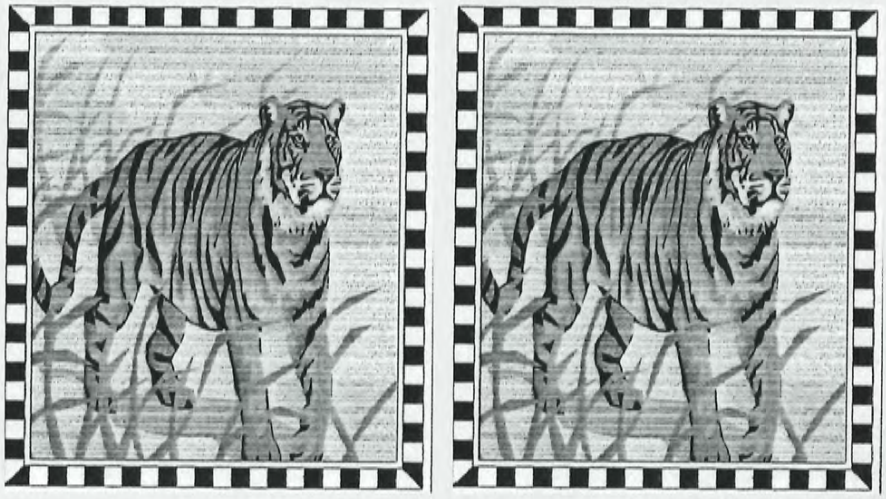
TASK 4: Share ideas - Which cup would you buy for your party? Give reasons why.

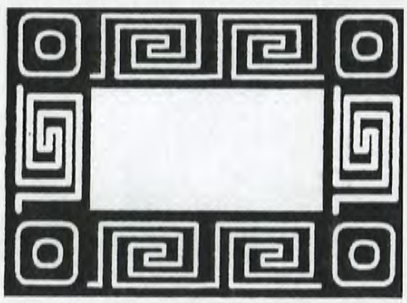
DONT FORGET TO RECYCLE THE WATER YOU USE!

Frame It

Materials Needed:

- Coloured card
- Magazine pictures (assorted sizes)
- A2 sheet of white paper
- Rulers
- Tape Measure
- Grid Paper





TASK 1: You need to frame all of the pictures in the team tray. Use coloured card to make picture frames which are 2cm larger than the pictures all the way around.

Share ideas - How can we make sure the frames are the correct size? Work as a team to frame the pictures. Glue the picture at the back of the frame so the picture can be seen through the window of the frame.

TASK 2: Share ideas - Decide the attributes you can use to order the framed pictures. **Order** the frames according to the selected attribute. (eg. area, length, width, perimeter.)

TASK 3: Select a framed picture and make a frame half the size. Draw your own picture to go in the frame.

TASK 4: Arrange the framed pictures on the A2 sheet of paper. Make use of all the space. Glue them on. Glue the half size frames on half an A2 sheet.

09.

Packaging Stamps

Materials Needed:

- 20 old stamps
- Strips of paper the width of a stamp
- 2 x A2 sheets of paper
- Rulers

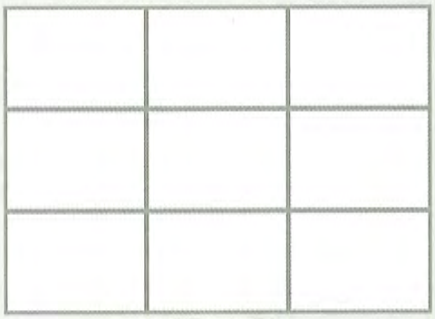
BACKGROUND INFORMATION: The post office sells boxes of 100 x 60c stamps. The stamps are also available on A4 sheets of paper in a plastic sleeve.

TASK 1: Use the stamps provided and the long strips of paper to work out - ***How long will the strip of paper in the box of 100 stamps be?***

Share ideas - What information will we need to work out the answer? Record your ideas on the team recording sheet (A2 sheet of paper). Share possible ways of solving the problem.

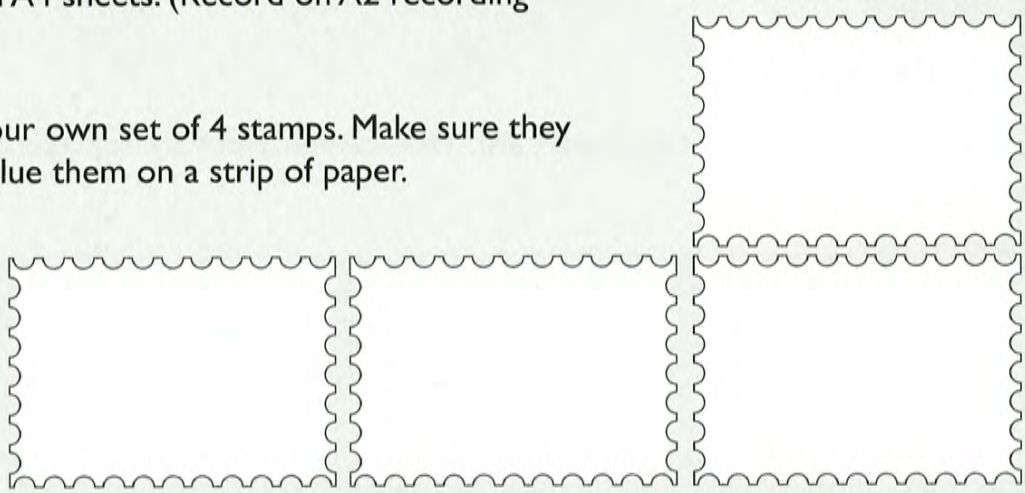
TASK 2: Use the stamps and A4 sheets of paper to work out - ***If the same number of stamps were stuck on sheets of A4 paper how many sheets of paper would be needed? (Fit as many on the page as possible.)***

Share ideas - To work out the answer, what information will you need? Share possible ways to solve the problem.



TASK 3: Share ideas - Discuss and record the advantages and disadvantages of packaging the stamps on strips of paper in box and on A4 sheets. (Record on A2 recording sheet.)

Task 4: Design your own set of 4 stamps. Make sure they are the correct size. Glue them on a strip of paper.



10.

Eureka!

DID YOU KNOW?

Archimedes was a famous Mathematician and Scientist.
One of his discoveries now know as ***Archimedes Principle*** is that a body partially or fully submerged in a fluid, experiences an upward force equal to the weight of fluid that is displaces. One story suggests that he discovered this principle while having a bath. As he sat in the bath he noticed the water level rise. That triggered his mind and he jumped out of the bath and ran down the street yelling "Eureka!'.
What a horrible sight that must have been.

Read the book - Mr Archimedes' Bath by Pamela Allen.

Eureka

Materials Needed:

- Did You Know? Card
- Book - Mr Archimedes' Bath by Pamela Allen.
- Measuring container
- Plasticine
- Assorted unusual shaped solid objects e.g rocks

TASK 1: Read the **Did You Know?** sheet and the book ***Mr Archimedes' Bath written by Pamela Allen.***

We can use this principle of displacement to work out the volume of unusually shaped solids.

TASK 2: Fill a litre measuring container with 500mls of water. **Put** a given lump of round plasticine in the container and note how much the water rises. Now change the shape of the same plasticine and put it back in the same container. *Note how much the water rises in the container.*

Repeat with other shapes made out of the piece of plasticine. **Share ideas** - ***What did you notice about the changes in the water level?***

TASK 3: Find out the volume of the objects in the suggestions tray by using the same principle of displacement. Create a table for the team to record their findings.

Record the name of the object or its shape, your estimate of the volume of the object and the actual volume calculated on the team recording sheet. **Compare** the estimates with the actual volumes calculated. ***Were your estimates reasonable?***

Share Ideas - ***Compare the volume of the different objects. What did you notice?***

Eggsactly

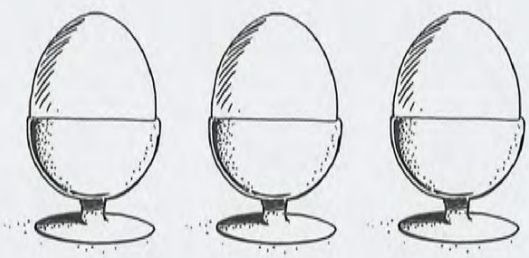
Materials Needed:
- Carton of eggs
- Empty egg cartons
- Digital scales
- A2 sheet of paper

BACKGROUND INFORMATION:
Eggs are sold in cartons according to their mass. The following information was printed on one carton of eggs:

12 fresh eggs *50g min net weight each egg*
600g min net weight
This means that each egg must weigh at least 50 grams.

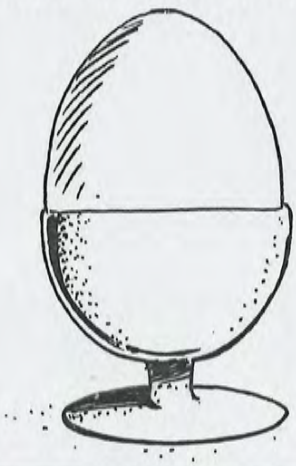
The ***net weight*** of an object doesn't include the mass of any packaging.
The ***gross weight*** of an object is the total mass of the object including the packaging.

TASK 1: Weigh the egg carton with the eggs on the digital scales to find out the gross weight. **Weigh** the empty egg carton. Use this information to find out:
- The net weight of the 12 eggs.
- The approximate weight of each egg.



Inspectors choose cartons at random to check that the egg packers are not including eggs below the minimum net weight.

TASK 2: Your team needs to check and record the mass of each egg in a carton of eggs. **Use** the digital scales to weigh each egg. ***Accuracy is extremely important.*** Record the information in a table. **Add** the total weight of the 12 eggs and compare with the weight recorded on the egg carton.



TASK 3: Share ideas - Are there any other differences between the eggs in the carton of eggs?

TASK 4: Write a team report to the egg marketing board on your findings about the eggs in the carton.

TASK 5: Change the original egg carton (2x6 or 6x2) to a 4x3 or 3x4 design.

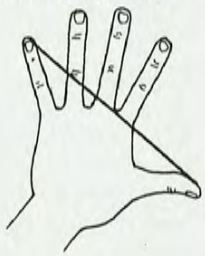
12.

A Hand Measure

Materials Needed:

- String
- Assorted tape measures/rulers
- Calculator
- Recording sheet - A3 plain paper

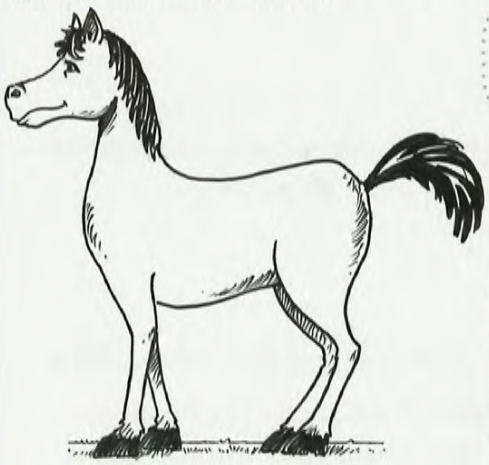
BACKGROUND INFORMATION: *A hand measure is defined as being the distance between the tip of the thumb to the tip of your little finger when your hand is stretched out. Horses are measured in hands. A horse might be described as standing 16 hands high (hh) whereas a pony might be 13 hh.*



TASK 1: Find out the hand measure of each person in the team. **Trace** around your hand while your fingers are wide open. **Rule** a straight line from the tip of your thumb to the tip of your little finger. **Measure** the distance in cm. **Cut** a piece of string to show your hand measure. Compare your hand measures (hand breadths).

BACKGROUND INFORMATION: *The standard hand measure is about 10cm long (or actually 10.6cm).*

TASK 2: Compare your hand measure with the standard hand measure. Calculate the average hand measure for the members of the team.



BACKGROUND INFORMATION: *Phar Lap is a famous Australian horse that stood 17.1 hands high.*

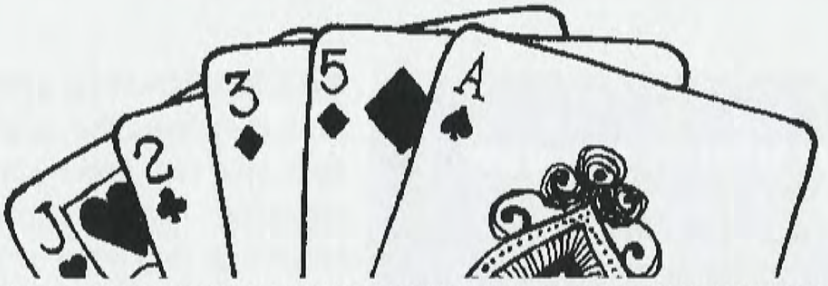
TASK 3: Use a standard hand to show the height of Phar Lap. **Use** string to show how high this horse stood. **Measure** 17 hands using the smallest hand measure in the team. **Use** string to show the height. **Measure** 17 hands using the largest hand measure in the team. **Use** string to show the height.

TASK 4: Share ideas - Compare the hand measures for Phar Lap. ***What did you notice?*** What are the advantages and disadvantages of using hand measures to determine height? Record ideas on the team recording sheet.

13.

14. Cut The Deck

Materials Needed:
- Playing cards
- Graph paper
- A-2 paper



Note: Before you do the tasks, remove the jokers from the pack of cards and shuffle them.

Task 1: Share ideas- If you cut the deck of cards 20 times, what colour would you expect to turn up more often? Cut the deck 20 times and record the results. Compare with your predictions. What did you notice? If you repeated this activity 100 times what results could you expect for each colour?

Task 2: Plan an investigation to find out — (work in pairs)

- What ***suit*** will turn up the most if the deck is cut 20 times.
- What ***picture card*** will turn up if the deck is cut 20 times. *(You will need to remove all of the number cards for this investigation.)*

Record *the results in a table.*
Create *a simple graph to show the results of your investigation.*
Present *all data and findings on a team sheet. (A-2)*

Task 3: Share the results of your investigation with others in your team. **Share ideas-** Predict the results if you repeated the cut 40 , 80 and 100 times? Justify predictions.

All About Pencils

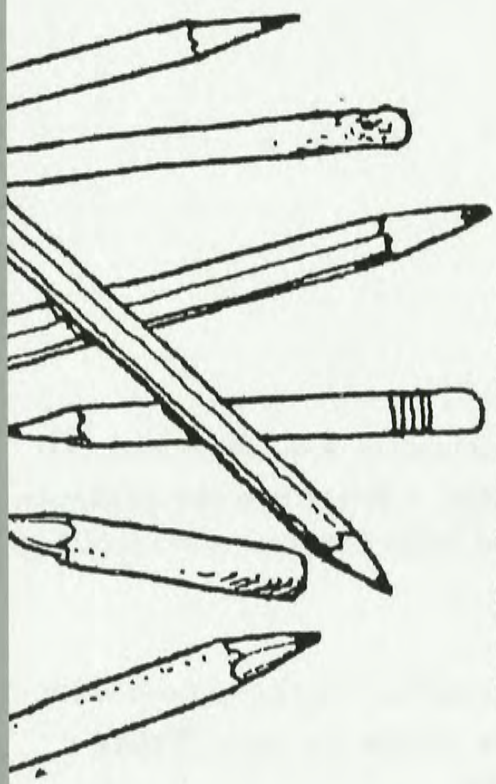
Materials Needed:

- 5 bags of assorted pencils (25 in each bag)
- New pencils
- Assorted tape measures and rulers

BACKGROUND INFORMATION: The pencil was invented in 1565. More than 14 billion pencils are produced in the world every year which is enough to circle the globe 62 times. Pencils didn't have erasers until 100 years ago because teachers felt they would encourage students to make a mistake.

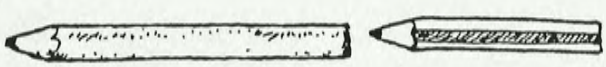
TASK 1: Share ideas - the average pencil can be sharpened 17 times, write 45 000 words or draw a line 56km long. ***How do you think they found out this information about pencils?***

TASK 2: Take a bag of assorted pencils each and sort them into groups. Ask another student to identify how you have sorted the pencils. **Combine** all of the pencils and, as a team, sort them all into groups.



TASK 3: Select 10 different length pencils and order them according to length. (This is called ***Seriating.***) Use a ruler to measure the length of each pencil in cm and record the information in a table . **Share ideas - Compare** the length of each pencil with the length of a new pencil.

TASK 4: Line up enough pencils to show the approximate length of a 30cm ruler. Use a ruler to check the length of the line of pencils and make any adjustments needed so it is close to 30cm.



TASK 5: Line up enough pencils to show approximately a metre in length. **Measure** with a tape and make any adjustments needed so the line is a metre long. **Find** out how many metres you can make with all of the pencils lined up.

TASK 6: Find out how many times you can sharpen a new pencil. Take turns to sharpen the pencil. (6 turns of the pencil each time.)

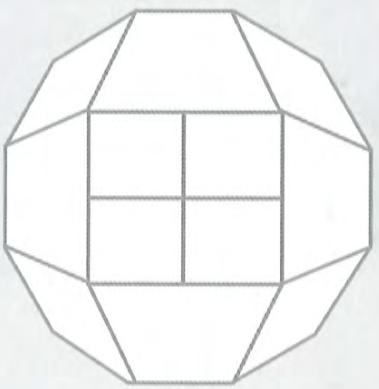
15.

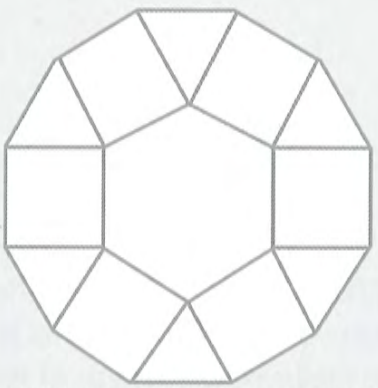
Making Dodecagons

Materials Needed:

- 5 sets of Pattern Blocks
- Digital camera
- A2 sheet of paper
- Barrier

BACKGROUND INFORMATION: A dodecagon is a 12 sided shape. There are over 60 different dodecagons that can be made using different combinations of pattern blocks. Here are three examples:





TASK 1: Create the 3 examples of dodecagons with the pattern blocks. **Share ideas** - ***What are the common attributes of Dodecagons?*** Record on the team recording sheet.

TASK 2: Use the pattern blocks to create other examples of dodecagons. **Display** the models you make. **Take** a digital photo of the shapes made.

TASK 3: Select a dodecagon shape made and hide it behind the barrier from the others in the team. **Give** oral directions to other team members to make the hidden dodecagon. **Repeat** with other examples made.

16.

Money Trail

Materials Needed:
- Coins
- Calculator
- Metre rulers
- Tape measure

BACKGROUND INFORMATION: A trail of money can be made to raise money for a good cause. The amount of money raised will depend on the coin used to create the trail.

TASK 1: Investigate to find out how much money can be raised if a money trail extended for 50m and used the following coins:
- Trail 1 - 5c pieces
- Trail 2 - 10c pieces
- Trail 3 - 20c pieces
- Trail 4 - 50c pieces
- Trail 5 - $2.00 coins

Note - The coins need to be in a straight line and the sides touching with no overlapping.

Share ideas - ***What information do we need to work out how much each trail is worth? What would be useful to help calculate the amounts?***

Record the ***money raised*** using each coin, and the ***total number of each coin*** used in the trail, in a table on the team recording sheet.

TASK 2: Order the trails from the most to the least amount of money raised.

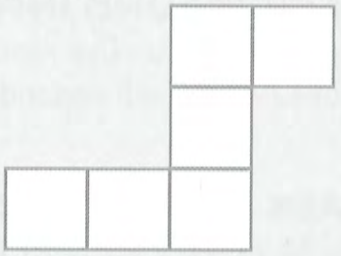
TASK 3: Estimate how much money would be needed to border the desk you are working on using -
- 20c coins
- $1.00 coins

Work out the total cost. **Compare** with your estimate.

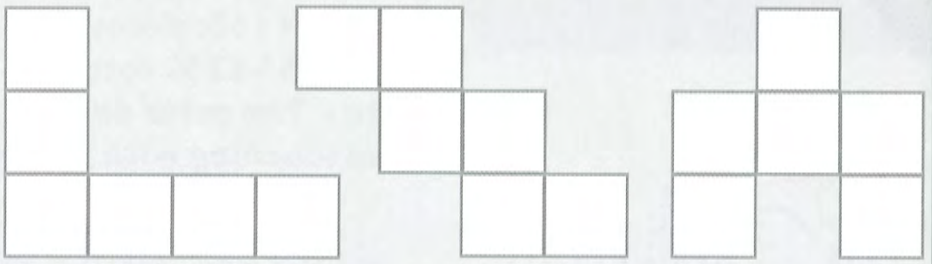
Making Hexominoes

Materials Needed:

- Plastic square tiles
- Paper squares
- Digital camera
- A2 sheet of paper



BACKGROUND INFORMATION: *Hexominoes are shapes with 6 squares connected together along their sides like this:*



There are 35 different ones to create.

TASK 1: Use the square tiles to make as many hexominoes as you can. Take a digital photo of your examples. **Use** the paper squares to create them and glue them on the team recording sheet.

TASK 2: 11 of the hexominoes can be folded to form a cube. *Eg. The T shape hexominoes can be folded to make a cube.*

Select which hexominoes you think will make a **cube** and **draw** them on grid paper so you can **fold** them to check.

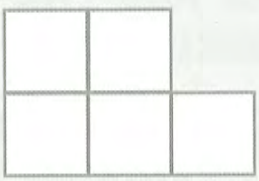
18.

Discovering Pentominoes

Materials Needed:

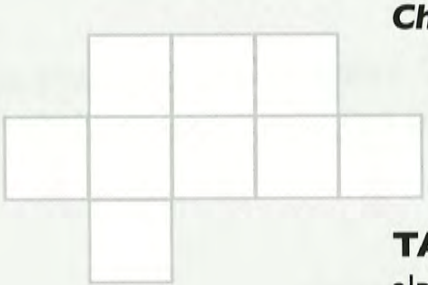
- Paper square tiles
- 5 sets of pentominoes
- Grid paper
- Pentomino game card
- A2 sheet of paper

BACKGROUND INFORMATION: A pentomino consists of five squares connected together so that each square has at least one side in common with another square.
Eg:



There are 12 pentominoes to make using the 5 squares.

TASK 1: Use the square tiles to discover and make the 12 pentominoes. **Create** the pentominoes with the paper squares and glue them on the team recording sheet.
Share ideas - Are there any duplications, reflections or rotations included?



Check - How many pentominoes are 5 squares in a row?
How many pentominoes are 4 in a row?
How many pentominoes are 3 in a row?
How many pentominoes are 2 in a row?

TASK 2: Identify which alphabet letters each of the pentominoes resemble and **record** this on the team recording sheet.

TASK 3: Identify which pentominoes you think can be **folded** to form a box without a lid. **Draw** and **cut out** the ones selected to check your choices.

TASK 4: *Play the Pentomino Game.*
You will need:

- Pentomino Game Card (shape to cover)
- Set of Pentomino Pieces

Rules - 1. Each person in turn places a pentomino piece on the shape provided. The winner is the last person to able to place a piece on the shape.
Investigation: Can this shape be covered with the 12 pentominoes?

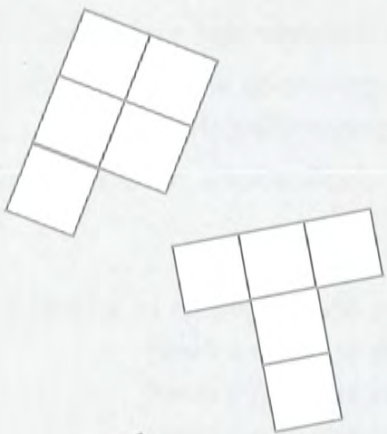
19.

Tessellating Pentominoes

Materials Needed:
- Set of pentominoes
- Full house cards
- A2 piece of paper

WILL ALL THE PENTOMINOES TESSELLATE?

TASK 1: Share ideas - write a definition for tessellate. How will you know if a shape tessellates?

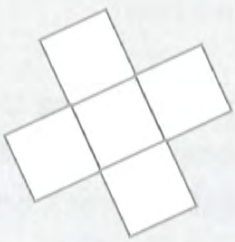


TASK 2: Use the pentominoes to discover which ones tessellate. **Draw** the tessellating patterns created and glue them on the team recording sheet.

Share ideas -

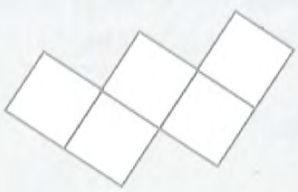
Which pentominoes tessellate in several ways?
Do some tessellate more easily than others?

TASK 3: Select and create one tessellating pattern on an A4 sheet of paper and colour it, using 2 or more colours to create a pattern.



PENTOMINO CHALLENGE:

TASK 4: Use all twelve pentomino pieces to make all of the shapes on the ***Full House*** card.



Make a set of shapes on your own that can be filled using all of the pentomino pieces. (Keep a copy of the solution.) Allow another team member to cover the shapes with the pieces.

20.

Hundreds Chart

Materials Needed:

- Laminated 100 charts
- Whiteboard markers (assorted colours)
- 100 charts - paper
- A2 recording sheets
- Stop watches

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

TASK 1: Share ideas - Which digit is written most/least often on a 100 chart? **Record** predictions.

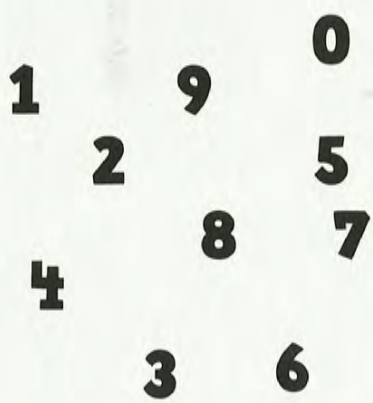
TASK 2: Use the 100 chart to find out which single digit is written the most often on a 100 chart. **Record,** in a table, how many of each digit is recorded on the chart. Which single digit is written least often on a 100s chart?

TASK 3: Share ideas - How many single digits do you need to write the first 100 counting numbers? **Identify** 3 methods your team could use to find the answer. Try each method and decide which is the most efficient. **Record** your working out on the team recording sheet.

TASK 4: Share ideas - How many of the first 100 counting number contain:

- ***Only even*** digits
- ***Only odd*** digits
- ***Both odd and even*** digits

Decide on a method to investigate this. **Record** findings on the team recording sheet. You can record the answers as whole numbers, fractions or as percentages.

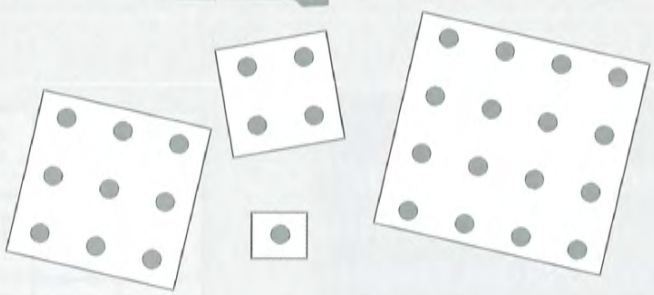


100 CHALLENGE

Who, in the team, can write the first 100 counting numbers the quickest? **Use** a stop watch to record the time taken by each person. ***Can you find the quickest way to do it?***

21.

Square Numbers

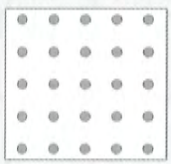


Materials Needed:

- Dotted paper
- Grid paper
- Geoboards and rubber bands

Task 1: Share ideas – ***What do you know about square numbers?*** **Record** what you know on the team recording sheet. Include ***written*** information and ***pictorial*** examples of square numbers (use dotted or grid paper.) Show examples of square numbers on the geoboards using the rubber bands.

Discuss – ***What is the rule for finding square numbers?***



Some numbers can be written as the sum of four square numbers. *Eg:*

9	4
4	1

18= 9+4+4+1

16	9
1	1

27= 16+9+1+1

Task 2: Write these numbers as the sum or total of 4 square numbers. **Share ideas** – What method can we use to discover the 4 square numbers that add to the given number?

31 ***52*** ***99*** ***48***

65 ***82*** ***220*** ***207***

Task 3: Choose your own numbers that are the sum of 4 square numbers. **Ask** a team member to find the 4 square numbers that add up to the number given.

22.

Magic Nines

Materials Needed:

- Magic cards– 99 999 9 999
- Score sheets
- Calculators
- A-2 recording sheet
- 10 sided dice

Task 1: Follow the instructions on the ***99 Magic*** card. You may want to use a ***calculator.*** **Share ideas-** What do you notice about the results?

Task 2: Does ***999*** weave the same MAGIC ?
Follow the instructions on the ***999 Magic*** card.
Share ideas- Compare your findings with the 99 Magic card.

Task 3: Will the same result happen with the magic 9 999?
Investigate.
Follow the directions on the ***9 999 Magic*** card.
Share findings.

Task 4: ***Play- 999*** or ***BUST.***

This is a game for ***2-4 players.***
How to Play:

- Take turns to roll the 10 sided die. If a 4 is rolled the player can count it as 4, 40 or 400. (Select a value of ones, tens or hundreds.) The selected amount will become the player's score for that round and is recorded on the score sheet.
- Each new score is added to the previous total and the new score is recorded on the score sheet after each round.
- After 7 rounds, the player whose total is closest to but less than 1000 is declared the winner. If you go over 999 at any stage before the end of the game you are out. ***BUST!***

Share ideas– ***What strategies are useful to help you get close to 999?***

Play again. This time plan your strategy to win.

23.

Playing Cards

Materials Needed:

- Grouping circles
- Playing cards
- Criteria cards
- Carroll Diagram– A-3 card
- Blank playing cards

Task 1: Lay the playing cards on the table face up. Look at the symmetrical patterns on the cards. **Sort** the cards into ***3 groups:***

- Cards which have ***line symmetry.***
- Cards which have ***rotational symmetry.***
- Cards that have ***line and rotational symmetry.***

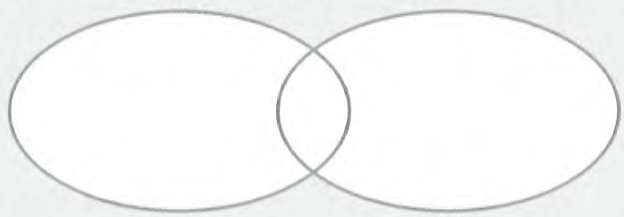
Task 2: Design your own playing cards to represent ***11 12 13.*** The symbols need to be arranged in a symmetrical pattern. **Draw** the designs on the blank playing cards. Ask your team members to identify whether the cards show rotational and/or line symmetry.

Sort all of the cards made by the team, according to the symmetrical pattern created.

11	12	13

Task 3: Take turns sorting the playing cards into groups. Use the grouping circles. Ask your team members to ***identify the criteria*** you used to sort the cards.

Task 4: Use the grouping circles to create a ***Venn Diagram.*** Select two criteria cards and place each one in a circle. **Sort** the cards. Change the criteria cards and sort again.



Task 5: Sort the playing cards on the ***Carroll Diagram (A-3 card)*** using the given criteria.

	ODD	EVEN	PICTURE
RED			
BLACK			

Magic Card Trick

Materials Needed:
- Template with numbers on
- Calculator

Task 1: Make your own set of 8 cards for this trick.
The first 8 ***ODD*** numbers appear on the front and the first 8 ***EVEN*** numbers are on the back.
Glue the numbers together as shown below:

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

Task 2: *Time to do the card trick.* Work through these steps with a team member:

- Place cards with all ***ODD*** or all ***EVEN*** numbers facing up.
- Ask your team member to flip some of the cards over.
  NOTE-*You are no longer allowed to look at the cards.*
- Ask the team member: How many of the cards are ***EVEN***? What is the **total** of all the numbers? (**Write** it down)
- It is now your job to reveal the number.
  Share ideas- How can you work out the number that has been written down?

How it Works:
- Add up the total of the ***ODD*** numbers (remember that before you start the game).
- Ask how many ***EVEN*** cards are left showing after some of the cards have been turned and **add** that number to the total of all the 8 ***ODD*** numbers.
- Now see if it works each time you do the trick.

1	**4**	**5**	**8**	**9**	**12**	**13**	**16**

Are the cards showing? You are told that 4 cards are even. You know the total of the odd cards is 64 so you add 64 + 4 = 68. This will be the mystery number. Case Solved.

Task3: Challenge - Share Ideas- Could you perform this trick by knowing what the first 8 ***EVEN*** numbers add up to? What would your volunteer have to tell you about the cards this time? Would you ***ADD*** or ***TAKE*** that number from the total of the ***EVEN*** cards? Do the trick and see.
REMEMBER-**Keep** how it works a secret.

25.

You Need Glasses

Materials Needed:

- Messy maths box - assorted items
- Rulers/tape measures
- Assorted glasses
- White board/markers
- A2 paper

BACKGROUND INFORMATION: They say that if you measure the circumference (distance around the rim of the glass) of most glasses it will be larger than the **height** of the glass. Is this TRUE?

TASK 1: Plan an investigation to find out if this statement is correct. **Share ideas -**

- How many different types of glasses should we measure?
- How are we going to measure the circumference and height?
- How can we record our measurements so that we can compare the circumference and the height of the glasses?

TASK 2: As a team, measure the ***circumference*** and ***height*** of each of the selected glasses using your chosen method. Present your findings on paper. Include the evidence to prove the statement true or false.

TASK 3: Share ideas - Are you able to say how much bigger the ***circumference*** is than the ***height*** for each glass? Record this information.

TASK 4: Is this true for champagne glasses? Measure and find out. **Share ideas -** when you compared the circumference and the height of these glasses what did you notice? How much bigger is the ***circumference*** or the ***height?***

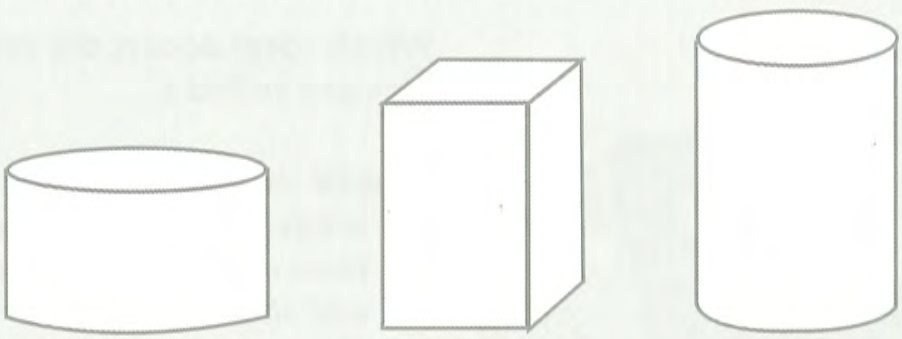
26.

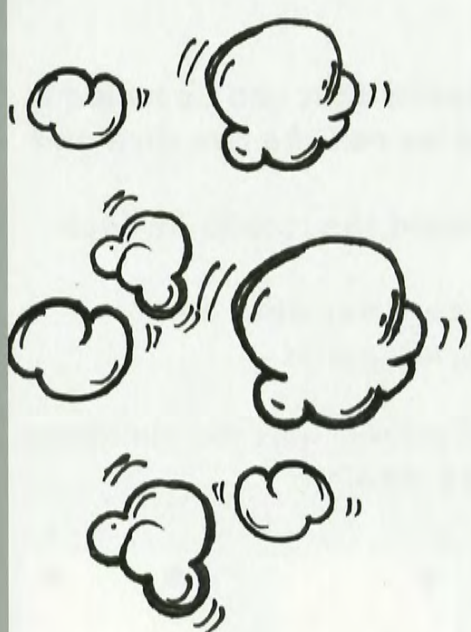
Popcorn Packets

Materials Needed:

- A-4 paper
- Measuring cups
- Popcorn /crunched up paper
- Scoops
- Samples of popcorn containers

Task 1: Your team is to ***design a popcorn packet*** that will hold the most popcorn. Each container is to be made out of a single sheet of A4 paper. If you are making a cylinder you are able to use other paper to make the bottom. Sticky tape can be used to hold the container together.





Task 2: Determine which packet offers better value for money if it is used to hold popcorn sold at the cinemas.

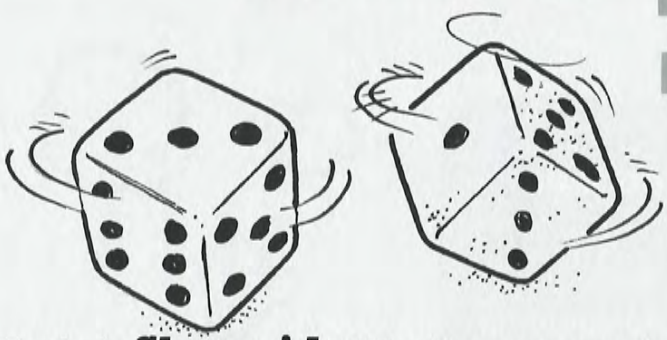
Share ideas- How can we find out which container holds the most popcorn? Record how much each of the packet designs hold.

Task 3: If the popcorn costs ***50c per cup*** how much would each of your popcorn containers cost? Record answers.

Task 4: Design a label for your popcorn packet. Make sure it will fit on the front of the packet.

27.

Roll Of The Dice



Materials Needed:
- 6 and 10 sided dice
- Graph paper
- A-2 and A-3 paper

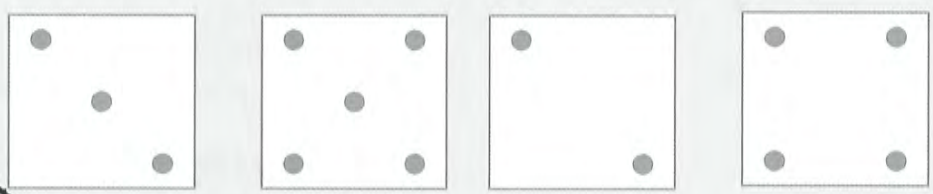
Task 1: Share ideas- Many games ask you to roll two dice and add the numbers to move along the board.
- What is the highest score possible ?
- What is the lowest score possible ?

Task 2: In your team, plan an investigation to answer the follow question:

Which total occurs the most often when two 6-sided dice are rolled ?

Share ideas-
- ***What are the possible totals that can be rolled ?***
- ***How many times should we roll the two dice and add them?***
- ***How are we going to record the results of each roll ?***
- ***How are we going to record our data and findings?*** *Eg: pictures, tables, tally, graphs.*

Task 3: Find out and record all possible ways you can ***throw a total of 14*** using ***4 six-sided dice***?



Task 4: CHALLENGE-
How many different ways can you throw a total of ***14*** using ***4 ten sided dice***? Record all possibilities.

28.

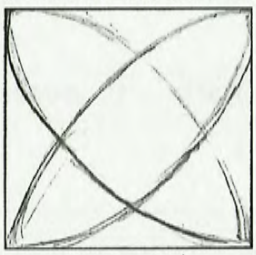
Creating Patterns

Materials Needed:

- Compass/pencil
- Squares of paper (different sizes)
- Textas
- A-2 paper

Task 1: Design patterns on the squares of paper using a compass and pencil.

Follow these directions:

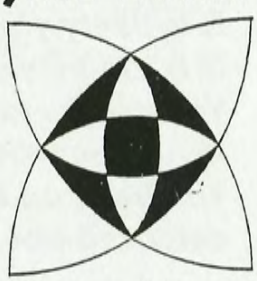


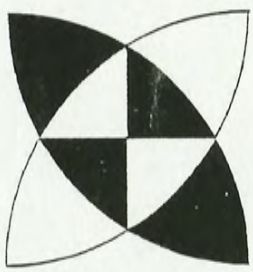
The ***radius*** for drawing the first lines in the square is ***equal to the length of the side of the square.***

Put the compass in each corner of the square and draw the four lines.

To complete the patterns as shown below, you need to work out where to put the compass point next and what the radius would be to create the other lines. **Colour** your designs.

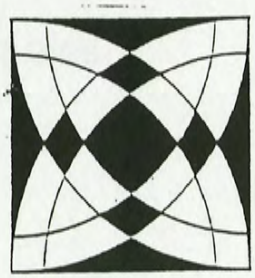
Share your ideas.

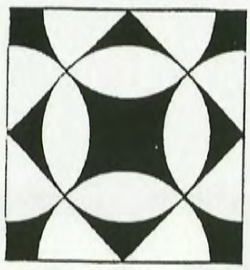




Task 2: Share ideas– What features do your patterns show? Are they symmetrical? (How many lines of symmetry?) Which designs have rotational symmetry?

Task 3: Experiment and find out what other designs you can create. Show others in your team how to create your designs. **Colour** designs to create the pattern. Make a ***team collage*** of the designs.





29.

Taking A Chance

Materials Needed:
- Lolly jars (clear)
- Counters –coloured and white
- Chance cards

Task 1: As a team order the chance cards from most to least likely to happen. *Eg:*

highly unlikely	***even chance***	***impossible***

CERTAIN ——————————— ***IMPOSSIBLE***

Identify a situation that would match each of the cards. Write down a example of a situation to match each of the cards. *Eg.* ***certain*** - ***It will rain today.***

highly unlikely - ***Teacher will come to school with purple hair.***

Task 2: Place counters in the lolly jar to show ***(total of 20)***:
- ***It is likely you will take out a coloured one.***
- ***It is unlikely you will take out a coloured one.***
- ***You are certain to take out a white one.***
- ***It is impossible to take out a white one.***
- ***You have an even chance of taking out a coloured one.***

Task 3: Draw marbles in bags to show ***(10 marbles in each bag)*** Colour choices: ***YELLOW RED BLUE GREEN***

BAG 1: You have no chance of taking out a ***yellow*** marble.
BAG 2: You have a better chance of taking out a ***green*** than a ***red.***
BAG 3: You are unlikely to take out a ***yellow*** or a ***blue.***
BAG 4: You have an equal chance of taking out a ***red*** and ***yellow.***
BAG 5: You are certain to take out a ***green*** marble.

30.

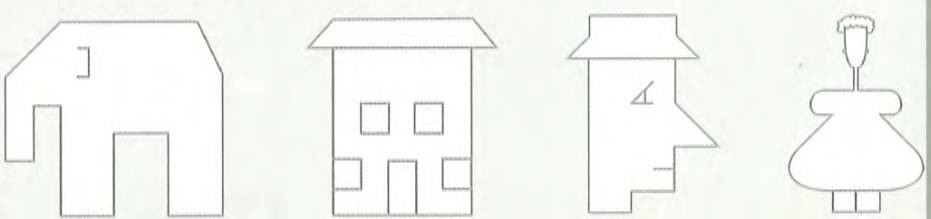
Caricatures

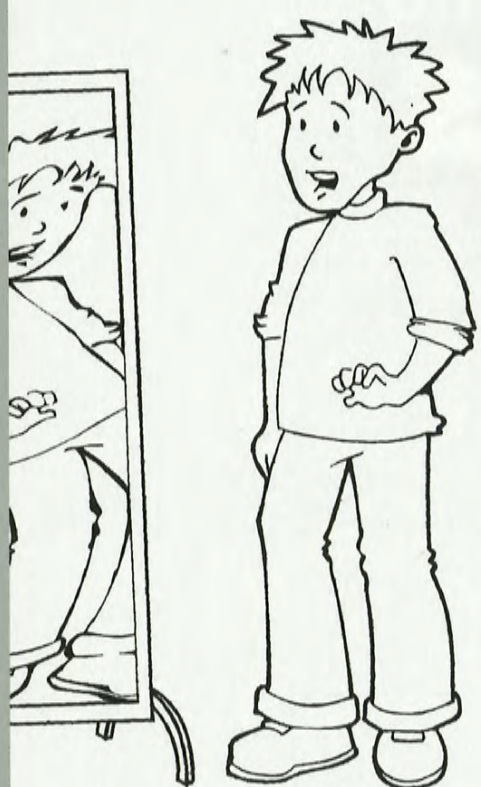
Materials Needed:

- Cards with figures on.
- Grid paper - circular, square
- Worksheet-grid systems

A CARICATURE IS A DISTORTION.

Task 1: Copy the four figures onto square grid paper 1cm x 1cm. **Cut** the circular grid into 4 equal parts. Each team member is to copy one of the figures onto the circular grid paper. **Glue** the circle back together on paper with the original pictures (A-2 paper).

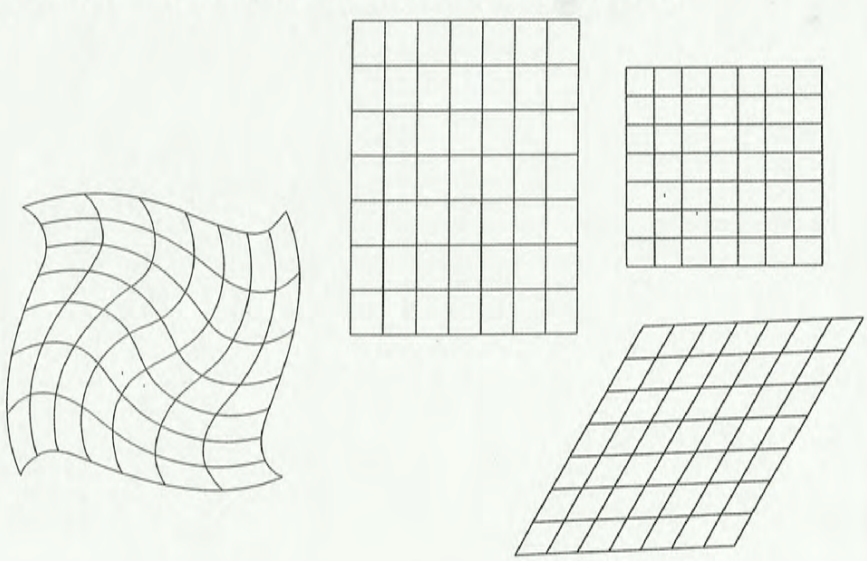




Task 2: Share ideas. How have the figures been distorted?

A SHAPE OR FIGURE MAY BE DILATED, ENLARGED OR REDUCED USING A GRID SYSTEM.

Task 3: Copy the figures onto the different grid systems available. **Colour**. **Glue** onto the A-2 paper with the caricatures. **Share ideas–** What happened to the figures on each grid? (Compare with the original figures.)



31.

Managing Maths Activity Sessions

ANSWER/RESOURCE CARDS

03.

Design Paper Money

$1	$2
$5	$10
$20	$50
$100	

04. Agents in Disguise Clue Cards

ADRIAN IS ***TALLER THAN*** GREG.

CHRIS IS ***TALLER THAN*** ADRIAN.

JACK IS ***SHORTER THAN*** GREG.

IAN IS THE ***TALLEST***.

ETHAN IS ***SHORTER THAN*** ADRIAN BUT ***TALLER THAN*** HARRY.

FRANK IS STANDING ***BETWEEN*** IAN AND CHRIS.

BRIAN IS ***NEXT TO*** JACK.

HARRY IS STANDING ***BETWEEN*** JACK AND GREG.

THERE ARE FOUR SUSPECTS STANDING ***BETWEEN*** GREG AND IAN.

DANIEL IS THE ***SHORTEST***.

ADRIAN	DANIEL	GREG	JACK
BRIAN	ETHAN	HARRY	
CHRIS	FRANK	IAN	

06. Crack the Code : Beale Cipher Cards

1. 38 31 28 23 74 38 - 17 74 23 35 28

2. 22 35 74 31 - 2 32 13 75

3. 20 16 26 11 72 - 59 18 72 31

4. 11 8 11 11 73 73 - 73 59 - 24 3 76

06. Crack the Code : Caesar Shift Cards

1. oic-yrhiv-xli-qex

2. lieh-xs-xli-xsqiv

3. gliwx-mr-xli-exxmg

4. oie-stirw-gliwx

5. xyvr-aie-gpsgoamwi

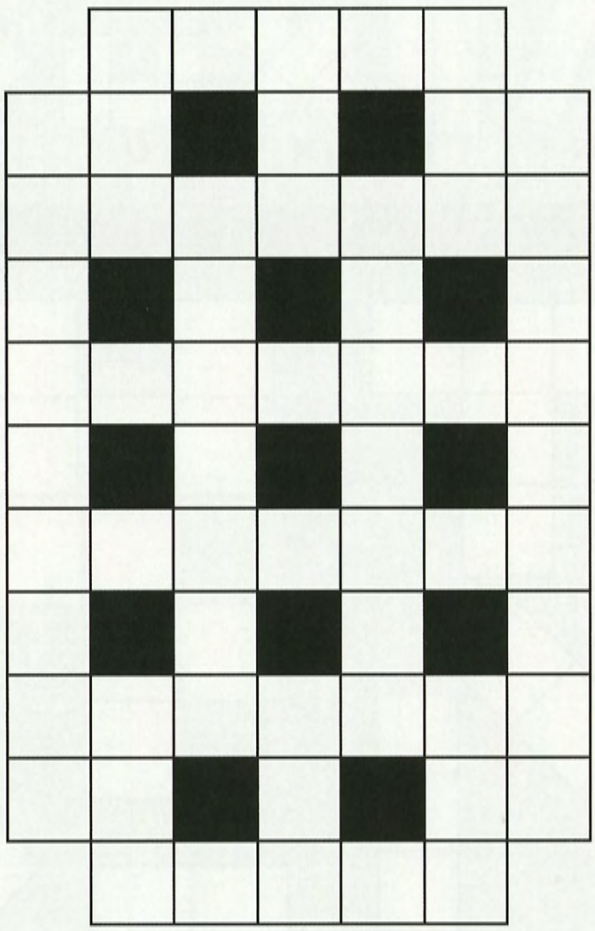
06. Crack the Code : Caesar Shift Answers

1. Key under the mat.
2. Head to the tower.
3. Chest in the attic.
4. Key opens chest.
5. Turn key clockwise.

06. Crack the Code : Beale Cipher Answers

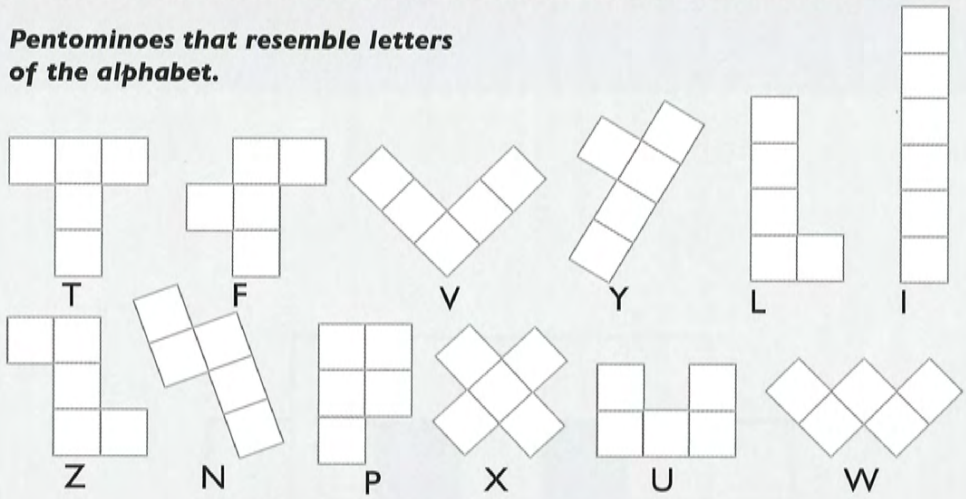
1. Medium Build.
2. Blue Cat.
3. Small Nose.
4. Tattoo On Arm.

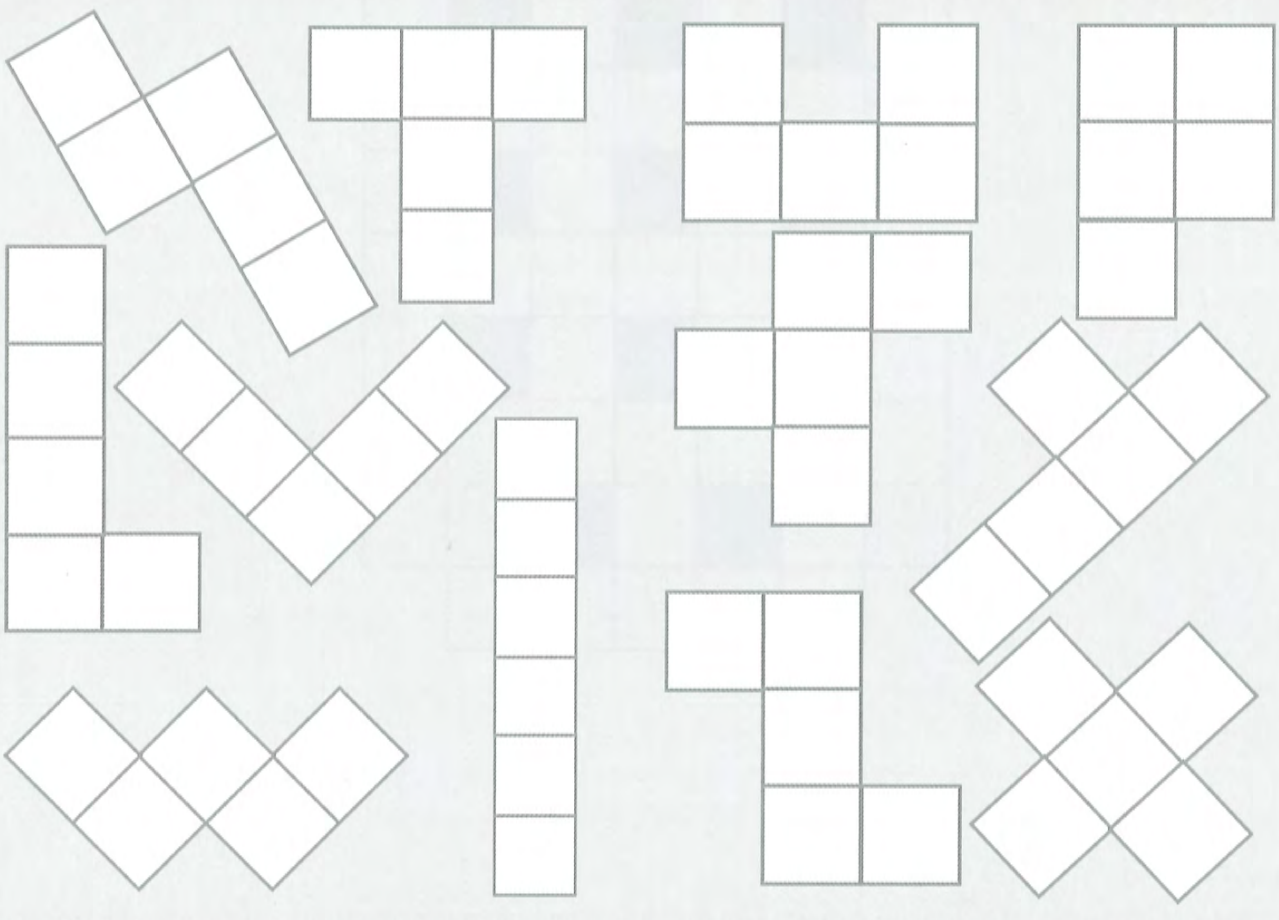
19. Discovering Pentominoes: Pentomino Game



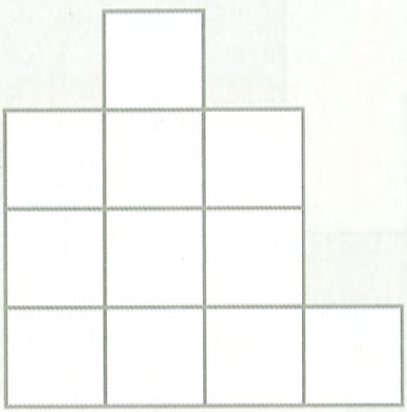
19. Discovering Pentominoes : Answers

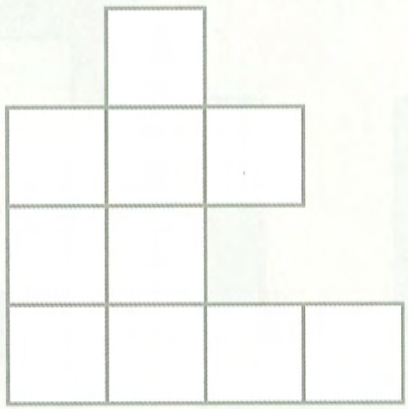
Pentominoes that resemble letters of the alphabet.

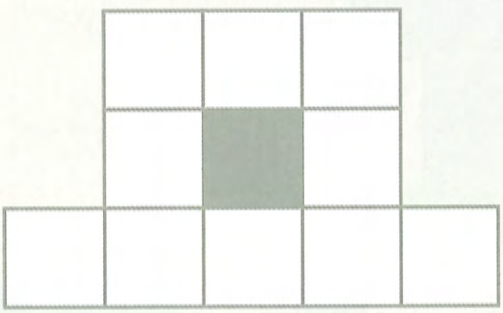


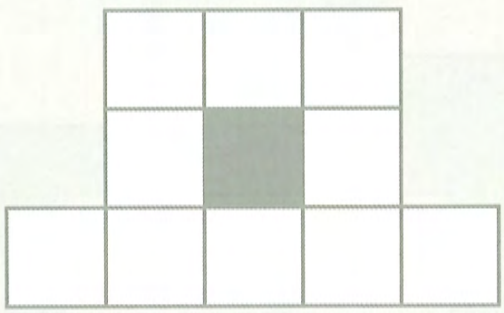


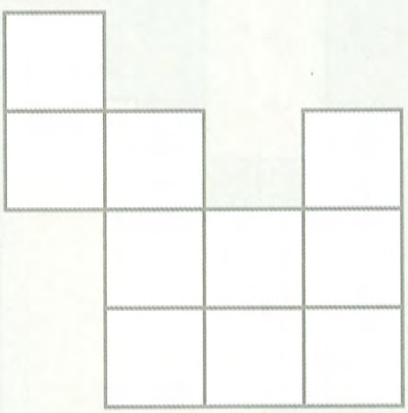
20. Tessellating Pentominoes: Full House

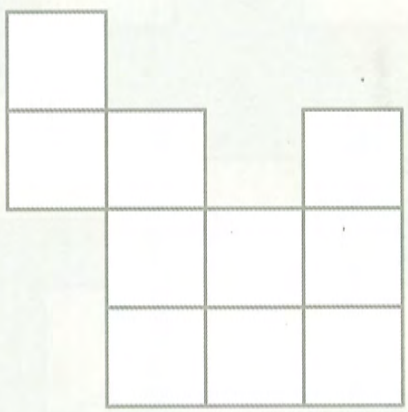




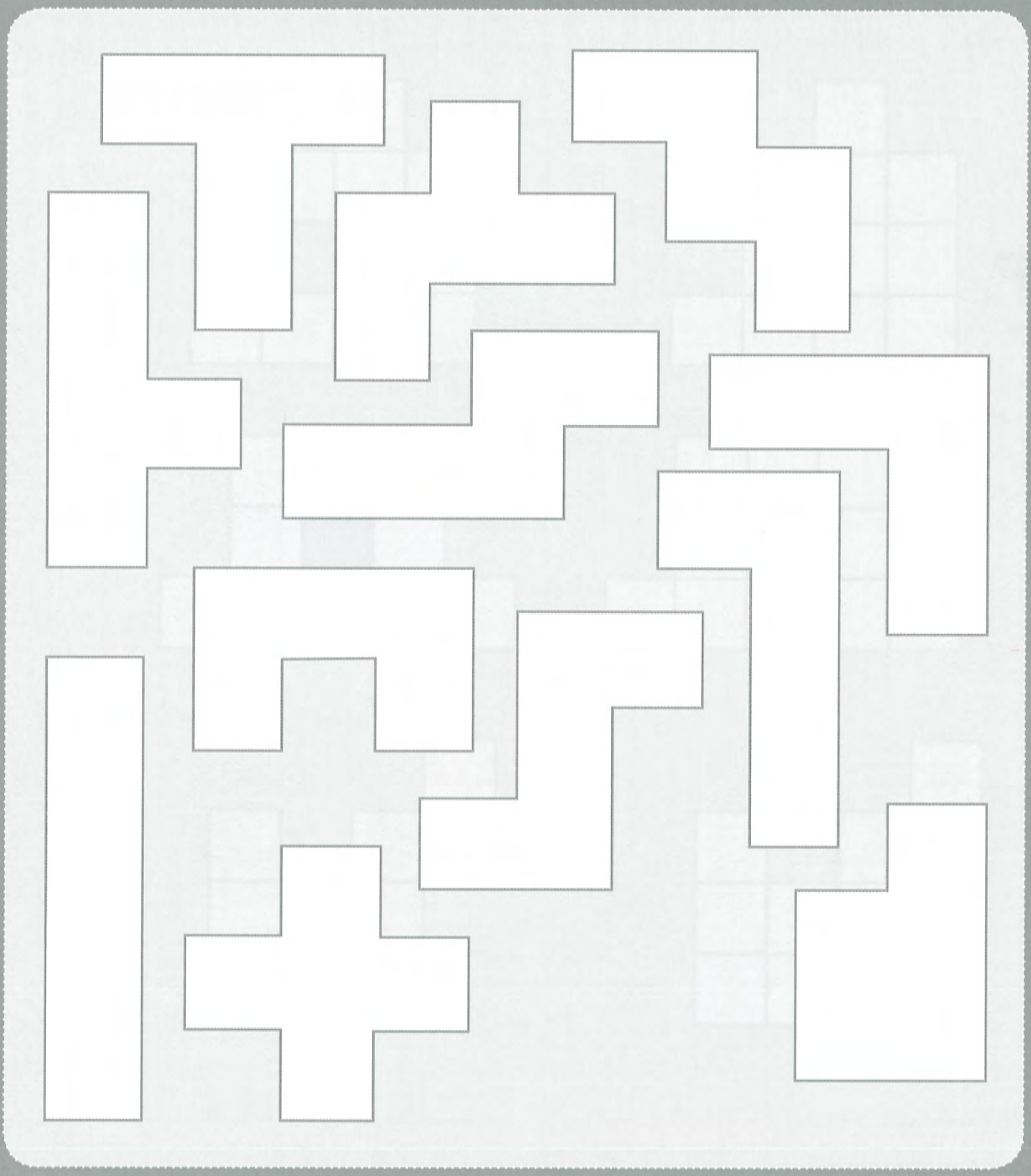








20. Tessellating Pentominoes : Pieces



22. Square Numbers : Answers

Note: There may be more than one set of answers.

31

9	9
9	4

OR

31

25	4
1	1

One answer is provided for the rest:

52

25	25
1	1

99

64	25
9	1

48

36	4
4	4

65

49	4
4	4

82

36	36
9	1

220

81	81
49	9

207

100	81
25	1

23. Magic Nines : Magic Nine Cards

99 MAGIC

1. Divide any two digit number by 99 *eg. 35 ÷ 99*

2. Try another two digit number and divide it by 99.

3. What do you notice about the results?

4. Predict what 47 ÷ 99 will be.

Were you right?

999 MAGIC

1. Divide any three digit number by 999. *eg. 458 ÷ 999.*

2. Try dividing other three digit numbers by 999.

3. What do you notice about the results?

4. Predict what 294 ÷ 999 will be.

Were you right?

9999 MAGIC

1. What do you think would happen if you divided 4 digit numbers by 9999? eg. 2378 ÷ 9999.

INVESTIGATE.

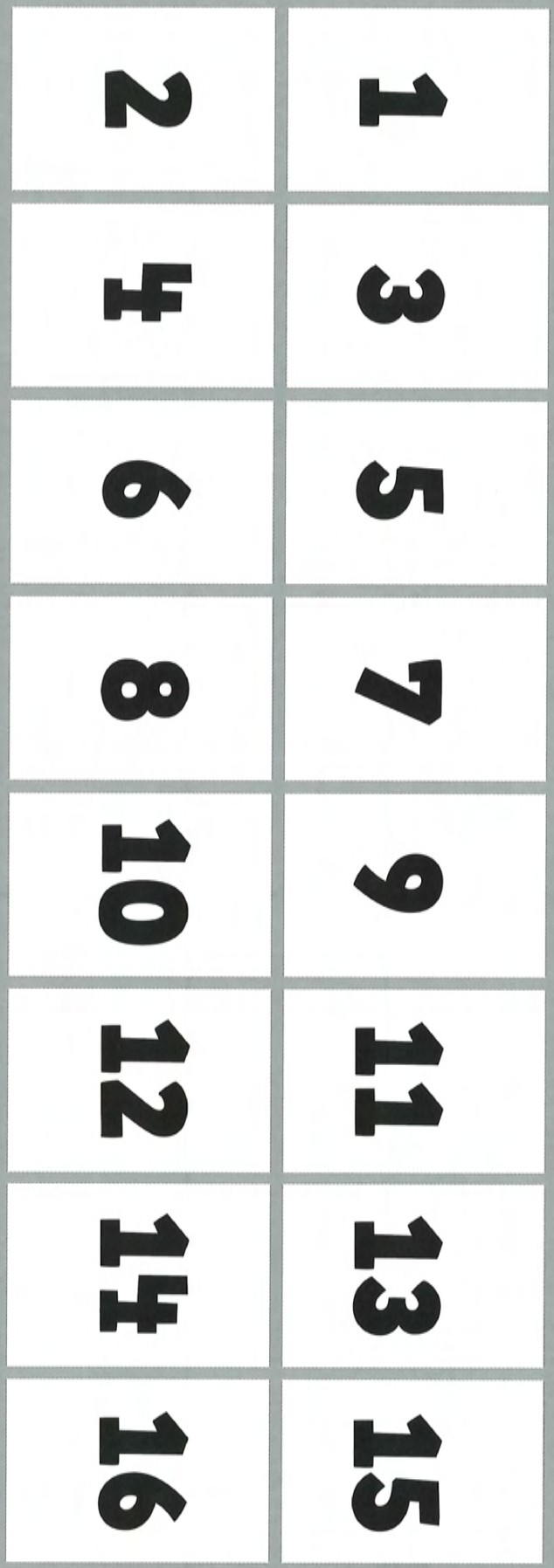
24.

Playing Cards : Carroll Diagram

	RED	BLACK
ODD		
EVEN		
PICTURE		

25.

Magic Card Trick : Cards



30.

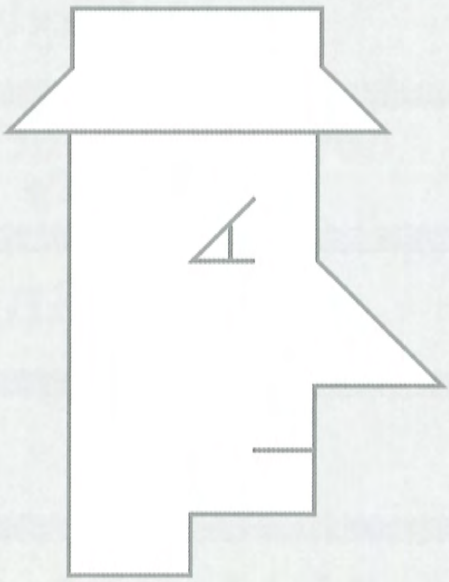
Taking A Chance : Chance Cards

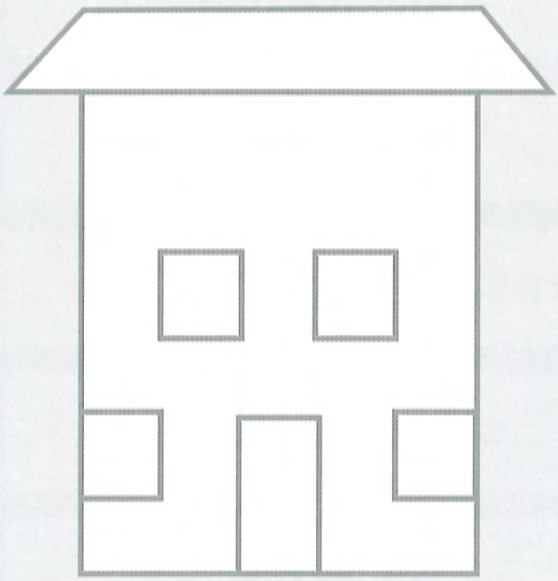
certain	fairly likely
sure thing	not in a month of Sunday's
likely	one in a million
extremely likely	never
slim chance	highly probable
no way	impossible
even chance	uncertain
possible	a small chance
maybe	pigs might fly

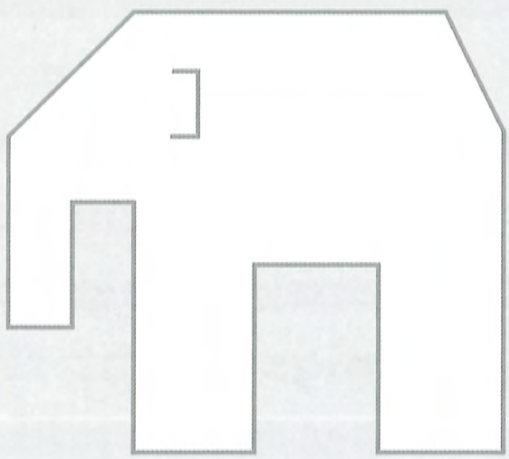
probably
in a blue moon
fat chance

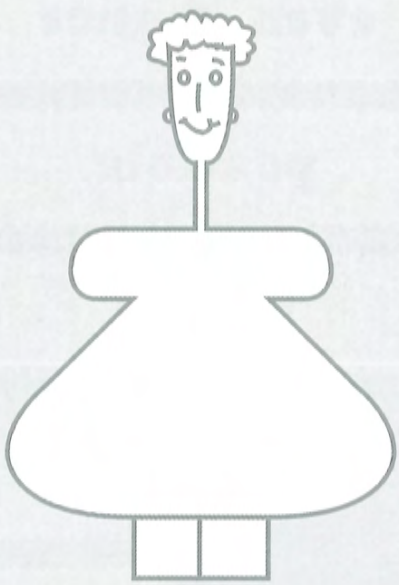
31.

Caricatures : Picture Card



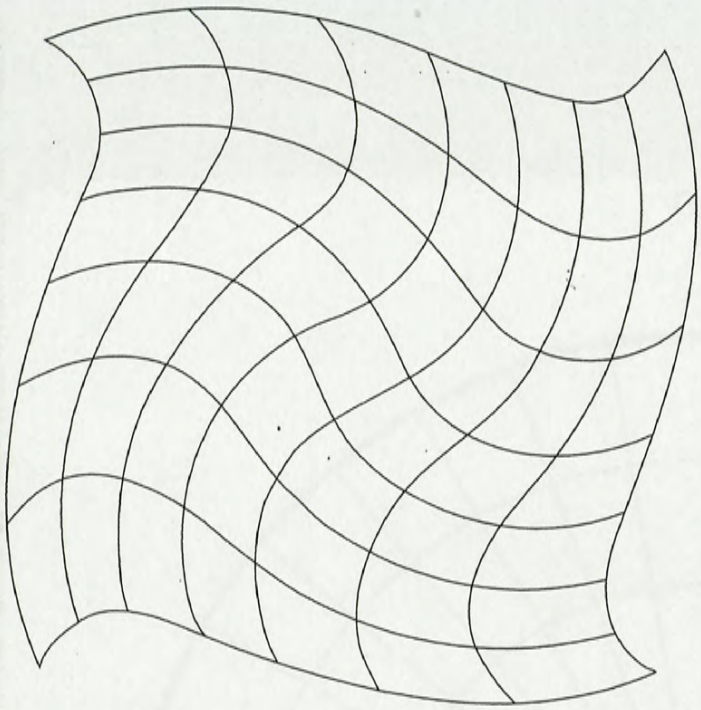


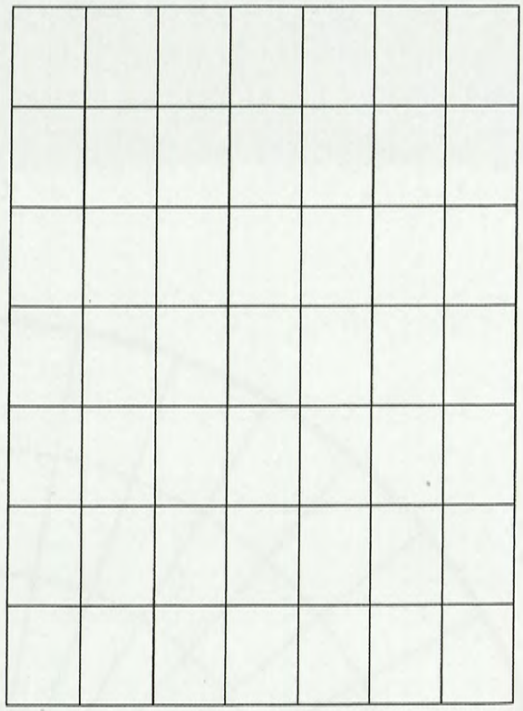


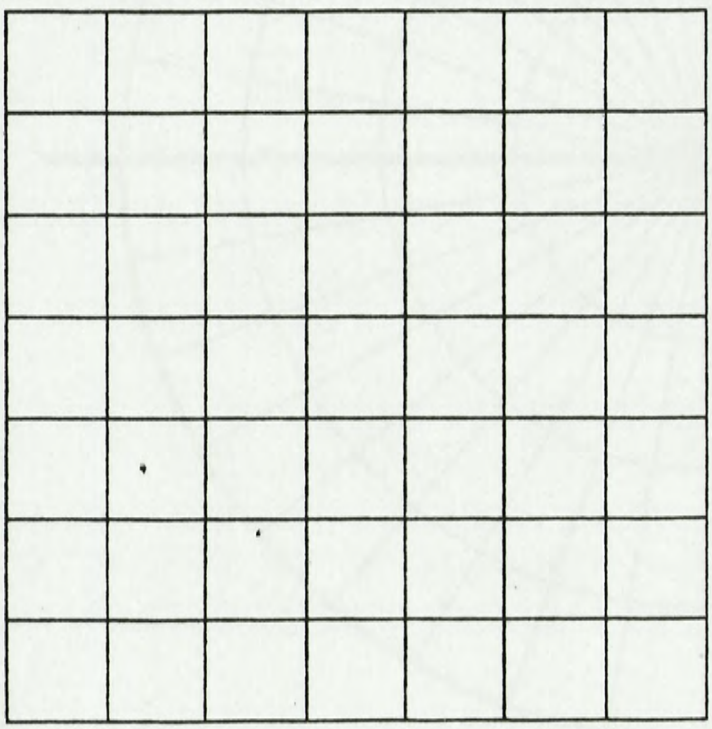


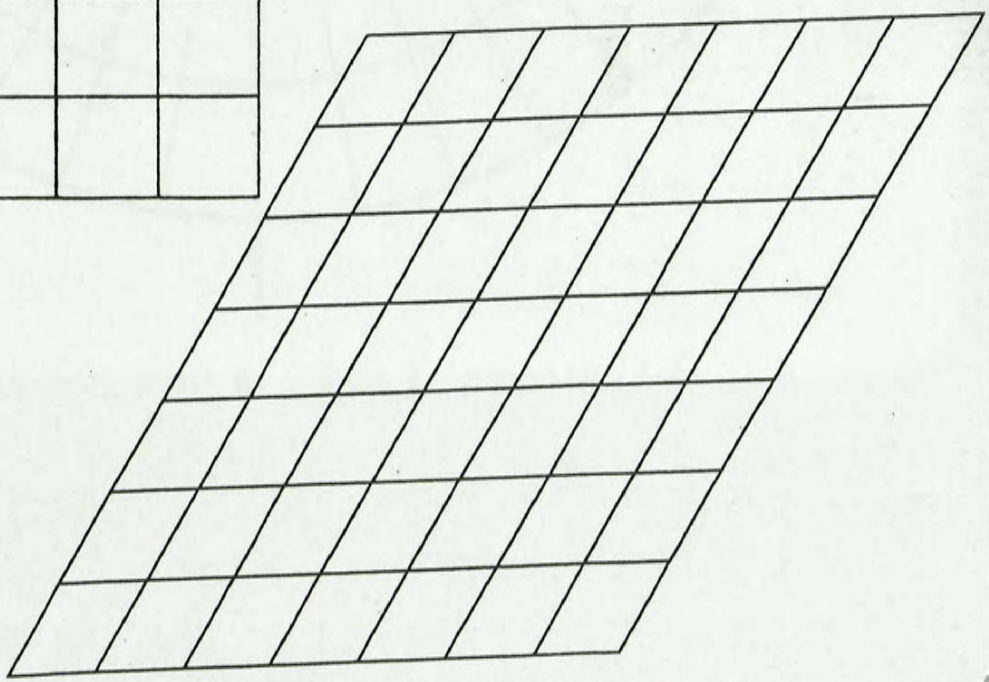
31.

Caricatures : Grid Card



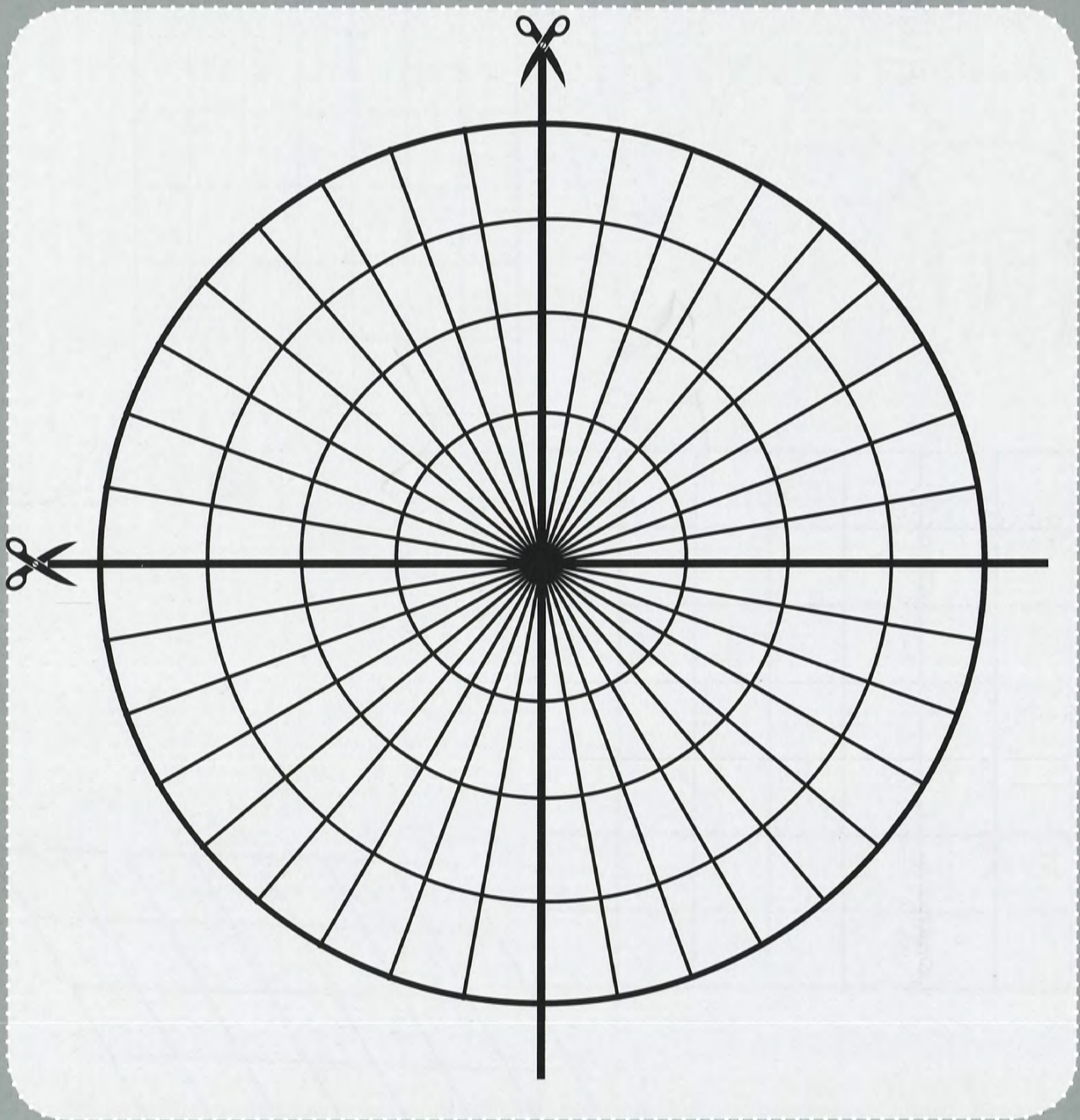


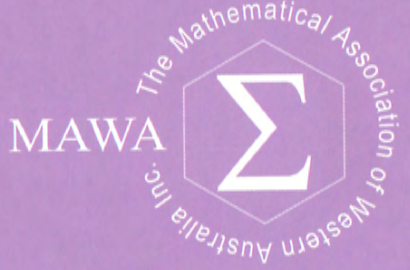




31.

Caricatures : Grid Card





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