

Brain Friendly Maths

- My brain & how it likes to learn.
- Exploring different learning styles.
- Working with my mega memory.
- Showing what I know.

Brain Friendly Maths Tutor Pack

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Revised 2006

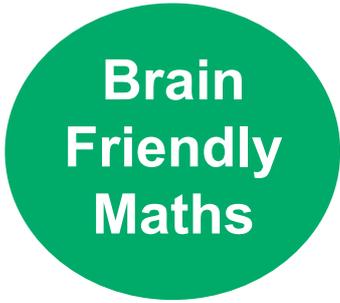


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CAN

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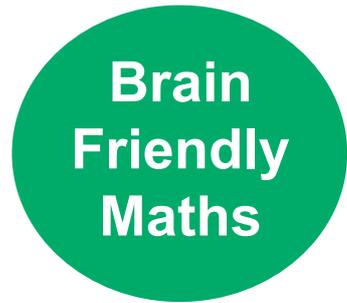
Brain Friendly Maths

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Foreword

As part of the University of the First Age national programme many fellows and young people have been engaged in using the opportunities presented in study support to explore and experiment with new and exciting ways of learning. Much of the material in this programme has evolved as a result of a UFA Maths Club run at Our Lady and Pope John School in Corby EAZ. Many thanks go to the young people who helped create the course by telling us where they felt their weaknesses lay and who were enthusiastic enough to turn up in ever increasing numbers week on week and to the staff who supported this initiative.

Manjit Shellis
National UFA



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Introduction

This study support course is designed essentially to be a 'learning to learn' course to equip your young people to become much more aware of themselves as learners and find out how they learn best. It gives them the opportunity to find out about the amazing potential of their brain and demonstrates ways in which they can use this knowledge to make their learning more effective. The specific focus is on maths but much of the content is applicable to learning in general and will help young people become more effective learners by raising their awareness of how they think and learn. Each session is designed to make full use of energisers, brain breaks and periods of reflection and review.

These tutor-led sessions strongly model accelerated learning and will give you the opportunity to pilot the effectiveness of many theories of learning. This programme was devised with borderline level 4 students in mind. Therefore, you may want to adapt the activities, perhaps building in many more maths examples, to suit your young peoples' needs whilst still retaining the essential characteristics of a brain friendly learning experience.

Sessions should:

- Provide a 'high challenge low stress' environment
- Make use of/create a multi-sensory rich peripheral environment
- Include energisers, brain breaks and multi-sensory activities
- Highlight learning-to-learn strategies
- Give young people opportunities to demonstrate their new understanding
- Build in time for reflection and review for the brain to process new learning
- Use music to enhance the learning
- Provide information for parents about the activities being undertaken and how to support them at home.

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A key feature of UFA extended learning is a safe, stimulating learning environment. To support you to create this, many stimulating, colourful resources are included in this manual. These will partly support you to create an environment conducive to learning but you will also need to consider the venue for the course. Ideally, plenty of space, including wall space is needed. If the environment looks and feels 'different' this will help students put aside any preconceived ideas they may have about their effectiveness as learners coloured by past experiences. The learning can be much enhanced by building up the peripheral environment week on week. Time spent on preparation of the environment will reap many benefits and should not be underestimated. Remember, we take in 90% of information from visual sources!

This manual works best when those concerned with its delivery have some understanding of brain-based learning. The one-day training event that can accompany this manual will help you to further explore the learning theory that underpins this course and a written summary is included in the resources section of this manual.

Informing parents/carers and school staff

It is strongly recommended that parents/carers are fully informed about the course and the strategies it will use before the course starts, so that someone at home will be able to support the young person whilst they try out the techniques they have learned in between the sessions.

It will also prove more effective if other members of the school staff are informed about the course and the strategies the young people will be trying out, so that their efforts can also be supported within the classroom, in order to maximise the learning.

Have fun!

Outline of the programme

This is a 10-week course, each session lasts for an hour.

Session 1

My brain and how it likes to learn

This session introduces the building blocks of the course; the underpinning theory of how our brains like to learn and the processes and rituals that will be used through each of the subsequent sessions.

Session 2

Exploring different learning styles

The purpose of this session is to give young people the opportunity to develop strategies that will support their preferred learning style. They will also explore other learning styles so there is a breadth to their knowledge of learning approaches.

Session 3

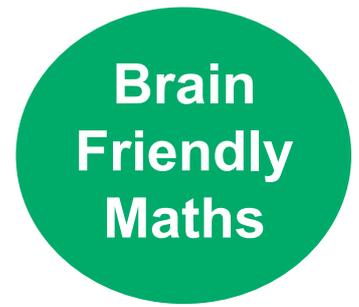
Using different learning styles to deal with the Mean, Median and Mode

This session explores the use of visual intelligence in learning mathematical vocabulary and kinaesthetic ways of collecting data.

Session 4

Using different learning styles to deal with angles

This is a kinaesthetic session designed to imprint the image of angles on the brain both inter and intra personally.



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Session 5

Using different learning styles to deal with positive and negative numbers

The purpose of this session is to give young people the opportunity both kinaesthetically and visually to manipulate positive and negative numbers in ways which can be transferred to the examination room.

Session 6

Using different learning styles to deal with shapes and area/perimeter calculations

An intrapersonal-dominated session using visual and kinaesthetic learning techniques.

Session 7

Using whole brain approaches to maths sites

A session that concentrates on the use of websites to learn Maths in a fun way. Computer learning can be a truly multiple-intelligence learning experience.

Session 8

Using whole brain approaches to numeracy challenges

A session that deals with problem-solving techniques which move from the kinaesthetic/practical solution method to methods which can be used in the examination room.

Session 9

Using different learning styles to deal with fractions

An introductory session to ways fractions can be taught in a multi-sensory style.

Session 10 Showing what I know

notes

This last session draws together the various elements of the course and provides an opportunity for young people to reflect on, prioritise and synthesis the key learning points from the previous nine weeks and to show their understanding.

The super Mathematician's rucksack

This is a ritual that runs throughout the sessions and helps students reflect on key learning points. It is a visual metaphor for the memory and as young people encounter new strategies, discover essential facts, or uncover tricks that work, they place something in the rucksack to remind them of that.

For example:

A piece of fruit – banana is excellent brain food – so what we eat matters.

A bottle of water – hydrating the brain is essential for efficient learning.

A CD – music (especially slow baroque music) helps the brain use alpha waves, which aids memory.

A pack of felt tips – because the brain loves colour.

A tip – written on a piece of card using colour to help remember how to do a task.

A photograph of an activity – to remind the young person what they did and why.

Session 1

My brain and how it likes to learn

notes

Big picture

This session introduces the building blocks of the course; the underpinning theory of how our brains like to learn and the processes and rituals that will be used through each of the subsequent sessions. This session is vital in establishing an environment that is conducive to learning one that is safe yet challenging. During the programme young people will also be given the opportunity to have time to think, reflect and have an active involvement in engaging activities. As the young people may not all know each other session 1 also needs to contain a significant element of team building.

Aims

- To introduce the course and young people an opportunity to set some personal goals
- To establish some simple facts about the brain
- To stress the individuality of learning

Outcomes

By the end of the session the young people will have some knowledge of basic brain facts that will inform the way they approach their learning in general and more specifically how they approach the learning of Maths. The young people will experience the impact of acquiring new knowledge in a kinaesthetic way. Finally they will have begun the process of understanding the underpinning theories of subsequent sessions.

Preparation & resources

Flip chart paper, felt pens, Post-its, brain fact posters (BFM-S1-A), super mathematician's rucksack (BFM-S1-A5-rucksack)

1) Give the big picture of the course
5 mins

Use a slide of the 10-week course outline to show how the course develops. The main aim of the course is to equip young people with a range of strategies that they can use to become better mathematicians.

Personal goal setting

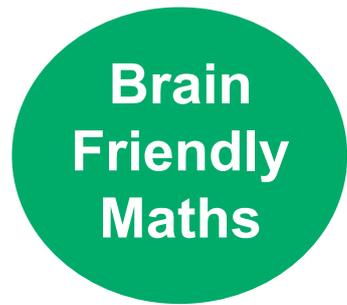
Give each young person two post-it notes and ask them to complete the following sentences:

“I have come on this course because...”

“It will have been worth coming on this course if...”

These can be displayed on the wall initially so that everyone can see the range of responses but then can be stuck into the front of the young people’s own folders so they can look back at them at the end of the course.

Alternatively the tutor may decide that the young people themselves will create the course outline according to their needs. This is excellent in terms of young persons empowerment and for those schools working towards QISS. This will obviously have an impact upon the time this activity takes and may indeed fill most of a whole session. Some form of questionnaire directed at the young people participating is helpful in determining young people’s needs from the syllabus or a brain storming session or mind mapping session could be used.



notes

2) Ice-breakers and getting to know you 20 minutes

1. Team names crossword

On a sheet of flipchart paper the tutor writes his/her name and the young people are invited to add their own names using letters from any name which is already on the paper, building up a huge crossword linking the whole team together

E.G.

	L		
S	A	L	L
T	N	E	E
E		A	R
V		R	L
E		A	T
		H	Y

2. More team building

Ask the young people to arrange themselves in alphabetical order – each person says their name out loud once and then without saying or miming anything else everyone moves to what they think is their correct position. each person then says their name again out loud moving around the circle. If there are any mistakes again people move without saying or miming anything and the process continues until everyone is in name order. Then give everyone a random number correct to two decimal places e.g. 3.25 and repeat the process until the numbers are in order. This can be done with fractions as well.

3) True or false run-around quiz

15 minutes

Play a game of percentages. How true are these statements?
Use the following percentages to rate the truth of the statement.

100% definitely true.

70% probably true.

30% probably false.

0% definitely false.

Put up a different % sign in each corner of the room.

Young people move to the appropriate corner of the room in response to the following statements:

EVERY BRAIN IS DIFFERENT

100% true: Although every brain has a similar set of systems each brain wires itself differently according to the experiences we have. Therefore, each brain is different and learning is as individual as our faces, our fingerprints and our personalities.

SOME PEOPLE ARE BRAINIER THAN OTHERS

30% true i.e. mainly false but true in some way. Although a few babies are born with actual brain damage, all brains have huge potential. We all have 100 billion brain cells that we could use. Use it or lose it, is true for the brain. The more we use our brains the brainier we get.

BRAINS LOVE COLOUR AND PICTURES

100% true. Our brains are naturally wired to deal with images. We can deal with up to 36,000 images an hour. We can distinguish between many different faces. We also like colour because it is visual. Our memory can code information making it easier to find when we need it.

COKE AND OTHER FIZZY DRINKS HELP YOUR BRAIN TO CONCENTRATE

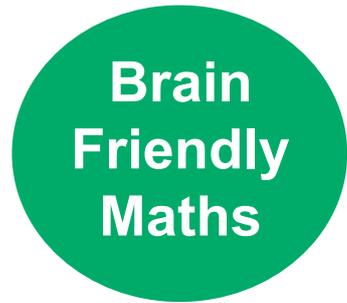
0% true therefore false. Sugary drinks encourage your brain to lose water that is needed to maintain concentration. The brain is made up of lots of water and needs to be kept hydrated to work efficiently, even diluted fruit juice is not as good as pure water. What you eat is also important - an unhealthy diet full of E numbers does not help your brain to learn.

IT IS NORMAL FOR THE BRAIN TO “FORGET” UP TO 70% OF WHAT IT HAS LEARNED WITHIN 24 HOURS

75% true. Your brain will forget 70% within 24 hours unless you review what you have learned – even if this is only for 5 minutes. Any Maths you learn in these classes you will need to review for a few minutes tomorrow, then again a few days later and then next week in order to put the information into your long-term memory.

SMILING HELPS YOU LEARN

100% true. Being positive about your learning is really useful. Your brain will believe what you tell it. If you think you can do something or if you think you can't, you're right! It's better to have a positive outlook, thinking that you will be able to do something even though it appears hard at first, rather than thinking you are not capable of learning.



4) Building a living brain 15 mins

Aim:

To use a physical approach through mime to construct a simple model of the brain and some of its functions in order to a nurture a sense of awe at this incredibly complex organ inside our heads.

notes

Resources/preparation/outcomes

You will need volunteers who will, through mime, construct a simple model of the brain showing its different parts and their functions.

This activity is obviously simplified. Current research suggests the brain is much more complex than we think. Skills/functions are probably not only 'sited' in the areas mentioned below but are the result of many different parts of the brain working together. However, the best sort of learning (and revision) is likely to be multi-sensory, providing a rich range of stimuli for the brain to latch on to. For instance, why is it that we remember the words to songs effortlessly? How is it that advertising slogans stay with us for years, without us even trying to learn them? Perhaps by understanding a little more about how the brain functions we can build in some of seemingly effortless approaches to learning?

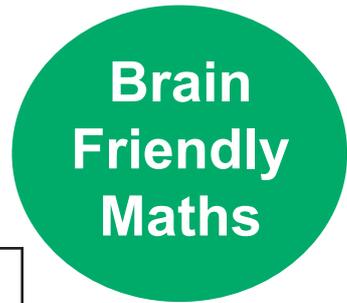
No of people	Position	Role/function
2	Kneeling side by side facing front	<p>Brain Stem Formed from the nerves that come up from the spinal cord. Regulates body functions such as breathing/ heart rate, blood pressure - things that we are not conscious of. This part of the brain is important for keeping us alive and is important when we feel threatened - governing our 'fight/flight' response.</p> <p>Suggested mimes: Taking pulse for heart rate, fighting/fleeing etc.</p>



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No of people	Position	Role/function
2	Kneeling behind brain stem	<p>Mid-brain/Limbic system A complex arrangement of modules, thought to be important for unconscious processing, more recently evolved than the brain stem. Structures in this area are important for processing memory and emotions.</p> <p>Suggested mimes: 1 person mimes an emotion, 1 mimes memory.</p>
2	Standing at sides linking arms across top of mid-brain	<p>Corpus Callosum This is a bundle of fibres (around 200 million!) connecting L/R hemispheres – sends electrical signals to and fro ensuring the hemispheres can work as a whole.</p> <p>Suggested mimes: join hands and sway back and forth to show communication between left/right</p>
3-4	Face front on left side (right as you're looking at it!)	<p>Left hemisphere Important for/leads on processing:</p> <ul style="list-style-type: none"> • Language. • Logic. • Analysis/detail. <p>Left hemisphere will deal with the detail in a stimulus. Perceives details – small steps.</p> <p>Suggested mimes: ask each volunteer to think of a mime for each of these functions.</p>



Number of people	Position	Role/function
3-4	Face front on right side	<p>Right hemisphere Important for/leads on processing</p> <ul style="list-style-type: none"> • Music/rhythm. • Creativity. • Visual/spatial. <p>Right hemisphere will deal with the 'whole'. Sees the big picture.</p> <p>Suggested mimes: Ask each volunteer to think of a mime for each of these functions.</p>

notes

Build the model up in stages and then set the whole brain working together with everyone doing their mimes together.

Points to make

Your brain is doing lots of things at the same time – many of these things you are not even conscious of!

Staying alive – keeping our heart going and keeping us safe is vital and so parts of our brain will carry out those functions.

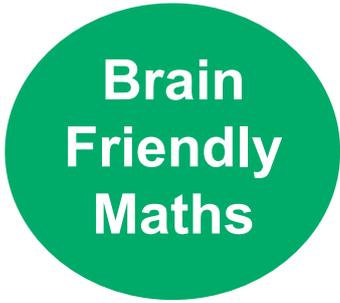
It is possible that these functions 'take over' and stop us from being able to carry out more complex tasks like problem solving/learning new things when we feel under stress.

If we are worried, sad, angry we may not be able to 'think clearly'.

We need to make sure we are aware of the 'big picture' and the 'small steps' in any learning.

The brain is able to process many stimuli at once – colour, music, sound etc. Perhaps we should try to make learning more multi-sensory?





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5) Review and reflection

Traffic lights

5 minutes

Ask the group for responses to the statement: *“As a result of finding out what you have about the brain, think of one thing you are going to STOP/START/CONTINUE doing when learning Maths.”*

Invite the group to think about this on their own. Then give them time to share it with one other person. If the group has enough time you may want to ask each person to share their thoughts. Alternatively, each young person can write their name and ideas on different coloured post-it notes (red, amber, green) and stick them to the appropriate flip chart paper. This will provide a reminder in subsequent sessions.

Session 2

Exploring different learning styles

Big picture

The purpose of this session is to give the young people a chance to discover their preferred learning style and to try out some strategies so that they have a range of approaches at their disposal.

Aims

- To find out what the young persons preferred learning style might be and how this may influence the approach they take to learning Maths.
- To explore a range of strategies from each of the learning styles that young people can use when learning Maths.
- To secure an understanding of the 7 and 9 times table.

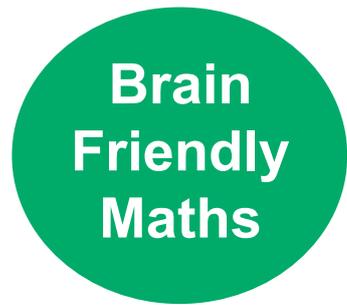
Outcomes

By the end of this session the young people will have tried at least two approaches for learning Maths. This gives them a basic multi sensory approach to their future work.

Resources/preparation

- The multiple-intelligence questionnaire (BFM-S2-A3-MI Questionnaire).
- Sheets of plain and lined paper (various sizes and colours).
- Plenty of coloured felt tip pens and post-it-notes.

The workstations for the intelligence circus activity will need to be set up in advance. Use posters and other interesting objects to make the workstations as stimulating as possible. Be aware that the music station may be noisy so may need to be away from the others and that extra space will be needed for the kinaesthetic station. You may wish to give copies of the intelligence posters to students as aide memoirs.



notes

1) Big picture, icebreaker and brain break 5mins

Begin the session with a brain break e.g.

- Write the two times table in the air using preferred hand e.g.
 $2 \times 2 = 4$.
- Now bring the other hand into play and write with both
e.g. Preferred hand: $2 \times 2 = 4$ $3 \times 2 = 6$
Other hand: $2 \times 2 = 4$ $3 \times 2 = 6$

2) Find someone who...

- Can play a musical instrument.
- Knows how to play darts.
- Ever goes shopping.
- Builds models.
- Can explain how a sports team can become top of their league.
- Can tell you in numbers when their birthday is e.g:
12/07/1992.

Ask the group: What do all of these skills have in common?

Answer: They show the importance of Maths in our everyday life.

3) Multiple - intelligence circus 50 minutes

Give out the multiple-intelligence questionnaire and explain how to complete it.

Give the young people at least 10 minutes to do so.

Young people complete a bar-chart representation of their intelligence profile

Once all of the results are collated create a human bar chart by putting the intelligence posters in a row along one wall and getting the young people into a single line in front of each according to their highest score. If they have joint highest scores, they may choose one of these they feel most confident in.

Divide the young people into groups which reflect one of their intelligence strengths. Once divided the young people should spend 10 minutes preparing a presentation of the 7-times table to be presented to the other groups at the end of the time.

Ideas may include:

- Singing or rapping the table (musical).
- Drawing pictures to represent the numbers or just a colourful poster (visual).
- A flow chart diagram (logical).
- A dance or a game (kinaesthetic).
- A story (linguistic).
- Sets of natural symbols e.g. 2 looks like a swan, 1 looks like a tree etc. (naturalistic).

Each group makes its presentation.

Then new groups are formed this time with the young people going to a different learning style to their preferred one – they may choose and do the same exercise for the 9 times table.

If there is time these may be presented.

4) Review and reflection

5mins

Which 2 strategies from today can I use on my own

- At home.
- At school.
- When learning Maths.

5) Super mathematician's rucksack

Remind the young people what the rucksack contains from the previous week. Invite them to think about today and we want to add into their rucksack this week? Encourage them to consider if they would add anything different to their personal rucksack?

Session 3

Working with my mega memory

notes

Big picture

This session builds on the knowledge that young people have a preferred learning style by introducing some basic memory facts. Most importantly, this session focuses on the need to review material regularly in order to maintain long-term memory. It also indicates the importance of a variety of activities, when possible, to aid effective learning and to maintain interest.

Aims

- To reinforce the need to take a variety of approaches to learning Maths.
- To dispel the myth that a preferred learning style means that that is the only approach to take.
- To introduce and stress the importance of review and repetition in the learning process.

Outcomes

- The young people will have had the opportunity to extend the range of strategies they have used so far to learn Maths.
- The young people will have begun to look a new ways of remembering Maths and for making it fun.

Resources/preparation

Specific posters on memory would be particularly suitable for this weeks' session. Some are included in the resources section of this package (BFM-S3-A1-(a/b)). Again, you may want the young people to take away some copies for them to display at home.

- Flip chart paper (3 sheets per student).
- Felt pens, a CD player – some CDs of short tracks (no running times on packaging).
- Long tape measures (50 metres).

Brain Friendly Maths

Icebreaker and brain break
5 minutes

The young people stand in a circle. As they listen to each question they can step forward to answer. You may wish to use these questions to begin the pre-processing:

- Who has a good memory?
- What is your memory?
- Who would like to improve their memory?
- Why is a good memory useful?
- Is it good to forget things?
- Guess how many memories you have?

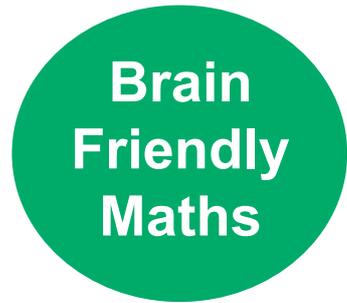
Answer (You have three – immediate, short term and long term).

notes

1) Poster share
5mins

Give half the young people the following statistics

- We remember:
- 20% of what we read
- 30% of what we hear
- 40% of what we see
- 50% of what we say
- 60% of what we do
- 90% of what we see, say, hear and do!



notes

The other half are given a copy of the review poster

Give the young people a couple of minutes quiet, intrapersonal, thinking time, focusing on the following question...

“If these facts are true what does this mean for the how we should learn Maths?”

Pair one: young people pair up with someone with the same poster and share their thoughts.

Pair two: young people pair up with someone who has a different poster and they take turns to explain what their poster is about and what this means for how they should learn Maths.

You may want to pull this together by asking:

“As a result of this activity what do we want to add to our Super Mathematicians rucksack?”

2) Introducing my mega memory

5 mins

Use slides to briefly summarise what we know so far about our brain’s memory systems:

My CLAP, RUN, HOP Maths Memory

Memory loves:

C olour	R eview	H idden words
L inking	U nusual	O rder
A ctions	N umbers	P atterns
P ictures		

3) Let's learn some Maths

50 mins

a) Posters

10 minutes

On the 3 large pieces of flip chart paper

- Draw a picture of a really mean and horrible face.
- Draw a picture of representing a modem.
- Draw a picture of an odd number (e.g. 3,5 or 7) of things and an arrow pointing to the middle one.

Label the posters – The Mean, The Mode(m) and The Median (middle)

b) Explanation

5 minutes

Now explain how to do each – talk in terms of the mode being popular (as modems are) so to find the most popular we find the items that occurs the most, the median is the middle so we need to put things in order and find the middle one and the mean is the mean and horrible and difficult one so we have to do two things – add them all up and then divide by the number of things.

c) Working with our intelligence data

10 minutes

Remind students of the preferred learning styles from last week. Re-create the bar chart. Change this into a data bank e.g. we have 6 interpersonal learners, 3 linguistic learners etc. Which of the mode, mean and median can we find out from this data bank of information? Really only the mode is guaranteed in a sensible way – the one with the most votes. For the others the median may work out but there may not be one in the middle because there are 8 (and we may not want to get into this at this point) and certainly the mean will have no meaning because e.g. 3.2 will not equate to an intelligence.

d) Data collection and manipulation activity
20 mins

Now get the students to devise an activity where measurements can be made and all 3 worked out e.g:

- The results of a long jump competition.
- The results of a running competition.
- Timing the tracks on a CD.

Carry out the activity and record the data. Then manipulate it to find the mode, mean and medium.

e) Reflection and review – 3,2,1 review
5 minutes

- “What 3 words have you been working with today?”
- “What two pieces of information/advice do you want to take away from this session and/or add to your super Mathematician’s rucksack?”
- “What one question do you still want an answer to about the mean, median and mode that would help you to be a better Mathematician?” Questions can be written on a post-it note and added to the questions board displayed on a wall.”

Session 4

Using different learning styles to deal with angles

Big picture

This session focuses on learning the names of angles. The young people will also be able to approximate the degree of any given angle by the end of the session. It also focuses on kinaesthetic learning techniques – both the sort that require large spaces (a hall/gym or a playground) and those that can be done sitting at a table.

Aims

- To equip young people with the knowledge of the terminology used when talking about angles.
- To enable young people to visualise angles of certain sizes.
- To enhance young people's understanding of kinaesthetic learning.

Outcomes

- By the end of this session students will have explored a range of angles and will be able to sketch many of them approximately.
- The young people will begin to be able to create kinaesthetic activities for themselves .

Resources/preparation

- Balls (one for each three students).
- A large space outside (with a gym or a hall on).
- Clocks with moveable hands (BFM-S4-A2-clockface + BFM-S4-A2-clockhands).

Big picture

The focus of the session is going to be the different names we give to angles and the ability to estimate angles and sketch them whilst using kinaesthetic methods of learning.

Icebreaker and brain break

5mins

Angle arms

Use the slide (see resources section) as the young people read out (shouting) from the display & using their arms to make an angle of their choice.

1) The ball angle game

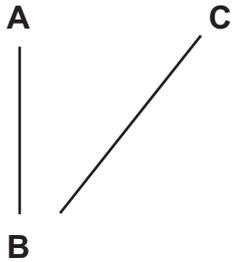
20 minutes

This activity requires either an outdoor playground (preferably) or a gym/hall.

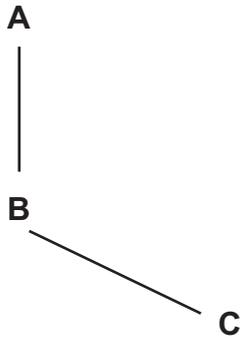
Young people are divided into teams of 3. Each team is given a ball. Two members of the team stand 10 metres away from each other and will remain in this position. They are labelled A and B. B would be the centre point on a clock and A 12 o'clock. There is an imaginary line between A and B and the ball will travel along this – either by rolling it at ground level or by throwing it (if the imaginary line is suspended in the direction of A to B). The ball can also be kicked and thus incorporated into soccer skills. The third member of the team is C. They have to run clockwise from A to make the shape of the angles.

e.g.

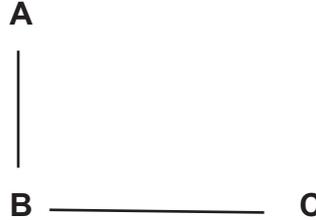
Acute



Obtuse



Right-angle



The tutor calls out different angles.

To begin with the simple angles are called out e.g. right angle, straight line. Progress is made through to acute angles and obtuse angles. Then to e.g. 45° , 33° , 120° but all of them carried out clockwise from A and by C.

The team then changes so, A becomes B, B becomes C and C becomes A so that the former B is now the runner.

When all members of the team are happy with this, with each member of the team becoming C two or three times, the tutor can point out the complications e.g. there are in fact 2 acute angles from A if we do not run clockwise, that we could make angles from position A instead of B (indeed you can move the game onto this and call out. "An acute angle of 33° from B", followed by the next instruction of "An acute angle of 66° from A" etc). You could also build in reflex angles but you must make sure that the children know whether to run clockwise or anticlockwise or the reflex angles could become confused with acute angles. It is actually easier to insist that all running is clockwise from the given point. When this is transferred to paper, later on in this section the paper can always be turned so that the line being used is a north-south line.

2) The clock game

15 minutes

Use the cardboard clocks with moveable hands. The minute hand is placed pointing to 12 o'clock and the hour hand moves.

Angles are called out just as in the ball game. To begin with call out the simple ones e.g. right angle, straight line. Progress through to acute angles and obtuse angles. Then to e.g. 45° , 33° , 120° etc. A greater degree of sophistication can be incorporated once the children can work out that each 5 minutes is worth 30° (or you may wish just to tell them this). Since they will automatically tend to work clockwise the idea of acute and reflex angles does not become confused. The angle is always being made from the centre of the clock in relation to the stationary minute hand pointing to 12. This game has the added advantage of being used to start work on bearings since the stationary minute hand pointing to 12 is equivalent the compass pointing north. It is easier to keep moving clock hands than repeatedly drawing diagrams. and thus this helps pattern the brain more effectively by repetition.

3) Drawing estimated angles

10 minutes

Now ask the group to draw some angles free hand using the information they have gained above. This means they will always be able to estimate an angle.

4) Review and reflection

10 minutes

Ask the young people to get into pairs and make up three questions about angles that they know the answers to. Ask each pair to join another pair and test each other on the questions they have come up with.

Session 5

Using different learning styles to deal with positive and negative numbers

Big picture

This session focuses on learning how to order and manipulate positive and negative numbers. This session will also explore the ways in which a young person can adapt kinesthetic principles of learning. This adaptation from kinesthetic to visual is necessary if the young person is to succeed with mathematical problems in the examination room.

Aims

- To equip young people with the skill to order positive and negative numbers.
- To enable young people to manipulate positive and negative numbers.
- To enable young people to begin to build learning strategies of their own that can be used in an examination room.

Outcomes

By the end of this session the young people will have explored a way of manipulating positive and negative numbers under examination conditions.

Resources/preparation

- Large cards with numbers -10 through 0 to $+10$ (BFM-S5-numbers). Thermometer picture (BFM-S5-A1-thermometer) and/or real thermometers.
- An outside area with a long wall along one side (for the temperature cards to be stuck up on at least 5 feet from the ground) or a hall/gym.

Big picture

The focus of the session is going to be to learn how to put positive and negative numbers in order, to carry out additions and subtraction calculations involving them and to transfer this learning to the examination room.

Icebreaker and brain break

10mins

Put positive and negative number posters along a wall in order from -10 to $+10$. Start with the 0 poster. Everyone stands in a line next to this. Talk in terms of it getting hotter and colder by $x^{\circ}\text{C}$ and the young people run to the correct temperature so that they should always end up in a row across the room from the poster with the answer on it. e.g. starting at 0°C it gets hotter by 6°C so they all run to $+6^{\circ}\text{C}$. It gets colder by 4°C so they run to 2°C , it gets hotter by 5°C so they run to 7°C and it gets colder by 10°C so they run to -3°C . Play this until they are happy with the idea.

1) Thermometer journey

20 mins

Ask the young people to write a short account of the temperature changes a traveller might experience in travelling from England to Spain to Central Africa to Greenland to South America to North America to Iceland to England.

Start the story with something like "Upon leaving England in a temperature of 22°C I travelled to Spain where the temperature had risen by 10°C . I then moved onto ..." etc.

Using the thermometer picture (or you could use a real one) actually add in what the temperatures would have been at each location.

2) The running game

10 mins

This is a repeat of the ice-breaker but this time the tutor simply calls out in terms of adding and taking away numbers e.g. everyone starts at 0. Then add 6, - 4 + 7, -8 etc with the young people running up and down at each shout.

3) The competition

10 mins

Get the young people to draw a line that represents the thermometer and add positive and negative numbers to it from -20 to +20. Make it clear that they will be able to use this in an exam. Then call out 10 questions building up each time on the number of figures involved.

e.g.

1. $6 - 8 = ?$
2. $5 + 3 - 6 = ?$
3. $2 + 13 - 19 = ?$
4. $5 - 8 + 4 - 7 = ?$ etc

The young people will feel really good when they get the really long questions right.

Review and reflection

10 minutes

Make a rucksack card called "Tip for examinations".

Ask the young people to consider the fact that you can't take a thermometer with you into the examination room but the examiner can't stop you drawing a thermometer. What tip can you put into the rucksack about ways to solve problems in the examination room (e.g. think of a way to create a physical thing on paper).

Session Six

Using different learning styles to deal with shapes

Big picture

This session focuses on learning how to recognise the basic shapes and how to work out their areas and perimeters.

Aims

- To equip the young people with the skills to recognise shapes.
- To enable the young people to remember the difference between area and perimeter.
- To enable the young people to work with the concepts of area and perimeter.

Outcomes

By the end of this session the young people will be able to recognise a variety of shapes and be clear about area and perimeter calculations.

Resources/preparation

- Pieces of card of many colours, scissors, metre rulers, “awkward shapes” to find the area of (cut out of card)
- A selection of outdoor and indoor spaces of various sizes and shapes
- A ‘tutor (or could be a Peer Tutor) prepared’ sheet of shapes which can be found on the school site e.g. Find a glass circle – with space for the student to answer e.g. “the window in the hall”, or ‘A grass circle’ – with space for the student to answer e.g. “on the football pitch”.

Big picture

The focus of the session is going to be on recognising different shapes and being able to work out area and perimeters.

Icebreaker and brain break

5 mins

Have an octagon, a hexagon, a rhombus and a pentagon cut out of the same coloured card. On the four walls of the room put up big labels for “8 Octagon” “6 Hexagon” “4 Rhombus” “5 Pentagon”. Hold up each card in turn (more than once) and the young people run to the wall which applies.

1) Making a poster

10 mins

Cut out shapes in different sizes and on different coloured paper e.g. three different sizes of triangle on blue card, 2 rectangles of different sizes on yellow card etc. Do as many as you can in 5 minutes. Now arrange all the pieces that have been cut out onto a piece of flipchart to make an informative poster about shapes. This can be done individually or in pairs (whilst the examples given here are simple shapes obviously the shapes can be made more complex e.g. octagons etc).

2) Scavenger hunt

10 mins

Go round the school and the school grounds with the shape sheet and identify where certain shapes can be found.

3) Finding the area and perimeter

15 mins

Find two large areas e.g. a car park and a games pitch.

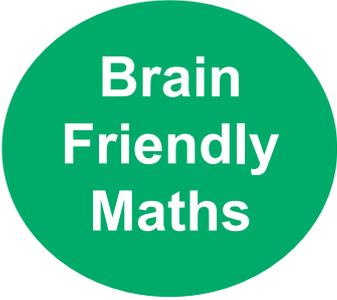
To find the perimeter each young person walks around the outside of the area counting their paces and saying “one perimeter, two perimeter, three perimeter etc” all the way round. To find the area the young people pace the length once and then take one pace along the adjacent edge before pacing the length again and then taking a pace along the adjacent edge before pacing the length again. For each pace the young person counts “one area, two area, three area” etc. This will give them the idea that the perimeter is easier and quicker to find than the area, just as it is easier to add up four numbers than multiply two. It will also illustrate that the area will give a bigger number than the perimeter.

notes

4) Finding the area and perimeter of awkward shapes

15 mins

Have available five cut out shapes that would be awkward to find the area of. Allow the young people to cut them down into shapes that they could find the area of (e.g. squares, rectangles or for those who are slightly more advanced triangles). By adding all of the small cut down shapes they will find the area of the whole shape.



Brain Friendly Maths

Review and reflection

5 minutes

Make a rucksack card called “Tip for examinations”.

Ask the young people to consider using the fact that you cannot take scissors with you into the examination room but the examiner cannot stop you drawing lines on a diagram, what tip can you put into the rucksack about ways to solve problems in the examination room. (e.g. think of a way to create a physical thing on paper). Try to make this a different tip to last week’s thermometer tip.

notes

Session 7

notes

Using whole brain approaches to some 'cool' maths sites

Big picture

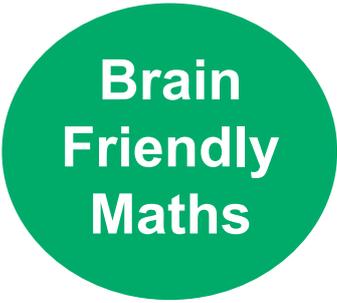
Computers are multi-intelligence based tools. They are visual, linguistic, logical, kinaesthetic, intrapersonal, interpersonal and can be musical and naturalistic. Therefore this session is going to be mainly individuals/pairs working on Mathematical computer programmes. At the end of the session the young people will need to do a review in some form or another, e.g. a written review for a teenage magazine, a poster advertising the maths programme, a jingle to be used on a TV advert or a mind map to convince a teacher of the use of such programmes.

Aims

- To encourage young people to use computers for individual learning in their own time.
- To enable young people to realise that Maths can be game-form and fun but still educational.
- To develop young peoples evaluation skills of and Maths games packages.

Outcomes

Young people should have discovered another way of accessing Maths through a learning style which is helpful to them.



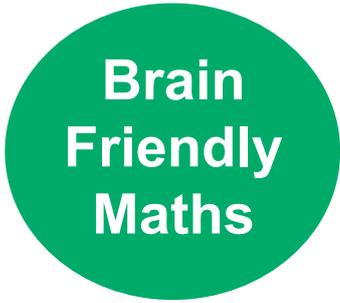
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Resources/preparation

Scavenger hunt sheets (BFM-S7-findsomeonewho), writing paper, drawing paper, felts, audiotapes etc for reviews.

Tutors should have trialled the games first and ensured that all systems are running for access to the Internet.

notes



Brain Friendly Maths

notes

Give the big picture of the session
5 mins

Computers are multi-intelligence based tools. They are visual, linguistic, logical, kinaesthetic, intrapersonal, interpersonal and can be musical and naturalistic. Therefore this session is going to be mainly individuals/pairs working on Mathematical computer programmes. At the end of the session you as a young person will need to do a review in some form or another, e.g. a written review for a teenage magazine, a poster advertising the maths programme, a jingle to be used on a TV advert or a mind map to convince a teacher of the use of such programmes.

Ice-breaker/Brain break
5 mins

Scavenger hunt: Find someone who can tell you how a computer can be a multi-intelligence based tool and complete the sheet you have been given.

Activity
30 mins

The purpose of this session is to encourage young people to: use computers for individual learning in their own time it is also about helping them to realise that Maths can be in game form fun but still educational. The bulk of the session therefore should be spent with the group investigating the sites listed overleaf that have been found to be of value and possibly finding sites of their own to develop the list further.

Websites

www.funbrain.com
www.Aplusmath.com (brilliant)
www.Mathslessons.co.uk - Angler
www.4learning.co.uk/mathszone
www.happychild.org.uk
www.bbc.co.uk/education/ks3bitesize
www.bbc.co.uk/education/mathsfile

Review and reflect

15 minutes

The young people produce a review of one of the programmes they have used. This could be a written review for a teenage magazine, a poster advertising the programme, a jingle to be used on a TV advert or a mind map to convince a teacher of the use of such programmes.

Session 8

Using whole brain approaches to numeracy challenges

Big picture

This session focuses on visualisation as a way of problem solving.

Aims

- To equip young people with the skills to visualise a problem which is set out in a linguistic format
- To enable young people to develop learning strategies of their own that can be used in an examination room.

Outcomes

By the end of this session young people will have explored another method to aid their learning and will have begun to master the techniques of visualisation.

Resources/preparation

- A room in which chairs can be put in a circle big enough to seat the whole group.
- The coins needed for the second challenge (BFM-S8-A1-coins).
- Card/paper/tape for the Mathematician's rucksack product.

Big picture

The focus of this session is to deal with solving written questions using visualisation techniques.

Icebreaker and brain break 10mins

Visualisation ice-breaker

Whilst playing very slow, gentle, quiet background music, get the young people to sit in a circle on chairs with their feet together and hands on their knees. Ask the young people to close their eyes.

The tutor then very gently and quietly goes into the following script:

“Sit with your feet flat on the ground with your hands on your knees. Close your eyes and sit comfortably. Imagine warm rays of sunshine pouring onto you. Imagine the sunshine sinking into your feet until they feel warm and completely relaxed and firmly rooted to the floor. Then allow the sunshine to move into your legs, filling them with relaxed feelings. (Keep going through all body parts one by one all the way up to the head – guide them through one part at a time).

The sunshine has now taken all of the strain out of your body. It is supporting you so you can relax.

Keeping your eyes shut imagine you are on a warm beach. The sun is still shining and you are beautifully warm but you are also cool and fresh. Remember the happiest time of your life – really enjoy the good, happy feeling you get. Remember how calm and happy you were and how good you felt. Really re-live the experience until you have that really happy feeling in your mind.

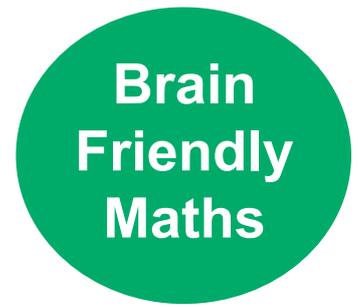
Each time you imagine yourself on the beach you will remember this calm, happy feeling. Enjoy it for a few seconds.

Brain Friendly Maths

notes

Now keeping your eyes closed, gradually bring yourself back into the present. See the sunshine pouring into your feet again going down into the ground beneath you. Take several deep breaths so that you feel fully present in your body again. You can gently move your head and now your shoulders, now your arms and knees and now your ankles and eventually your feet...and now open your eyes. Give your arms and legs a shake if you want to. “

Explain that this is a visualisation technique. That it can be done when exam panic steps in or at the beginning whilst waiting for the exam to start and that visualisation is also a way of solving Maths problems.



notes

1) Challenges 1 and 2
20 minutes

Challenge 1

The young people are set a series of challenges and encouraged to undertake them in the following way.

Step 1

Visualise what is actually happening – remember the power of strong visualisation and the detail and the feel of doing things. Make your visualisation vivid.

Step 2

Carry out the activity and then check this against the visualised concept.

Challenge 2

Having solved their first challenge, the next challenge for the young people is to work out a way of solving it again without leaving their tables. By:

Step 1

Visualise solving it – again be vivid.

Step 2

Think of a way of testing this out at your examination desk.

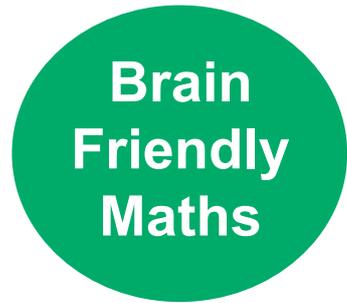
Step 3

Work out the answer this way.

Then they carry out:

Step 4

Test out your answer in the way you did in Challenge 1.



notes

Challenge 1

A father goes for a walk with his daughter. The daughter takes three steps for every two the father takes. They both start on their left foot. How many steps will each take after that until both step together on their left feet again?

- Step 1 Visualise what is actually happening.

- Step 2 Actually do the activity and then check this against the visualised concept i.e. in teams of three set two people to walk the role of the father and the daughter and the third watches for the answer.

Challenge 2

Now work out the same problem but with a daughter who has to take four steps for every three of her father but this time you must not leave the desk to do this.

- Step 1 Visualise this happening.

- Step 2 Think of a way for testing this out at your examination desk.

- Step 3 Work out the answer this way.

- Step 4 Test out your answer in the way you did in Challenge 1 i.e. in teams of three set two people to walk the role of the father and the daughter and the third watches for the answer.

Challenges 3 and 4

20 minutes

Follow exactly the same working procedure for the next two challenges.

Challenge 3

A coin collector collects rare coins and has bought 18 large Roman coins for £500 each. She gets a tip from a friend that one of the coins is counterfeit, being made of lead and gold, not all gold and this makes it very slightly lighter than the real thing, but the difference is so slight that only a set of scales could tell the difference.

The scale has two pans and can be used to check if the weight of both sides is equal or not. Each time the scales are used it costs £50. She is only willing to spend £150 checking out the coins. How can she do this?

Challenge 4

Now use the same process, but this time without the coins, to find out how much at most and how much at least the coin collector would have to pay to find the fake coin if there were 36 coins.

Review and reflect

10 minutes

Close your eyes. Visualise the whole of this session from start to finish. At the end of the visualisation chose three words or images that will always bring this session back to your mind. Put these words or images onto a piece of paper or a tape. Add these to the Super Mathematician's rucksack.

Session 9

Using different learning styles to deal with fractions

Big picture

This session offers ways to help young people understand how to manipulate fractions using their various intelligences. There are more ways here than fit in one session and since some of them are fairly adventurous it is left to the individual tutor to select methods they wish to try. The 'drawing hearts', 'visualisation' and 'card manipulation', for the story exercise, is one session in its own right if all aspects of this are covered. An alternative could be to select the 'drawing hearts', 'story card manipulation' and the 'number cards manipulation' as one session. If the emphasis is on the 'final operations' acting and completing the addition or subtraction of fractions then only the 'Counters Activities' are needed.

Aims

- To make young people more confident in dealing with different aspects of fractions.
- To make fractions fun.
- To use a variety of intelligences to try to achieve these aims.

Outcomes

These will depend upon which activities the tutor has chosen to work with, however the outcome, no matter which activities are used, should be to increase young peoples confidence when working with fractions.

Resources/preparation

Depending upon which activities you chose to undertake you might need:

- A large open space or room.
- Lots of paper and red felts. Other colours and pencils for storyboard.
- Cards with numbers on them (BFM-S9-A5-numbers)
- Counters of different sizes.
- Story cards (BFM-S9-A4-names).
- 10 examples of improper fractions and ten of fractions which may or may not cancel down.
- Cards with fractions on them (as many as young people in the group).

Give the big picture of the session

5 mins

This will vary according to which of the activities the tutor has chosen to use but basically will be to help with manipulation of fractions and the operations connected to this.

Ice-breaker/Brain break

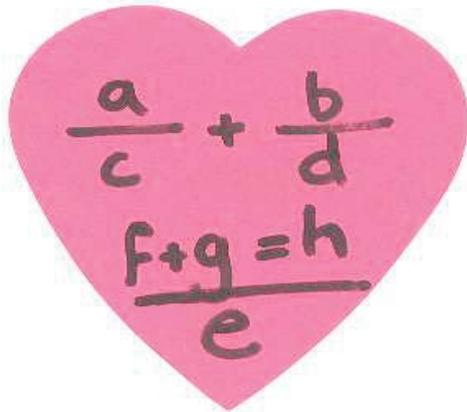
5 mins

Randomly give each young person a card with a fraction on it. Each young person holds up their card so all can see it. Without speaking or gesturing each young person has to put themselves in order around a circle starting with the smallest fraction and working round getting gradually bigger. After two minutes stop the circle to take a look around, still without speaking or gesturing. Then give the young people the opportunity to move to get in order. Take as long as it takes to achieve the objective, although certain “hints” may be included if the tutor feels this is appropriate. The fractions can be as easy or difficult as the tutor deems appropriate for the young people attending.

1) Valentine hearts 15 mins

Draw 10 Valentine hearts on a page

In each write



Where

- a = Ann (or any girl's name starting with A)
- c = Carl (or any boy's name starting with C)
- b = Barbara (or any girl's name starting with B)
- d = Daniel (or any boy's name starting with D)
- f = Fred (or any boy's name starting with F)
- g = Gemma (or any girl's name starting with G)
- h = Helen (or any girl's name beginning with H)
- e = Ed (or any boy's name starting with E)

Ask the young people to copy the heart 5 times, cut them out and stick them on any available wall space. This will help pattern the lay out in the brain. By allowing students to chose their own names it enhances ownership and thus makes learning more complete.

notes

2) Visualise this story
10 mins

(N.B. This links to the Valentine hearts above)

Ask the young people to sit in a circle with their feet together, hands on their knees and their eyes closed.

The story is that Ann (or if the tutor has allowed students to use names they have chosen all the way through, the tutor needs to refer to the characters as e.g. person A) and Carl (person C etc.) are a couple and do things together Barbara and Daniel are a couple and do things together and Fred and Gemma are a couple and do things together. Their best friend is Helen. Ed is a friend to everyone. Ed, Carl and Daniel have something in common – they all have a job but they earn different amounts of money. Ed is told he will earn as much as Carl and Daniel multiplied together. Carl works out how many times his wage this is and tells Ann who multiplies it by what she earns and that is what Fred earns. Daniel works out how many times his wage Ed's is and tells Barbara who multiplies it by what she earns, that is what Gemma earns. Fred and Gemma together therefore earn a lot more than Carl and Ann or Daniel and Barbara. And Helen knows what this amount is. This may or may not be more than Ed.

Repeat the story once or twice.

Activity 3
20 mins

Now make up storyboard, rhyme, rap, song, poem of this story.

4) Manipulate story cards 20 mins

Make cards with the names on and manipulate the cards whilst telling the story i.e. put out Ann's card with Carl's card underneath and on Carl's card put what he might earn, then Barbara's card with Daniel's underneath and on Daniel's card what he might earn, put Ed's card in the right place and work out what he earns – add this to the card. Now move Carl's card to talk to Ed's card so he can work out how many times more than him Daniel earns, then move Carl's card to Ann to tell her the result. A new card is needed at this point with Fred's name on it and the amount he must earn is added and the card placed in Fred's place.

Now move Daniel's card to talk to Ed's card so he can work out how many times more than him Carl earns, then move Daniel's card to Barbara to tell her the result. A new card is needed at this point with Gemma's name on it and the amount she must earn is added and the card placed in Gemma's place. A new card can now be put in Helen's place with the total of Fred and Gemma's wages on it.

(N.B. If the cards can be laminated this will allow different figures to be used and then rubbed off so the young people can run through the story two or three times).

notes

5) Manipulate number cards

20 mins

Give the young people sets of cards with numbers on them (one number per card) and with lines on them (the short lines to divide the fractions and the longer line needed in the calculations) and on a separate sheet a set of fraction questions. The young people set the cards out as in each question and then manipulate them, echoing the manipulations for the story to reach the answer.

notes

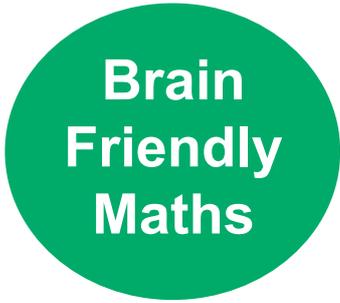
6) Final operations – the running games

20 mins

To deal with improper “top heavy” fractions and cancelling down, take the young people to a large open space or room and divide them into teams with 4 large and 50 small counters each.

Note: the number of teams depends upon the number of helpers available. Since each team has to run to a person who will check their counters, the most teams one person can really cope with is two or three as an absolute maximum. Peer Tutors are invaluable in this exercise.

The young people are first given a list of improper “top heavy” fractions which have resulted from their addition and subtraction of fractions. Each team has to count out the top number in counters, then divide the bottom number into this and replace whole numbers by big counters and keep the remaining small ones (e.g. $15/8$ results is one big counter and seven small ones) and then one team member runs with the mixture of big and small counters to be checked, taking the sheet with them to show which question they are answering. Once they have been confirmed as being correct the team member runs back and the team starts question 2. If they are incorrect they run back and re-do. Once question 2 has been completed another member of the team runs with the answer to be checked etc. The winning team is the first to complete all questions correctly or who has completed most in a given time.



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notes

The young people are then given a list of fractions some of which will cancel down and some of which will not. The team work out the answer and the runner this time has the top number (the numerator) in their left hand and the bottom (the denominator) in their right e.g. $\frac{6}{8}$ becomes 3 counters in the left and 4 counters in the right hand. The checking and winning procedure is before.

Review and reflect

5 minutes

Write a set of instructions for a younger person on how to do one or more of the following:

- Deal with improper fractions.
- Cancelling down.
- Adding fractions.
- Subtracting fractions.

What tip can you add to the Super Mathematician's rucksack from having done these activities?

Session 10

Showing what I know!

notes

Big picture

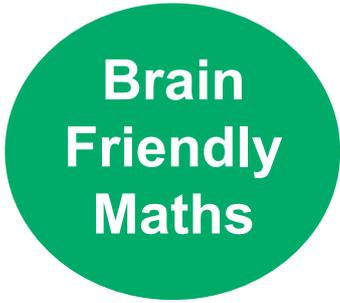
The purpose of this session is to draw together the various elements of the course and provide an opportunity for young people to reflect on, prioritise and synthesise the key learning points from the previous sessions and to show their understanding. The end product will also provide a permanent reminder of their learning.

Aims

- For young people to contribute and show their understanding of the course.
- To provide an opportunity for young people to work with other young people.
- To reinforce and check their understanding of key learning points.
- To celebrate their learning.

Outcomes

By the end of this session the young people will have experienced working with others under pressured conditions. They will have had to make individual decisions, as well as working towards corporate decisions. They will have worked to quite a tight product specification and experienced a challenge scenario.



Brain Friendly Maths

Resources/preparation

This session is very heavy on consumable resources. The young people will need plenty of coloured paper of various sizes, felt pens/crayons, scissors, glue/blu tac/sellotape, rulers, rubbers and pencils.

Make sure there is plenty of empty wall space so the young people have a place to put their display up. The young people may also request copies of posters and support sheets they have used in previous sessions. The environment needs to be flooded with the resources/posters from previous sessions to act as aide memoirs.

You may want to invite your Study Support Co-ordinator to introduce the challenge and then come in at the end to view the results. This would help to make the activity more authentic and raise the profile of the work of the young people. Ideally, the displays should be put up for public display and can be used as evidence in QISS portfolios!

notes

Big picture, brain break, icebreaker

What I have enjoyed most about this course?
Young people work in pairs or threes to share their responses to the whole course and this will begin the process of re-visiting everything they have done.

Mini Challenge

50mins

The scenario: The Study Support Co-ordinator has asked the young people to produce a display based on the course.

The purpose of the display is to:

- Encourage young people next year to undertake the course.
- Contribute to the profile of study support in the school.
- Contribute to the school's attempts to gain acknowledgement for their study support work through the QISS recognition scheme.

Your display must include the following information:

- Top ten tips for young people to improve their Maths.
- Super Mathematician's Rucksack: What resources do young people need to have to be ready to improve their Maths.
- Parents section: this gives advice to parents/families about how they can help support their children to be better mathematicians.

What else they need to know

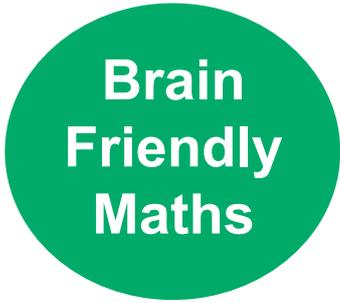
- The display should include pictures/images that illustrate and/or support your message/s.
- The display should have a slogan or title that attracts the attention of young people and parents and quickly tells them what your display can do for them.
- People should be able to understand its message easily even if you are not there to explain it (it can “stand alone”).
- The display needs to reflect what you know about how our brain likes to work.

Give each group an opportunity to reflect on their display and share their thoughts at the end.

Depending on the numbers of young people students you have, you could produce one display that everybody contributes to, or the young people could work in groups of 5/6 to produce group displays.

Variation

Alternatively, the product specification of this activity can be adapted to being a class booklet, rather than a display; this booklet can then be reproduced and each young person given their own copy to take home. A copy can also be put in the school/class library.



Brain Friendly Maths

notes

Review and reflection

Have the following statements displayed around the walls:

- *The most important thing I have learnt during this course is...*
- *One thing I would change about this course...*
- *The best bit of the course was...*
- *From now on I am going to...*
- *This course has helped become a better mathematician because...*
- *Now I need help with...*
- *Other comments I would like to make...*

Whilst some relaxing music is playing ask the young people to move around and add their contributions to as many of the sheets as they can.

Certificates for participation can be given out here or in subsequent school assemblies.

**Did you
know.....?**

80%

**of what we know about
learning has been discovered
in the last 15 years.**

Did you know.....?

**It is estimated that we use
only a small fraction of our
brain's capacity.**

Did you know...?

**Support for learning beyond
the school (in particular
parents and other family
members)
is a critical factor in learning.**

Did you know.....?

**When they are young,
children have a repertoire of
skills that they gradually learn
not to use as they progress
through school.**

Did you know.....?

**Different people learn in
different ways, in different
contexts and are at their best
at different times of the day.**

Did you know...?

**People learn best when they
have control over their own
learning and are encouraged
to learn for themselves.**

Did you know...?

**what you believe about
yourself determines your
capacity to learn.**

Did you know...?

**Your brain isn't fully
developed until your twenties.**

Did you know...?

**That motivation and attention
are driven by emotion.**

Did you know.....?

“Complex learning is enhanced by challenge and inhibited by threat. We want to deeply engage learners with their purposes, values and interests. Thinking and feeling are connected because our patterning is emotional. That means we need to help learners create a felt meaning, a sense of relationship with a subject, in addition to an intellectual understanding.”

Geoffrey Caine, 1998

Did you know.....?

“Our profession has paid little attention to emotion and yet, our emotional system drives our attentional system, which drives learning and memory.”

Robert Sylvester, 1998

Did you know.....?

**“Unexpressed emotions
can inhibit many functions,
including learning.”**

Candice Pert, 1997

Did you know.....?

“The impact of a stimulating or boring environment is widespread throughout the regions of the brain involved in learning and remembering.”

Marian Diamond, 1998

Did you know.....?

The brain develops best in environments with high levels of sensory stimulation and sustained cognitive challenge.

Did you know.....?

Each brain is unique.

Did you know.....?

**Learning involves conscious
and unconscious processing.**

Did you know.....?

**Learning is enhanced by
challenge and inhibited by
threat.**

Did you know.....?

**Learning involves both
focused attention and
peripheral perception.**

Did you know.....?

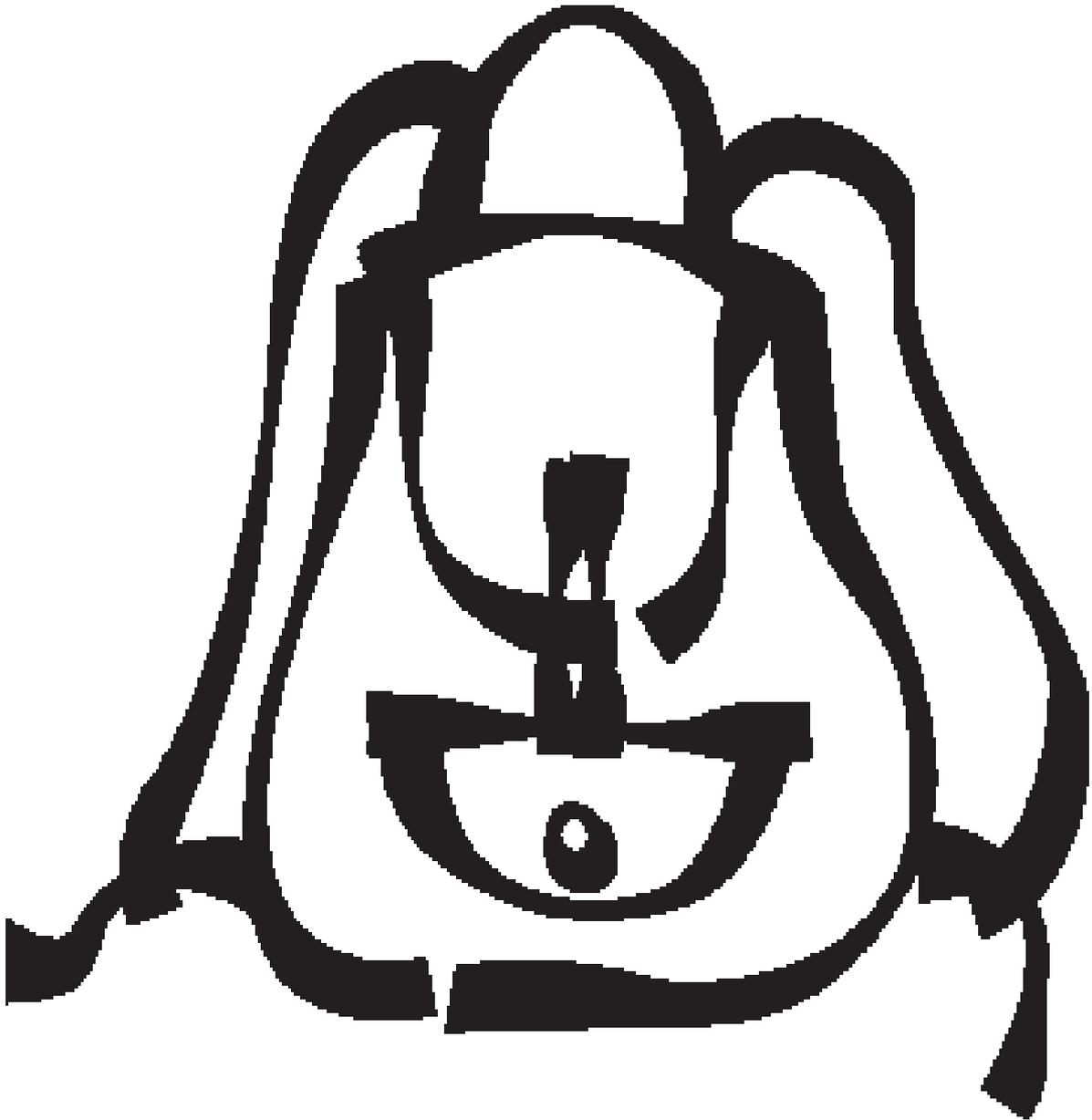
**90% of the brain's input is
from visual sources.**

Did you know.....?

**“The more we learn about
the human brain, the more
we realise how powerfully
it is affected by the learning
environment.”**

Did you know.....?

**Our brains can register up to
36,000 visual images per hour.**



Body Smart (Kinaesthetic Intelligence)	True	False
I do at least one sport in my free time		
I find it hard to sit still for a long time		
I like working with my hands to make things		
My best ideas come when I am walking or doing something		
I like to dance		
I need to touch things to learn about them		
I enjoy scary amusement rides		
I am not clumsy		
I like to learn by doing things rather than reading how to do it		
I like to act things out to help me remember		
Score Total (out of 10)		

People Smart (Interpersonal Intelligence)	True	False
People often come to me for advice		
I prefer group sports to solo sports		
I have at least 3 close friends		
I like social games and activities rather than those I do alone		
I like teaching others and know how to do it		
I think of myself as a leader or others have called me that		
I feel comfortable in the middle of a crowd		
I like parties		
I prefer being in a group at night to being on my own		
Score Total (out of 10)		

Word Smart (Linguistic Intelligence)	True	False
Books are very important to me		
I can hear words in my head before I read, speak or write them down		
I prefer listening to radio or CDs than watching TV or films		
I am good at word games like Scrabble or crosswords		
I like jokes and tongue twisters		
Other people ask me to explain the words I use when writing or speaking		
English is easier for me than Maths		
In adverts I notice the words more than the pictures		
I often talk about things I have heard or read		
I have written something recently that I am proud of		
Score Total (out of 10)		

Number/Order Smart (Logical Intelligence)	True	False
I can easily add and subtract numbers in my head		
Maths or Science is my favourite subject at school		
I enjoy playing games and solving puzzles		
I like doing experiments and questioning the results		
I am always looking for patterns, sequences and order in things		
I am interested in new developments in science		
I sometimes solve problems in my head		
I always notice when people are not sensible in what they say		
I like it when things are measures, sorted out and put into groups		
I believe you can explain most things with Science		
Score Total (out of 10)		

Myself Smart (Intrapersonal Intelligence)	True	False
I like to spend time alone		
I like lessons that help me learn more about myself		
I like to think for myself and not follow others		
I have a special hobby/interest I keep to myself		
I know what I want to do in the future		
I have a good idea of my strong and weak points		
I would prefer to spend some time alone than with a crowd of people		
I stand up for myself		
I keep a diary to record the events of my life		
I would like to be my own boss		
Score Total (out of 10)		

Music Smart (Musical Intelligence)	True	False
I have a good singing voice		
I can tell when someone sings or plays an instrument out of tune		
I spend a lot of time listening to music		
I play a musical instrument		
My life would be boring with no music in it		
I often find a TV jingle or tune running through my mind		
I can keep time with a piece of music with a drum or sticks		
I know the tunes of many different songs		
If I hear a piece of music once or twice I can sing it back		
I often tap or sing a tune when I am studying or working		
Score Total (out of 10)		

Picture Smart (Visual/Spatial Intelligence)	True	False
I often see clear pictures or images when I close my eyes		
Art is one of my favourite subjects		
I would like to use a camera or camcorder to record what I see around me		
I enjoy doing jigsaw puzzles or finding my way through mazes		
I have vivid dreams at night		
I can usually find my way round places that I do not know well		
I like to draw or doodle		
I like drawing diagrams and graphs in lessons		
I can imagine how something would look if I was right above it		
I prefer books that have lots of pictures		
Score Total (out of 10)		

Nature Smart (Naturalistic Intelligence)	True	False
I like being outside		
I enjoy being around animals		
I care about the environment in which I live		
I can recognise lots of sorts of animals		
I can recognise lots of sorts of plants		
I recycle as much as I can		
I enjoy going on long walks		
I switch off lights to save energy		
I hate being stuck indoors for a long time		
I like the wind and the rain		
Score Total (out of 10)		



MUSICAL

INTELLIGENCE



KINESTHETIC

INTELLIGENCE



VISUAL / SPATIAL

INTELLIGENCE



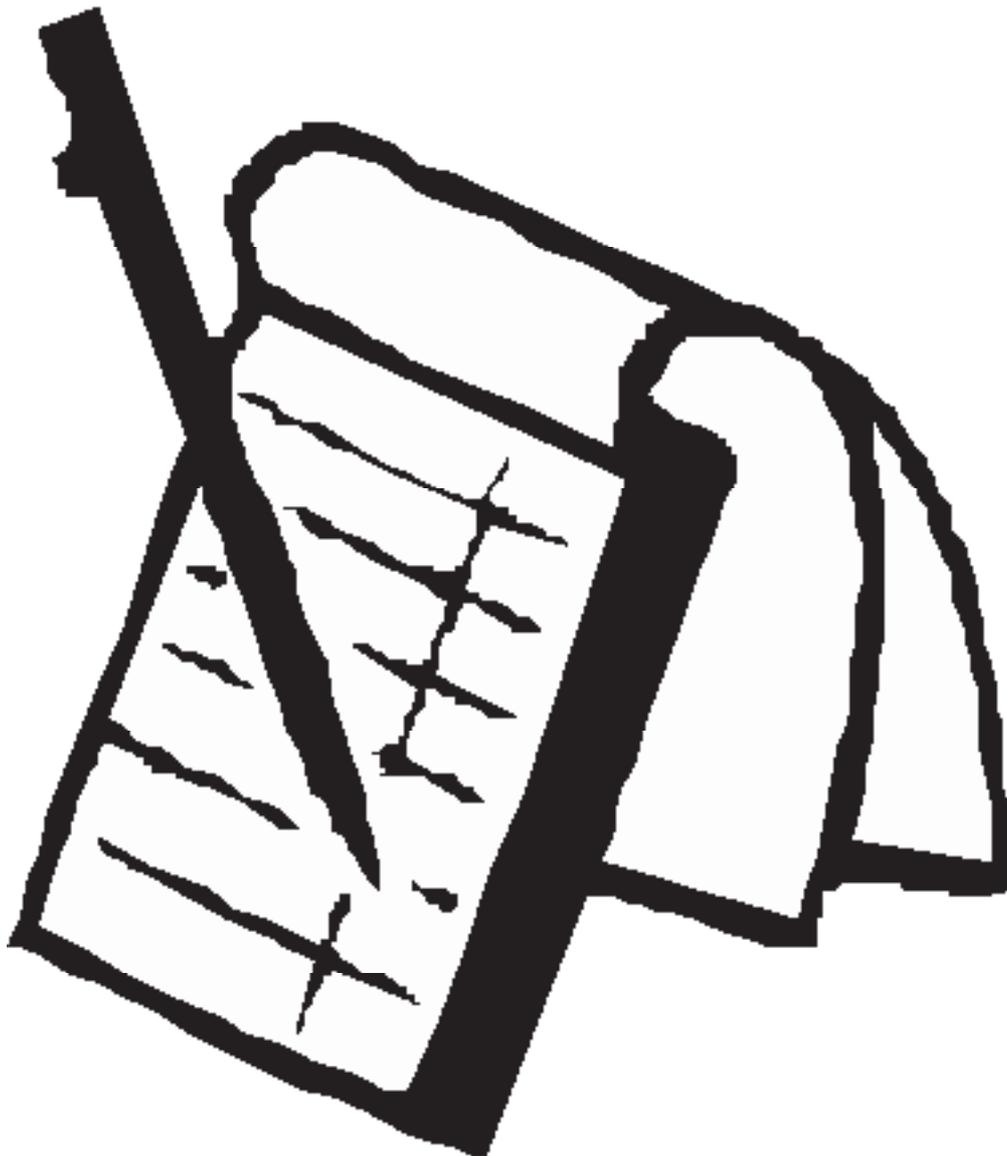
INTER-PERSONAL

INTELLIGENCE



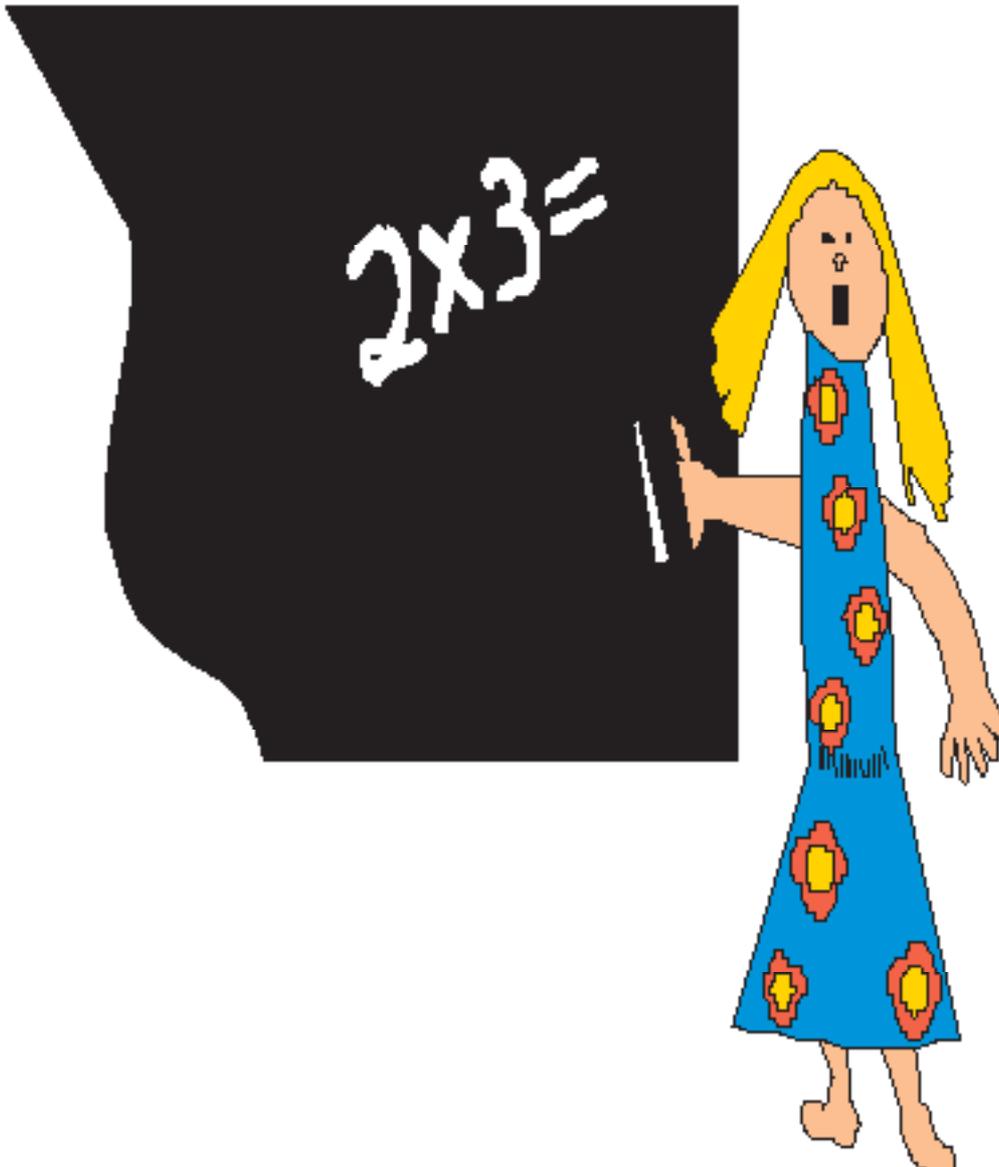
INTRA-PERSONAL

INTELLIGENCE



LINGUISTIC

INTELLIGENCE



MATHEMATICAL/LOGICAL

INTELLIGENCE



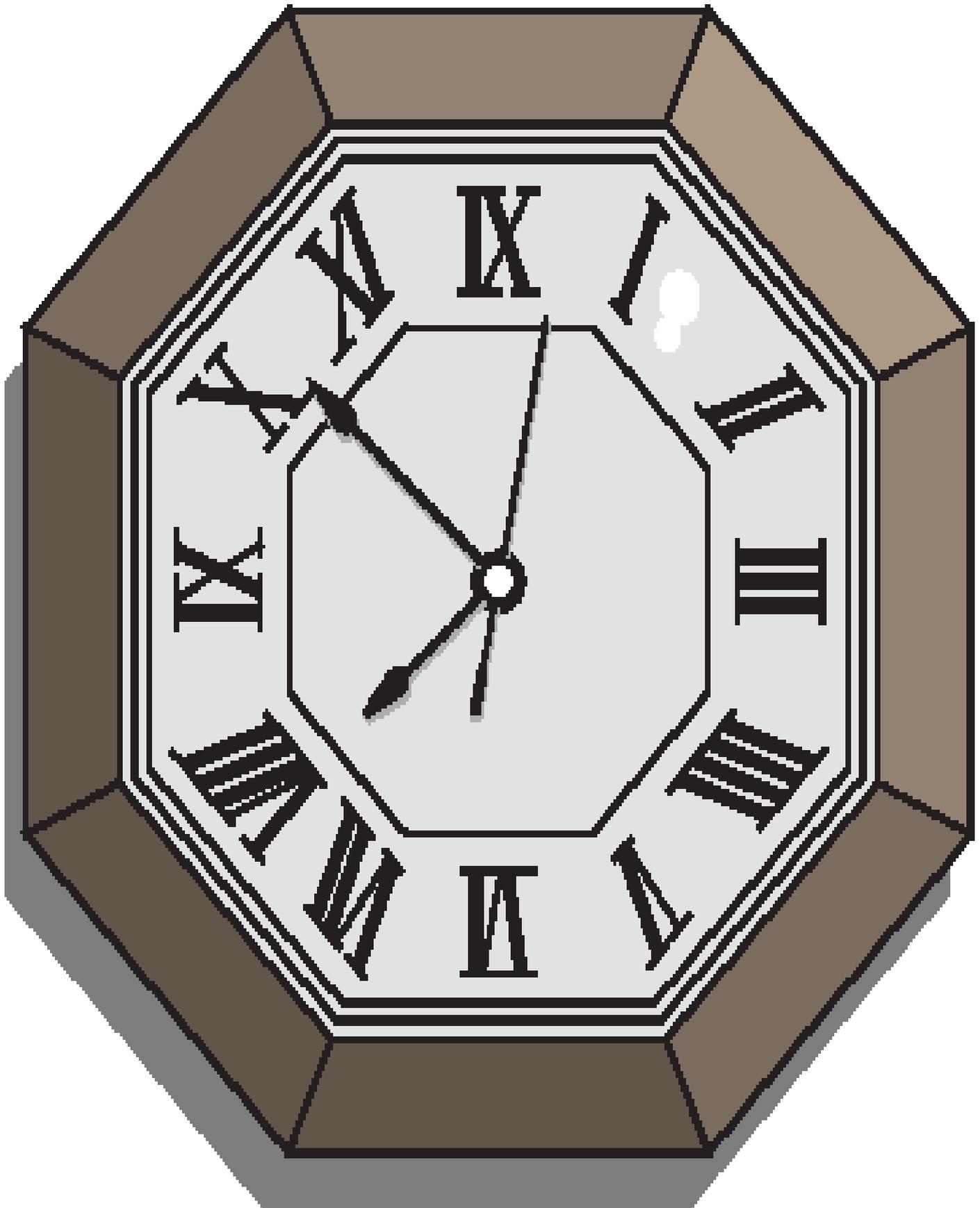
NATURALIST

INTELLIGENCE

**‘We can know ourselves only
because we can remember.
Memory is the centripetal force
that pulls together learning,
understanding and consciousness’**

**John Ratey
A Users Guide to the Brain**

What is memory – the storage space or act and strategy of retrieval? The act of searching for the memory or the energy devoted to forming the memory in the first place?





-10



Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

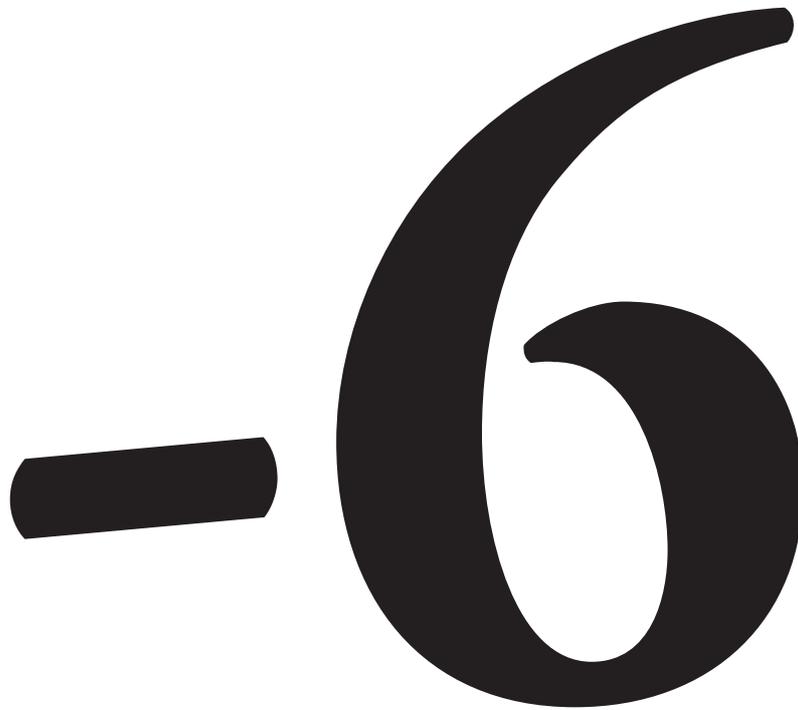
Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers



-8



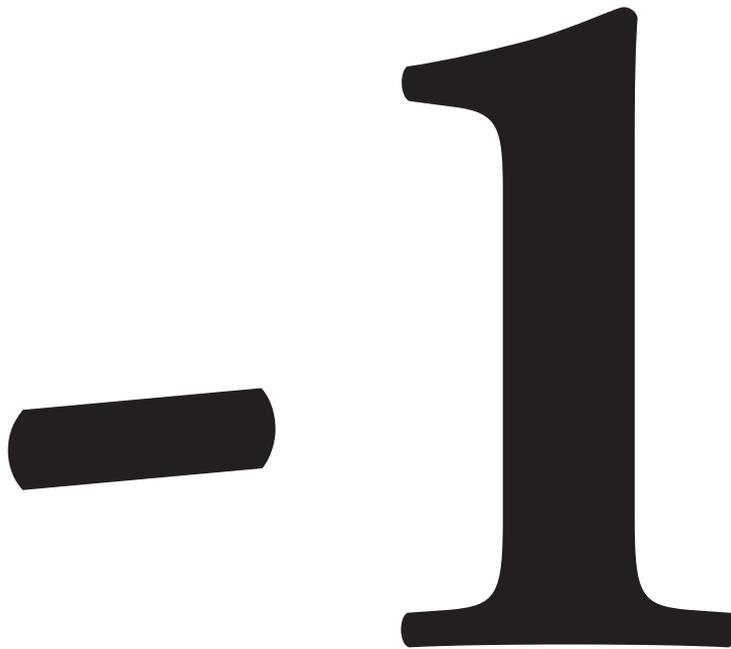


-5

-4

-3

-2



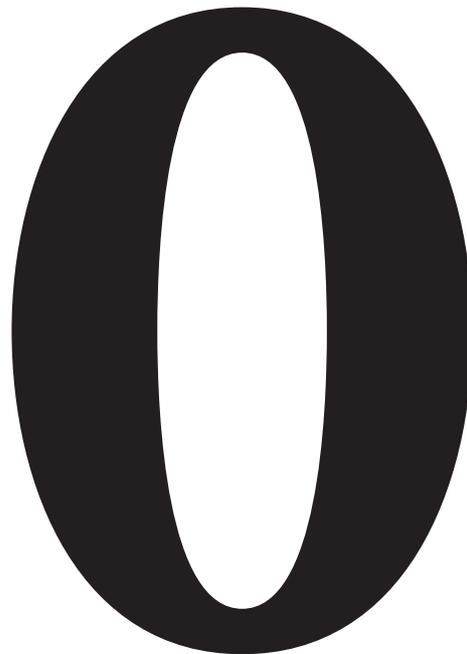


Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers





Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers



1



Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers



2



Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers



3

4



Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers



5



Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers





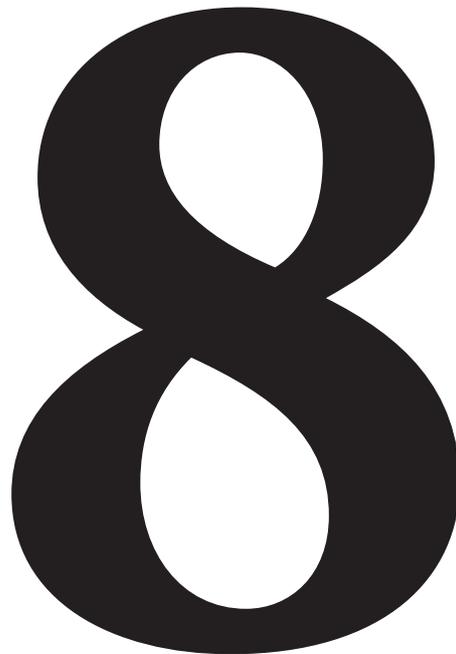
Supporting resources - Session 5

Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers







Supporting resources - Session 5

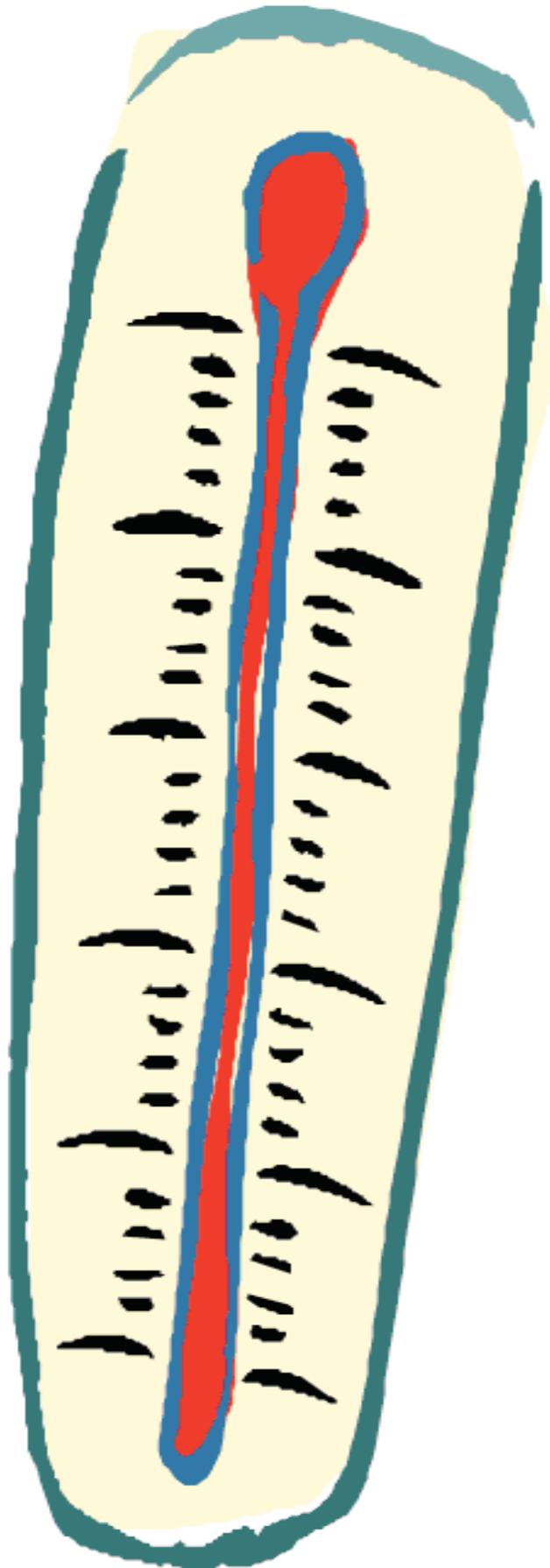
Using different intelligence to learn about positive and negative numbers

Large cards with numbers -10 through 1 to +10

BFM-S5-Numbers



10



Music 

Logical 

Linguistic 

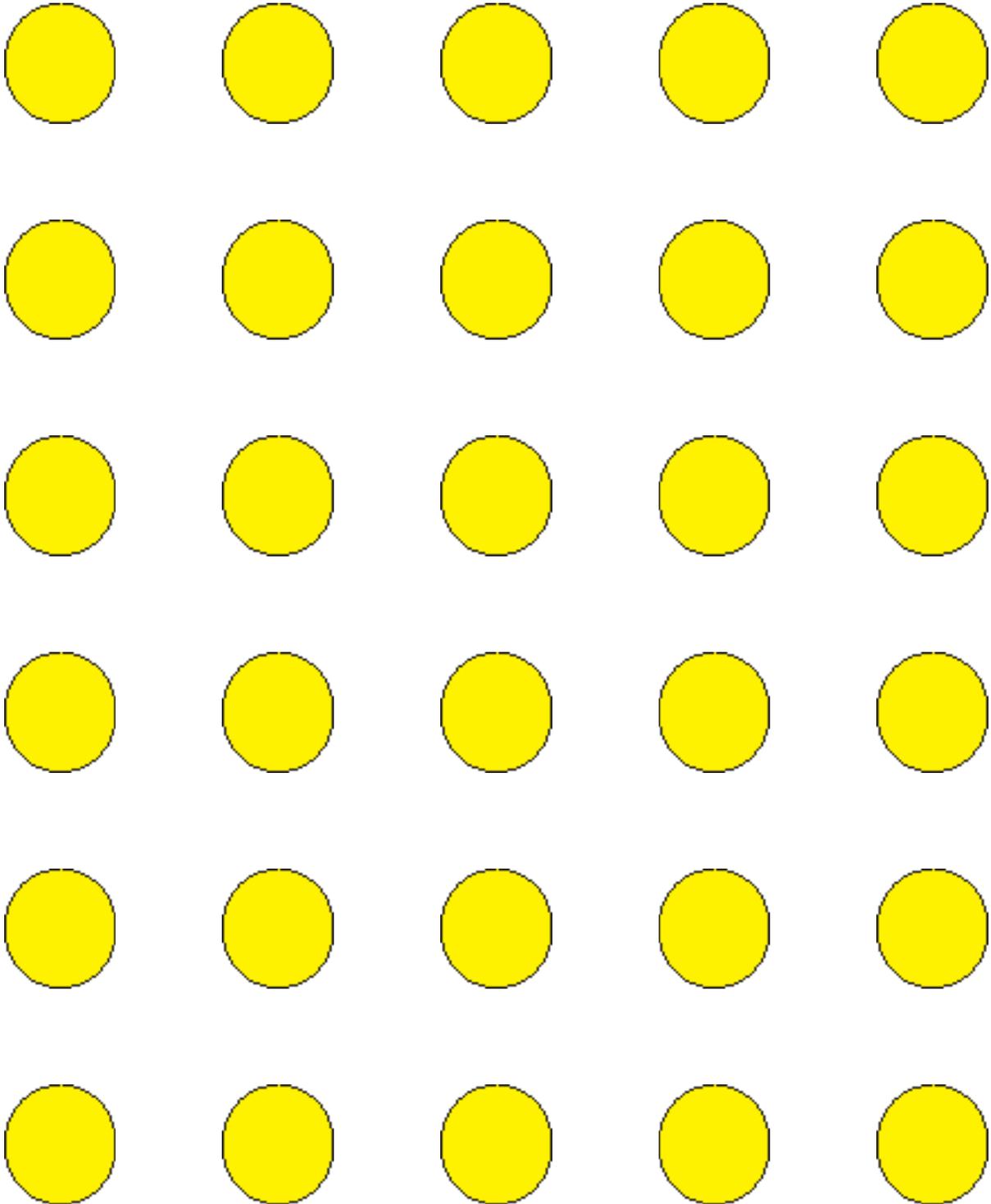
Visual 

Intrapersonal 

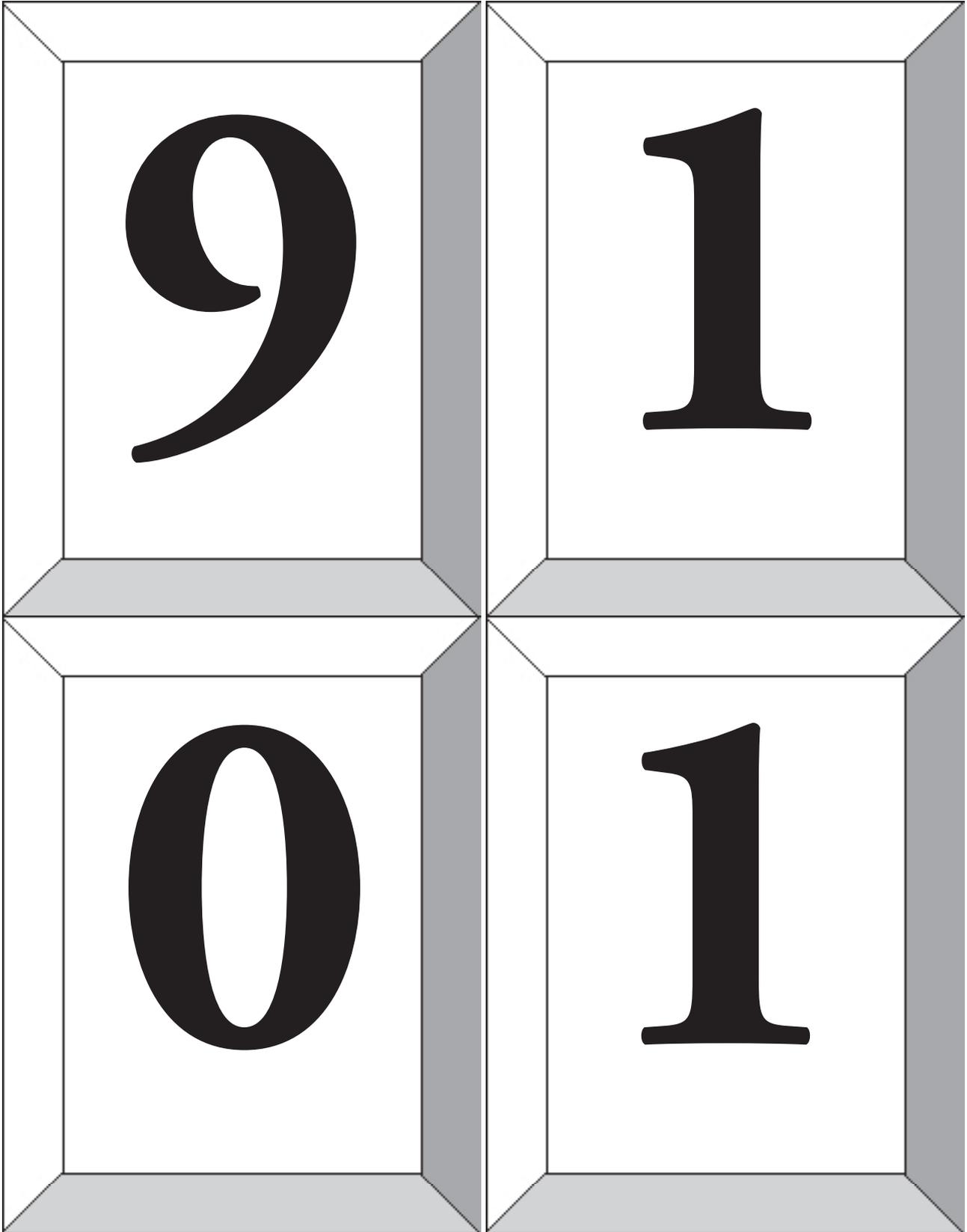
Interpersonal 

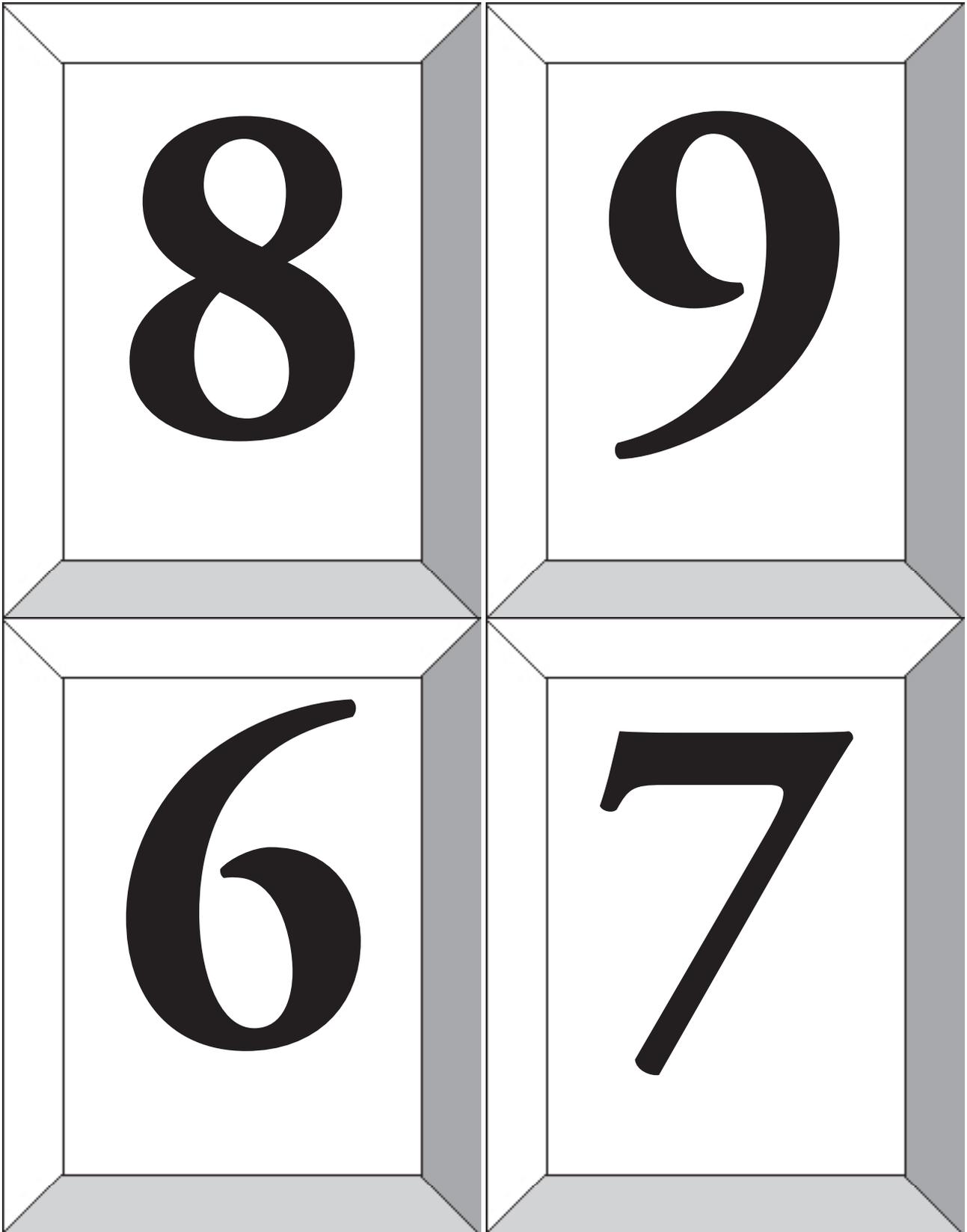
Kinaesthetic 

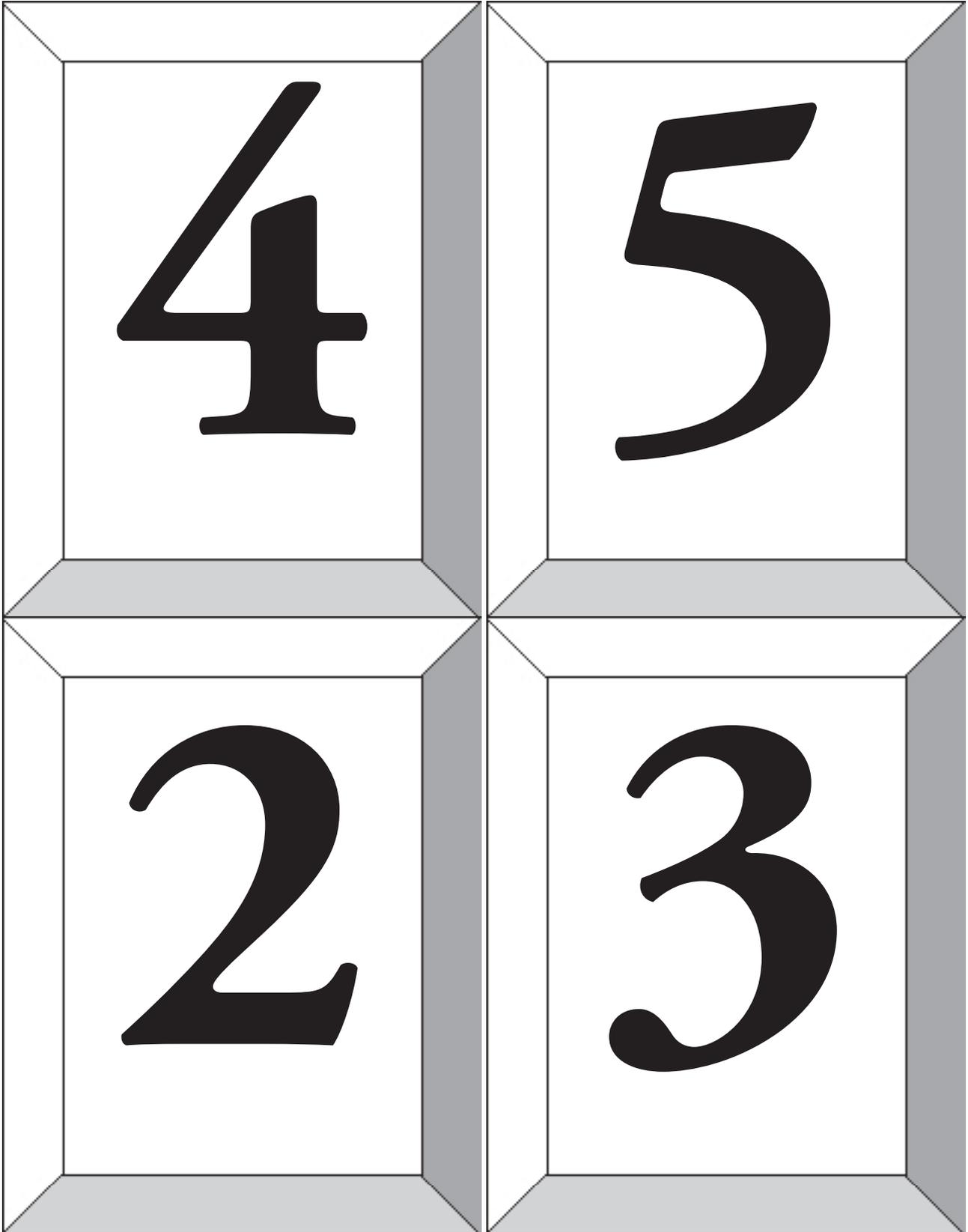
Naturalistic 

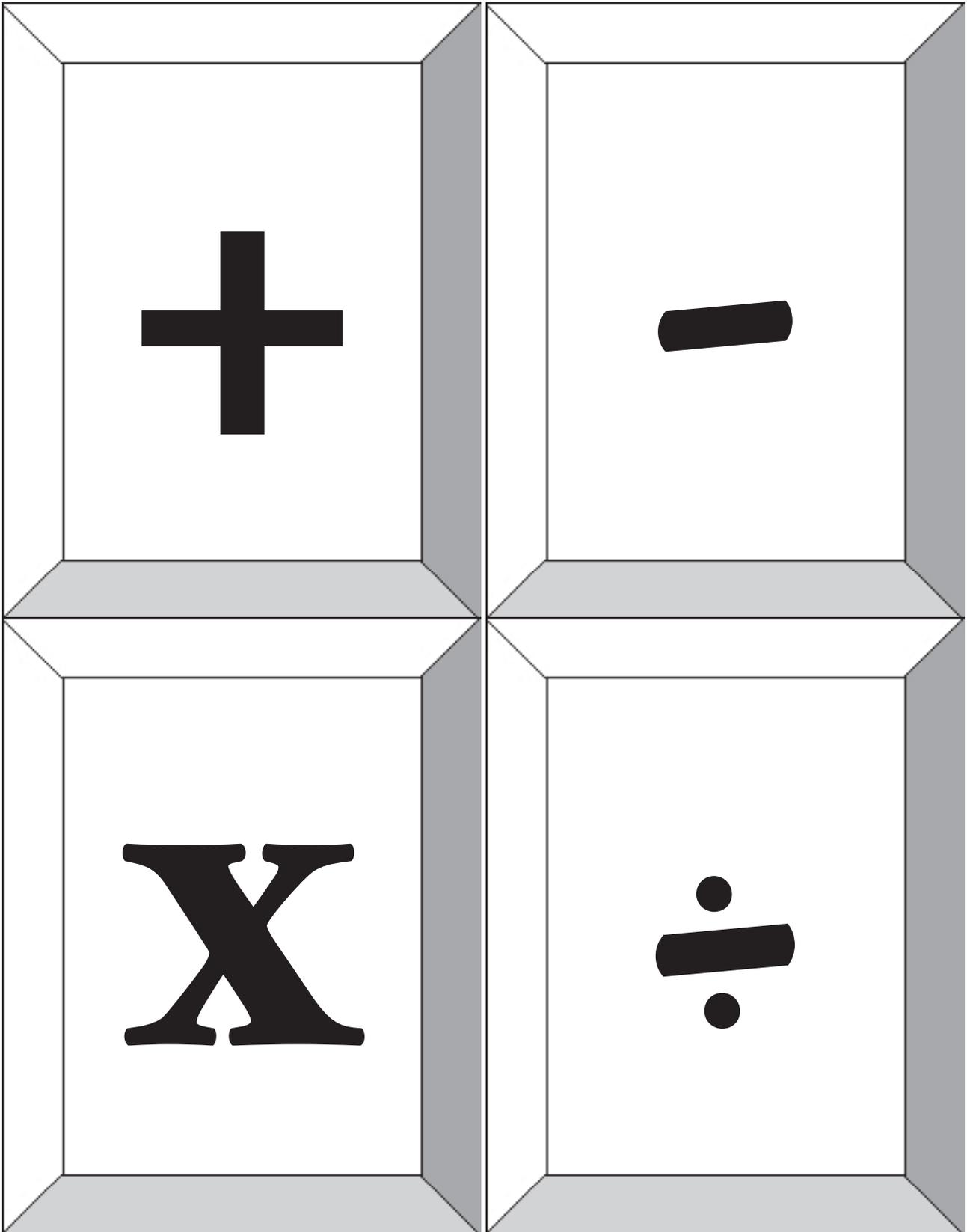












Ann

Carl

Barbara

Daniel

Ed

Helen

Gemma

Fred

The reading list below is by no means exhaustive but it's a start!

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