

# Values in Math Topics

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Rather than treating values education only as a subject in its own right, integrating it into existing curriculum topics has the advantage that schools do not have to abdicate in any way their responsibility to teach the academic skills but simply that they will be rethinking the ways in which they do this. Teachers often mention that they find it relatively easy to draw out values in humanities subjects but that they find it more difficult to do so in mathematics. The purpose of this book, therefore, is to suggest some ways in which values can be drawn out of existing mathematics topics and teaching approaches.

In generating the activities described in this book, attempts have been made to integrate the five universal human values as shown in the table below:

Five universal values and examples of sub-values:

<b>Truth:</b>	accuracy, curiosity, discrimination, honesty, human understanding, integrity, self-reflection, sincerity
<b>Right Action:</b>	courage, dependability, determination, efficiency, endurance, healthy living, independence, initiative, perseverance
<b>Peace:</b>	calmness, concentration, contentment, equanimity, optimism, self-acceptance, self-discipline, self-esteem
<b>Love:</b>	compassion, consideration, forgiveness, humaneness, interdependence, selflessness, tolerance.
<b>Non-violence:</b>	benevolence, co-operation, concern for ecological balance, respect for diversity, respect for life, respect for property.

Attention has also been paid to the questions of whether the activities described contribute to:

- bringing out human excellence at all levels: character, academic, and "being";
- the all-round development of the child (the heart as well as the head and the hands);
- helping children to know who they are;
- helping children to realise their full potential;
- developing self-reliance, self-confidence, and attitudes of selfless service

## **PART 1: HIDDEN VALUES IN THE MATHEMATICS CLASSROOM**

In nearly all cases of observing teachers integrating SSEHV into their mathematics lessons, we found examples of hidden values in their teaching, including:

- Warm, friendly smiles coming from the heart not from the mouth. (Smiling from the mouth takes a lot of energy whereas smiling from the heart gives you more energy and is easier to do!)
- Laughing and making the children feel comfortable (even if 60 children in the class)
- Giving a child a pat on the back or shoulder to show that you care
- Creating a warm, safe environment where the children feel comfortable to speak out about their ideas.
- Good listening skills – head on the side showing interest, nodding and smiling as the children speak, absorbed in listening to whichever child is speaking – all signs that the children are valued and respected.
- Children receiving praise and applause for good responses.
- One of the teachers discussed with the children ways to show love – smiling, making eye contact, communicating from the heart – but more importantly, she is an example of these things in her own behaviour, she is doing them, not only talking about them. This is true Educare teaching.
- After the lesson one teacher said that a lot of the ideas to talk about SSEHV just came into her heads as the lesson unfolded. This is another good way to integrate SSEHV – just seize the opportunities whenever you get the chance.
- There were some excellent audio-visual presentations prepared. This shows the children that you really think they are worth making the effort for. Even some teachers in schools that don't have the best computer equipment were able to make simple visuals that showed the children they cared about them.
- Let children see that different people learn in different ways – some can learn best from diagrams, some from using words etc. We must respect that everyone is different and has different strengths and weaknesses. Everybody has some special strength that they have a responsibility to use to benefit themselves and society.

### **General suggestions**

- Be aware of the small ways in which you can reinforce SSEHV outside the classroom as well as inside. For example, the way children move in and out of the classroom is important. You can remind them to be considerate to others and not to push. We noticed a lot of children pushing each other out of the way to have their photos taken. This can be another opportunity to remind them that they should consider the people around them and not just push to get the best position for themselves. Also remember

to praise small acts of kindness that children do for you or for each other in or out of the class – e.g. passing a stool to another child.

- From time to time it is a good idea to remind the children of the benefits to be obtained from silent sitting – not necessary to do this every lesson, but occasionally remind them.
- How can we use the group seating arrangement to ensure that children work together in teams so they can learn that each member has an important contribution to make? For example, the activity can become a game, a competition between teams, or children can take turns to explain the topic to their group mates. Every group member can be held responsible for making sure that every other group member understands the topic.
- Sometimes when doing group work you need to talk to the children about the idea of teamwork – that the combination of all team members is stronger than any individual working alone can be. If one group member is unable to understand, it's the group's responsibility to help him/her (LOVE/RIGHT CONDUCT)
- When you ask a question, sometimes it is a good idea to give the children a few seconds to discuss the answer with their partner before they put up their hands. This is a strategy to encourage all children to think/talk rather than just the few who get a chance to put up their hands and answer. (RIGHT CONDUCT)

## Games

Games that involve an element of skill and an element of chance promote discussion about:

TRUTH/honesty – not cheating by changing numbers or pretending you have an answer if you don't,

PEACE/self-esteem – everyone has an equal chance in life as long as they put in the work (i.e. to know the answers to the questions)

If some children are clearly disappointed that they do not get a chance to win, this provides a chance to talk about how they feel if somebody else wins and not themselves (jealousy) – how jealousy can damage us, not the other person, so it is better if we feel happy for the person who is successful

Games involving flash cards: One teacher used flashcards to reinforce number facts. One set of cards had number sentences and the other set had answers. Children with the answer cards took turns to find their matching number sentence cards. While they did this, the rest of the class sang a song “Find your friend”. This was a unique way to reinforce the value of friendship.

Discuss the meaning of the quotation from Sathya Sai Baba: “Life is a game, play it.”

## Discussion in the mathematics classroom

In one lesson two groups disagreed that their solutions were the same. The teacher asked them to look at other forms of the equation and they realized it was the same. It is good to ask



children to justify their decisions and to debate if they do not agree. This promotes mathematical understanding rather than just reproducing.

Love: We can learn a lot about conflict resolution from discussion. Two parties might be disagreeing but when they look more closely at each other's point of view they might find that they are able to come to an agreement.

### Group work

Discuss with children the quotations:

“If there is unity among educationists, any undertaking can be successful”.

“When the attitude of unity resides in the heart, there is a spontaneous oozing out of Love.”

### Use of concrete materials

Right Action (sharing): Children can be given one set of materials per group and asked to share them for the good of the group getting the right answer. It is very important that each child in the group is given a task that contributes to the group's outcome and that every group member is responsible for making sure that all group members participate and understand. Make certain that there are no children on the outskirts of the group just watching and not participating.

Examples that relate to giving donations or helping others in difficulty

Love / Right Action: If we expose children constantly to 'positive' input it will be more likely to come to be built into their subconscious minds and they will act in positive ways when a situation arises. It can help to talk briefly about why we should share our abundance with others – that Nature gives us so much and that therefore it is our responsibility to share it wisely.

You can use this opportunity to introduce children to the value of “Ceiling on Desires” – that is to develop self-discipline and self-sacrifice rather than expecting to get everything we want. As a supplementary service project, you could ask each child to sacrifice something that they think they want (e.g. buy less sweets for a month) and discover how much money they save. The teacher can also participate (e.g. reduce the number of cigarettes smoked for a month!) At the end of the month the money they have saved can be used to help somebody in need. Discuss with the children how this makes them feel.

### Estimation

It is important to include estimation in the mathematics programme, particularly to help children to develop strategies for getting the closest possible estimation. We should encourage them to think of getting close estimations rather than “right” or “wrong” estimations so they will use their strategies effectively.

Value: Sometimes we have to be exact in calculating answers but sometimes it is more appropriate to use our thinking skills to get an approximate answer. Also, estimation can be used to check whether our calculations (especially if we use a calculator) are reasonable

answers. (RIGHT ACTION)

**Constructivist** approach – discovering rules for themselves

Silent sitting: Do the visualisation about unlocking the ability to discover the rules.

We all have the ability within us to discover the rules of mathematics because these are rules of “Truth” that never change.

Children investigate: Some people say [insert the mathematical rule here]. Is this true? Does it work with [other numbers]?

Can you make up a rule that tells us how to .....?

Do you agree that the original rule we started with is true?

Problem solving, self-reliance, logical thinking

Checking **strategies**

Children should be taught checking strategies to ensure that their answers are correct. For example they can use the method of “casting out nines”, reverse operations (e.g. check an addition by using subtraction) etc. Checking answers creates an opportunity to discuss the value of Truth. It also encourages children to be self-reliant, relying on their own inner resources to check the Truth for themselves, rather than depending on what others tell them.

## PART 2. OPPORTUNITIES TO TALK ABOUT VALUES IN MATHEMATICS TOPICS

### SPATIAL AWARENESS

<p><b>Angles (acute, obtuse, right)</b></p>	<p><b>Topics for discussion:</b></p> <p>It is important that we look at the people and events around us from different angles. True wisdom is looking at things from a wide (obtuse) angle – if we look at our own personal troubles and problems through a narrow (acute) angle it is very easy for us to make too much of them – but if we look from a wide angled view we can see that they are really very small and trivial in relation to the whole world. This makes it easier for us to be strong and to deal in a healthy way with these troubles.</p> <p><u>Right angles:</u> Right angles can be joined together by their flat sides. If you join four together you can create a circle. Four right angles together in this way form a buttress that represents solidarity. It is because the flat sides of the right angle can give this solidarity that it is used in building, to keep buildings sturdy and level, so that we can feel safe and supported. Without right angles everything would be crooked and would have the feeling of instability. In physics and chemistry we have the elements silica and carbon. Silica is the building block for just about all minerals and stones, and carbon is the same for organic life. The atoms of both silica and carbon are structured from four ninety-degree angled spokes, i.e. interlocking right angles. This is why they are so strong. Ask children to relate this to themselves and to identify what they can do to be like right angles. Also discuss ‘strength in unity’: if one right angle is strong, interlocking four right angles is much stronger – similarly if we have four people of strong character working together it gives an extra force to their strength. This principle can be used for silent sitting – children can feel the sturdiness and strength engaged by their feet and feel it move up through their bones, strengthening their sturdiness of bone, their whole bodies, even their characters and their spirits. [Information about right angles retrieved from <a href="http://www.discoverholistichealth.com">http://www.discoverholistichealth.com</a> December, 2006)</p>
<p><b>Circle</b></p>	<p><u>Silent sitting:</u> We can use the idea put forward by a number of experienced psychologists (described by Phyllis Krystal in her video series <i>Cutting the Ties that Bind</i>), of enclosing hyperactive children in a golden circle that helps them to define their boundaries. The golden colour represents security and purity.</p> <p>Imagine that you are inside a golden circle. You can move around anywhere you like inside your circle and you feel very safe and happy. The other children are in their circles too. Sometimes you bump gently against each other but you are</p>



inside your own circle and nobody else can come in. Your golden circle is your own special space where you can go whenever you like. [Note that you can also do this exercise using a sphere.]

What is the difference between the circle and other shapes? A special property of the circle is that it is complete. We need to try to be like the circle – strong and complete in ourselves and not needing to rely on outer things to make us happy.

Each radius of the circle helps the circle to resist caving in from forces putting pressure onto it from the outside. We need to be like the circle – we also need to have radii that make us strong so that whatever the resisting forces on the outside we will not cave in.

From Swami Rama (1999). Living with the Himalayan Masters, Honesdale, Pennsylvania: The Himalayan Institute Press, p.317

Life is like a wheel, which is compared with a circle or zero. The circle is an expansion of the point. There are two points called death and birth, and life here is a line between the two. The unknown part of life is an infinite line.

Teacher: Liu Junqiang

Teaching objective: to help students understand the names of each part of a circle.

Teaching process:

- Silent sitting: visualizing the sunshine [**Opportunity for values education:** The sun is a circle, so it fits the theme of the lesson. The sun also represents strength, purity and wisdom. If we allow ourselves to be filled up with the light from the sun we will be strong, pure and wise and dark thoughts or actions will not be able to exist in us.]

价值教育的机会：太阳是圆的。因而它适合这一课的主题。太阳同时也代表着力量，纯洁和智慧。假如我们让自己心中充满来自太阳的光辉，我们也会变得有力，纯洁和智慧，而那些不光明的想法和行为都不会存在于我们的内心。

- Features of a circle: teacher asks students to tell where we have circles in the objects around us.
- Draw a circle. What is the difference between this circle and the other shapes we have learned? {shapes we have learned before are composed of lines but a circle is composed of curve}[**Opportunity for values education:** A special property of the circle is that it is complete. We



need to try to be like the circle – strong and complete in ourselves and needing to rely on outer things to make us happy.]

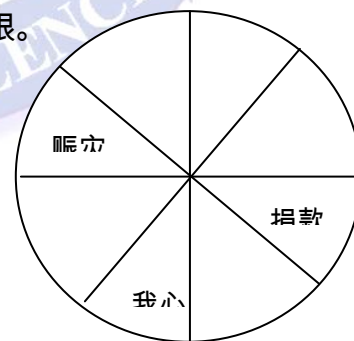
价值教育的机会：以一种特别的方法完成对圆的初步认识。我们需要在我们的内心建立如圆一样的强壮和完满，无须依赖外物使我们幸福。

- Find the centre of a circle – fold the circle equally then after you fold it many times what can you find? After you have made many folds what do you find are the features of each line across the centre and ending at the circumference? Tell them the name of the lines and the point.
- Story about ancient Chinese mathematician Zu Chong Zhi [**Opportunity for values education:** It is good to tell stories about famous mathematicians in their own and other cultures, particularly if these famous mathematicians showed examples of good values in their lives.]

价值教育的机会：给学生们讲自己国家或其他国家的著名数学家的故事是一种很好的方法，尤其是这些著名的数学家能成为他们生活中良好价值观的榜样。

- Game – love others – [see the diagram below]: The circle has many radii. These can represent the rays of sunshine and they can connect us to other people. How much love you have determines how much sunshine you will have. What kind of good deeds have you done will determine what virtues you have? Please fill these qualities in beside the radii marked on the circle. [Love: Heart to heart communication with other people; sharing and doing good deeds for others.]

通过光线把我心和他人连接起来。你有多少爱心圆中就有多少道光明（半径），爱心无限光明也无限。



你做过哪些有关爱心的好事或有哪些美德，请你填在圆内半径上。

The Wheel of Life is the medieval model of change. It describes the emotions

of change. In the Middle Ages when many people were illiterate teaching took place through images or pictures. The Wheel of Life was often carved in the stone walls of cathedrals. People seeing the image received instruction about the change process. What was the lesson?

At the top of the wheel is a well-dressed, smiling, kingly or queenly person. This person is in the position of *Happiness*. Things are normal and going well. The wheel turns with a clockwise movement. Change has occurred. The same person is now upside down and falling through space with a look of distress. This is the position of *Loss*. The wheel continues its movement and at the bottom of the wheel the individual is now nude and is being pulled along through the muck and mire of life. This is the position of *Suffering*. The wheel turns and the person, who is again clothed, rises up to the position of *Hope*. There is hopeful anticipation of once again reaching the position of happiness. The wheel's lesson is that there are only four positions in life: happy, loss, suffering, and hope. We are always in one of these positions.

**Happy is where we want to be.**

Happy is where everything seems normal. Happy is where we all want to be. What we are doing is succeeding. There is a routine that works.

We are comfortable.

Loss is where the happiness of routine begins to fall apart. A variety of events have signaled change and we are being challenged to let go of the routine that worked. When loss comes we want to return to our lost happiness as quickly as possible. We want to regain our equilibrium by making the wheel go in reverse. The wheel, however, only moves forward with a clockwise motion. To regain happiness we must follow the wheel into suffering.

**“Suffering” means to allow**

Suffering is at the bottom of the wheel. Suffering is the phase of transition. The Latin root word for suffering means to "experience or allow." So, to suffer means that we go through and fully experience our loss as we make and then implement our plans for a return to normal. This is a process that we cannot short circuit and still achieve our goal. We cannot go over, under, or around the transition phase.

We must go through it with the hard work of planning, implementing, and revising. This is often unpleasant and there is true suffering (tension, stress, anxiety, worry, frustration, anger, conflict, sadness). It is out of suffering (experiencing) that hope arises.

Hope comes when our plan is working and progress can be seen. We begin to feel competent. Our goal comes into view and we have a vision of a return to the happiness of normalcy.

	<p>The normalcy that we see will not be the same as the "old" normal. Through an effective process of change we return to balance but it is a new and different balance. Happiness is found in a new state of equilibrium.</p> <p><b>The Wheel always turns.</b></p> <p>Once returned to normal we look ahead and get that uneasy sense that, "Something's Up?" The winds of change continue to blow. The wheel always turns. Our happiness, normalcy, is not a permanent state. More change is coming and the journey around the wheel into loss, suffering, and hope begins again.</p> <p>Whenever change enters our life we experience the emotions of change. As we sense that loss is coming there is anxiety, apprehension, and worry. When loss arrives we feel sad, angry, irritated, and frustrated. Grieving needs to be done. With the experience of suffering through change may come stress, depression, burnout, helplessness, or even hopelessness. Eventually, hope brings a renewed energy, optimism, and enthusiasm and happiness brings a sense of satisfaction and contentment.</p> <p>The Wheel of Life teaches that we cannot get happy and stay happy. Change always comes. Change brings growth. The emotions of change are expected and normal. They cannot be avoided. Looking for and accepting them in yourself and others helps work through the process of change.</p> <p>From <a href="http://www.lessons4living.com/wheel_of_life1.htm">http://www.lessons4living.com/wheel_of_life1.htm</a> November, 2006</p>
<p><b>Polygons</b></p>	<p>Investigation (problem solving), constructing formulae for themselves, working as a team to solve the problem/taking responsibility for every group member to understand and helping those who don't (RIGHT CONDUCT)</p> <p>Construct several polygons. Measure the angle size and the number of sides.</p>
<p><b>Square</b></p>	<p>The square is balanced. What can we do to be like the square and make ourselves balanced (i.e. balance between work and play, happiness and sadness, etc.)?</p>
<p><b>Properties of a parallelogram</b></p>	<p><u>To introduce:</u></p> <ul style="list-style-type: none"> <li>• Start by giving a worksheet with 3 figures (eg a parallelogram ABCD) that are the same shape but different sizes.</li> <li>• Ask students to find out (by cutting or folding) which angles are the same, which lines are the same and which triangles are the same.</li> <li>• Are these things consistently the same for all three parallelograms?</li> </ul>



	<ul style="list-style-type: none"> <li>• If “yes”, will they be the same for all parallelograms?</li> <li>• What are the rules we can see from doing this? (e.g. opposite angles equal, opposite sides of a parallelogram are equal)</li> <li>• Have them explain each step in their <u>own</u> words, e.g.:</li> </ul> <p>Explore the balance in a parallelogram, e.g.:</p> <p><math>AB=DC</math> (opposite sides equal)</p> <p><math>\angle BAE=\angle DCF</math> (transverse angles equal)</p> <p><math>\angle AEB=\angle CDF = 90</math> (given)</p> <p>triangle <math>ABE</math>=triangle <math>CDF</math> (they have the same sized angles and one same-length side)</p> <p><math>BE=DF</math> (they are sides of congruent triangles <u>and</u> they are the sides opposite the angles)</p> <p><u>Values:</u></p> <ul style="list-style-type: none"> <li>• Through geometry we can discover the rational order and harmony created by Nature.</li> <li>• Geometry shows us about balance, symmetry, patterns etc.</li> <li>• What can we learn about our own lives from rules of geometry? (Have the students brainstorm)</li> <li>• Opposite angles are equal [People who appear to be opposites are really equal]</li> <li>• Congruent triangles</li> </ul>
<b>Pythagoras’ theorem</b>	Insert story about Pythagoras and the values he modeled- see p.79 of book volume 1)
<b>Surface area and volume of solid figures</b>	
<b>Sphere</b>	<p>We use the idea put forward by a number of experienced psychologists (described by Phyllis Krystal in her video series <i>Cutting the Ties that Bind</i>), of enclosing hyperactive children in a golden circle that helps them to define their boundaries, but extended the idea to a golden ball that enclosed them completely. The golden colour represents security and purity.</p> <p>Imagine that you are inside a golden ball. You are floating around in the ball, very safe and happy. The other children are in their balls too.</p>



	<p>Sometimes you bump gently against each other but you are inside your own ball and nobody else can come in. Your golden ball is your own special space where you can go whenever you like.</p>
	<p>While talking about spheres it is relevant to include Pythagoras' (Greek mathematician, b. c. 580 BC, Samos, Ionia--d. c. 500, Metapontum, Lucania) famous theory about Harmony of the Spheres. Pythagoras and his followers were the first scientists to consider the Earth as a sphere, revolving with other spheres (ie the other planets) around another sphere (the sun). They explained that these spheres are all moving harmoniously with each other according to a numerical scheme. They suggested that there is a connection between the distances from the Earth to other spheres (other planets, the moon, the sun) that correspond to intervals in music that create musical harmony. Based on this theory they proposed that the harmony of the spheres in the universe may actually create music, even though it is not possible for us to hear this music with the human ear. The composer <u>Johannes Kepler</u> used the concept of the music of the spheres in his <i>Harmonice Mundi Harmony of the Worlds</i> in 1619.</p> <p>In China people use harmony spheres (spheres that make harmonious tones as they are held in the hand and moved around) as a means of reducing stress and bringing about their own inner harmony. We need to talk to children about this concept of harmony in the universe and the importance of developing our own inner harmony. In the case of the Harmony of the Spheres in the Universe and the harmony in music, if something gets out of balance the result is unpleasant – similarly if we lose our own inner harmony the result is unpleasant for ourselves and for others around us.</p>
<p><b>Symmetry</b></p>	<p>Did you know that when we breathe it is usually not symmetrical? At any one time we are most likely to be breathing mainly through one nostril or the other. This can help to throw our physical, mental and emotional well-being out of balance. If we want to re-balance ourselves it is very helpful to spend some time thinking about breathing symmetrically – that is consciously breathing in and out of one nostril and then the other one, in turns. Even if we do it for only a few minutes it can help us to feel more balanced. (This can also be used for a silent sitting activity)</p> <p>Lesson demonstrated by Mr. Luo.</p> <p><u>Silent sitting</u></p> <ul style="list-style-type: none"> <li>• The teacher began this lesson by allowing a few minutes for the children to listen to listening to beautiful music and look at slides of pictures from nature. This created a very peaceful classroom atmosphere and helped the children to feel peaceful in their minds as</li> </ul>

well as to appreciate the beauty of nature and man-made beauty.

#### SSEHV in the lesson content

- The children were given cardboard cutouts of various shapes and, working in groups, were asked to recognize which shapes are symmetrical and – if they were not sure – to check for themselves by folding. This is a good example of the value of TRUTH
- The teacher asked a lot of questions that had the children thinking for themselves (RIGHT CONDUCT).
- There was an atmosphere where the children were listening to each other's ideas and they were discussing these ideas and suggesting others (LOVE/RESPECT, RIGHT CONDUCT)
- The teacher continually asked the children to explain why they gave a certain answer (CRITICAL THINKING/RIGHT CONDUCT)
- It was an active lesson that the children enjoyed – this is how SSEHV should be.
- Once the children had established the concept of symmetry the teacher returned to the nature slides shown during the silent sitting and were asked to identify symmetrical shapes in nature. Looking at symmetry in nature is a very good way to bring about NON-VIOLENCE, ie appreciation of the beauty in nature.
- At the end of the lesson the teacher reminded the children not to throw the waste paper away but to make use of it (NON-VIOLENCE)

#### Suggestions for other opportunities to integrate SSEHV

- When talking about symmetry you can also use the opportunity to talk about the importance of keeping symmetry and balance in our own lives (work and play, happiness and sadness, giving and receiving, mental and emotional symmetry etc.)
- Also, symmetry is about reflection/mirror images – discuss with children that when people irritate us it is usually because they are mirroring something we don't like about ourselves. What can we do to look more closely at ourselves in these circumstances, to see if there is something about our own behaviour that this person is mirroring that we may have to change.?
- When showing photographs of symmetry in nature, you could also use the water slides (Masuro Emoto: *Messages from Water*, IHM General Research Institute, HADO Kyoikusha Co. Ltd, Vol.1 & 2). The children can see the symmetry and beauty in the droplets that had received the kind words and thoughts, and the lack of symmetry in the droplets that had received the ugly words and thoughts. Talk to the

	children about how words and thoughts can affect all living things (LOVE)
<b>Triangle</b>	<p>The triangle is the strongest base for construction. Have children look at pictures or make their own towers and pyramids with rolled newspaper or straws. Also have them experiment with their own bodies – what shaped base is the best for enabling us to keep our balance? Let them discover that the strongest constructions are those with triangles in them. What do we need to do to be strong-based like a triangle?</p> <p><u>From Swami Rama (1999). Living with the Himalayan Masters, Honesdale, Pennsylvania: The Himalayan Institute Press, p.317</u></p> <p><u>Triangle</u>: Life should be an equilateral triangle. The angle of the body, the angle of internal states and the angle of the external world make up the equilateral triangle of life.</p>

## NUMBER

<b>Addition</b>	<p>What is the difference between a discussion, a dialogue and an argument?</p> <p>An argument is the meeting of two closed minds. In an argument <math>1+1=\text{nothing}</math>.</p> <p>A discussion is only possible when we are open to one another's ideas. In a discussion <math>1+1=2</math>.</p> <p>A dialogue will only happen when two parties collaborate to uncover a deep wisdom and co-create a new understanding. In a dialogue <math>1+1=3</math>.</p> <p>(Circulated by email, March, 2007, source unknown)</p> <p>Discuss this with children. What does it mean by “<math>1+1=\text{nothing}</math>” or “<math>1+1=3</math>”? Think about different ways that we can make “<math>1+1=3</math>” when we are talking about how two people relate to each other. What about ways of making “<math>1+1=1</math>” (ie the notion of “strength in unity”)?</p>
<b>Average</b>	<p><u>Average</u> – means the one who has more giving to the one who has less. (Discuss the idea of giving to those who have less unconditionally without any expectation of anything in return.) Talk about what we can do to help people in difficulty.</p> <p>A child's comment: “Average makes unfair become fair”.</p> <p>Tell the students that the idea of average helps us to appreciate each other's strengths. If we have a team in which one person is good at Chinese and another is good at mathematics, we can raise the average for the team by</p>



	<p>making good use of each person's strengths.</p> <p><u>Supplementary activity:</u> Use a spreadsheet to explore the effects on a class average of one person having a very high or very low score. Discuss: What can we do as a class to help to raise our class average? (Love: Accepting each other's differences: a team is only as strong as its weakest link so it is in everyone's interest to help the weakest link to become stronger. This can be linked to the "Strength in Unity" poster.)</p>
<b>Equal / equality</b>	<p>Topic for discussion: What does equality mean in relation to being a person of good character? It means that we can look at everyone impartially and see them all as the same – friends, enemies, strangers, foreigners, relatives, even cows, elephants and dogs etc. and not judge anyone as being better or worse than anyone else</p>
<b>1-100</b>	<p><u>From Swami Rama (1999). <i>Living with the Himalayan Masters</i>, Honesdale, Pennsylvania: The Himalayan Institute Press, p.317</u></p> <p>Every digit from 1-100 is explained with verses from Upanishad</p> <p>1: All other digits are multiples of the same 1. Similarly there is only one absolute Reality and all the names and forms of the universe are multiple manifestations of that One.</p> <p>All numbers are the outcomes of a point which cannot be measured, similarly the whole universe has come out of an unmeasurable void.</p>
<b>Greater than / less than &lt; &gt; signs</b>	<p>Make up some cards with different labels (e.g. 'Person with good character', 'person who is rich', 'person who helps others', 'person who is selfish', 'person who tells the truth', 'person who is famous' etc. Also have a card with &gt; and another card with &lt;. Play a game with the children that will help them to remember the &lt; &gt; signs. Ask two children to randomly pick cards from the set. Ask a third child to decide whether the sign between the 2 cards should be &gt; or &lt;, eg 'a person who tells the truth' &gt; 'a person who is selfish', 'being rich' &lt; 'having a good character' etc.</p>
<b>Honest numbers</b>	<p>An honest number is one that can be described in words using exactly the same number of letters (e.g. 4: four; 8: two cubed, 11:two plus nine). Ask children to investigate other honest numbers (all numbers <math>\geq 13</math> are supposed to be honest)</p> <p>Discuss what it means by "honest" – i.e. these numbers names reflect what the numbers truly are. Talk about the importance of honesty in people. Should we be honest if somebody is going to be hurt by what we say? Should we be dishonest and tell a white lie to make somebody feel good or save them from being hurt? (The answer to this is that we should not be dishonest in</p>



	these circumstances. It is better that we find something we can say truthfully or say nothing.)
<b>Commutative Law</b>	$2 \times 3 = 6$ , $3 \times 2 = 6$ They may look different but they are the same. Pupils can be encouraged to make lists of things that are the same about all people despite the fact that they look different.
<b>Decimals</b>	Putting 0 at the end makes no change, putting 0 in front makes the number smaller. Question: What happens to <u>us</u> when we make ourselves like 0 and put our own needs ahead of others? (ie we become smaller)
<b>Decimal point</b>	????
<b>Division by zero</b>	When we divide any number by zero the answer is infinite. Happiness = $\frac{\text{Number of desires fulfilled}}{\text{Number of desires entertained}}$ <i>Sathya Sai Baba</i> Ask students to discuss what happens when the number of desires entertained is zero – i.e. that is when we achieve infinite happiness (PEACE/contentment, self-discipline)
<b>Equations</b>	<b>Ms Wang: Mathematics</b> <b>Grade 1: Equations</b> <u>Silent sitting</u> <ul style="list-style-type: none"> <li>The teacher started the lesson by asking the children to imagine their mathematics thinking skills spreading everywhere in their brains.</li> </ul> <u>SSEHV in the lesson content</u> <ul style="list-style-type: none"> <li>The children were encouraged to think and make decisions, then to tell their outcomes, rather than the teacher telling them what to do. (CRITICAL THINKING/RIGHT CONDUCT)</li> <li>The children were given three numbers and asked to find more than one way to add them, and then to share their methods with their partners. This can be used to give them a message about life: that there are many different ways of going about things, and we should respect and accept that other people might do things differently from us (LOVE, NON-</li> </ul>

VIOLENCE)

Suggestions for other opportunities to integrate SSEHV

- A short activity on revision of numbers at the beginning of the lesson is a good way to start. Sometimes (but not every lesson) you can also ask the children to whisper the answer to their partners before they put up their hands. This gives all children the chance to think and speak, rather than just the few who are able to put up their hands to answer. (RIGHT CONDUCT)

**Topic:**

Equations

**Values for discussion with pupils:**

This teacher began with a silent sitting exercise in which the pupils were asked to visualize a village which was at first surrounded by trees but which changed as the trees were cut down and was eventually destroyed by a flood because there were no trees to protect the soil. The children were asked to think for a moment about, “What can I do right now to prevent this problem?”\* and what they had learned from reflecting on this scene. This helped them to realize that everyone has a responsibility to the environment, not just to leave it to others.

The theme of balancing the environment was used to lead into the topic of balancing equations. It could also be related to balance in themselves, i.e. keeping themselves peaceful even when things go wrong, and how they can get back into balance if they feel disturbed or bothered by something (e.g. breathing deeply, doing silent sitting, having a drink of water and lying down for a while). (PEACE/calmness, equanimity, NON-VIOLENCE/concern for ecological balance)

\*This is a good question to ask children often – it helps them to understand that even individuals can make a difference to the world, and that each one of us has the responsibility to do whatever we can.

**Topic for discussion:** What is a balanced person? When we have lots of desires and ‘wants’ these are clamouring inside us and we are open to feeling let down and disappointed, and balance is not possible. But if we can happily accept everything that happens to us and see it as an opportunity to learn and grow into stronger people, we can become more balanced.

Balanced people are those who cope equally with things that flatter and things that hurt them – they accept praise and criticism equally, they treat friends and enemies the same, they are not affected by events that happen around them that are either happy or sad.

<p><b>Exponents/ powers</b></p>	<p><b>Values for discussion with pupils:</b></p> <p>Illustrate the sequence of powers of 2.</p> <p>If one person (<math>2^0</math>) has love and peace in his/her heart and influences just one other, that will be 2 (<math>2^1</math>). If they each influence one other it will be 4 (<math>2^2</math>), then 8 (<math>2^3</math>), then 16 (<math>2^4</math>) etc. Graph these and show the effect of the exponential increase. We all think that we, as individuals, cannot make an impact, but this illustrates that if we change ourselves, “one candle can light many lamps” (PEACE, LOVE). [also refer to the poster “One candle can light many lamps”].</p> <p>Graph these and tell about Sathya Sai Baba’s prediction: World peace will come when more than half of the people have love in their hearts. The change will start slowly now and increase exponentially until suddenly this group will form the critical mass of people and will outnumber those with hatred and anger. This will tip the balance and the change will happen overnight.</p> <p>Every one of us has responsibility to put love in our hearts and to influence at least one other person to put love in theirs so it will gradually spread in an exponential way.</p>
<p><b>Factors and multipliers (LCM and HCF)</b></p>	<p>LCM and HCF: Look for the similarities, not the differences. How does this apply to people? What are some of the differences between people? What are the things that are the same about all people?</p> <p>Can people have highest common factors?</p> <p>Find the highest good quality that two children have (e.g. they both have brown eyes, black hair, both are funny and both are kind). These are all common factors but what is the <b>highest</b> of these common factors? (children will answer ‘kindness’).</p> <p>Look for highest common factors (qualities) in your friends.</p> <p>What is the highest common factor of everyone in the school? in the world?</p> <p>Discussion can be extended to talk about how people who share a highest common factor can work together to use this factor for the good of others.</p>
<p><b>Five</b></p>	<p>There are five elements of Nature: water, fire, air, space and earth</p> <p>(From B. Shyamala Rao, <i>The Significance of Numbers in Hindu Mythology</i>, New Delhi: Printoindia, 2001)</p>



<p><b>Four</b></p>	<ul style="list-style-type: none"> <li>• Four is connected with stability (eg a square, which is a stable figure, has four sides). Ask children to brainstorm about other real-life examples of the number 4 representing stability. In what other ways does 4 appear (4 directions, 4 seasons etc.) Discuss what is meant by “stability”. What do we need to be stable, and how can we meet these needs?</li> <li>• The four kinds of lapses the tongue is prone to: Uttering lies Carrying tales against others Criticizing or scandalizing others Excessive talking (From B. Shyamala Rao, <i>The Significance of Numbers in Hindu Mythology</i>, New Delhi: Printoindia, 2001)</li> </ul>
<p><b>Fractions (concept of the fraction as a part of the whole)</b></p>	<p>A fraction is linked to sharing, e.g. <math>\frac{1}{4}</math> is how you can share one (e.g. cake) between 4 children. Use this as a chance to talk to the children about WHY it is important to share.</p> <p>It is very important in establishing children’s concept of a fraction to establish it as a part of the whole (a whole cake, a whole packet of biscuits, a whole group of children etc.) You can use this as a chance to talk about what it means to be a “whole” person (ie one who is physically, mentally and emotionally healthy and is happy with who he is). What do we need to do to become whole people? Does having a lot of material possessions make us whole and complete? Think about yourself and think what fraction of a ‘whole person’ you are now. Think about what you can do to make yourself into a bigger fraction (part of the whole). Lead them to the idea that we can only really feel whole and complete if we have inner peace and are not disturbed by the good or bad things that happen around us.</p>
<p><b>Fractions: numerator and denominator</b></p>	<p>Think of the denominator as the family that the fraction belongs to – focus on qualities of the family and how families can support each member.</p>
<p><b>Fractions (addition and subtraction)</b></p>	<p>What have we learned from this rule that tells us fractions and people have the same needs?</p> <p>Fractions need to be the same family before we can add or subtract. It is only by becoming "one family" that we can work together. Ask children to suggest some real-life examples to illustrate this. (LOVE/interdependence,</p>



	<p>NON-VIOLENCE/respect for diversity)</p> <p><b>Value:</b> It is only by becoming "one family" that we can work together.</p> <p><b>Game:</b> Have the children sit closely in a circle. Then ask them to stand up all at once. They notice how difficult it is to stand up when they are all trying to do different things. Next, ask them to sit with their backs facing into the circle and to link arms as if they are a family. They can experience how much easier it is to stand up if they allow themselves all to become "one family".</p> <p><b>Introduction to topic:</b> Fractions are like us. If we leave them as individuals we cannot add or subtract them, but if we make them become all the same family they can work together much more effectively.</p> <p><b>Example:</b> <math>1/3 + 1/2</math> When these are from different families we cannot bring them together. But we know that they are really from the same family. How can we change them both so that we can see that they are from the same family?</p> <p>Children use their previous knowledge of equivalent fractions to write the patterns:</p> <p><math>1/3 = 2/6</math></p> <p><math>1/2 = 2/4 = 3/6</math></p> <p>As soon as they find the common family they stop. Now they can see that <math>2/6 + 3/6 = 5/6</math> is exactly the same as <math>1/3 + 1/2</math>.</p> <p>Ask the children to write down their rule for adding <math>1/3</math> and <math>1/2</math> and share it with their classmates.</p> <p>Will the same rule work for adding other fractions, eg <math>3/4 + 1/5</math>?</p> <p>Will this rule always work?</p> <p><b>Discussion of value:</b> What have we learned from this rule that tells us fractions and people have the same needs?</p>
<p><b>Fractions (Equivalence)</b></p>	<p><b>Value:</b> We can have different names and appearances, but we are all the same (NON-VIOLENCE/respect for diversity).</p> <p><b>Game:</b></p> <p>Groups of 4.</p> <p>Each group has a set of 12 cards. For example, if the set is <math>1/3</math> it contains cards showing pictures of <math>1/3, 2/6, 3/9, 4/12</math> and <math>5/15</math>. [Note that these all</p>

have to be the same size so the children can compare them directly.] It also has cards that are not equivalent to  $\frac{1}{3}$ , e.g.  $\frac{2}{4}$ ,  $\frac{3}{12}$  etc.

The cards are turned face down. Each child takes a turn to pick up a card and match it to the  $\frac{1}{3}$  card that s/he is holding. If it is the same as  $\frac{1}{3}$  the child earns 2 points. If it is bigger than  $\frac{1}{3}$  one point is earned. If it is less than  $\frac{1}{3}$  no points are scored.

**Recording:**

After the card has been picked up, the fraction name is written on the sheet, e.g.

$\frac{1}{3}$

Bigger than	Same as	Smaller than
$\frac{3}{4}$ , $\frac{5}{10}$	$\frac{2}{6}$ , $\frac{3}{9}$ , $\frac{4}{12}$ , $\frac{5}{15}$	$\frac{2}{12}$

The children need to keep these recording sheets for later discussion.

Children need to play this game several times and also to play it with other fractions, e.g.  $\frac{1}{2}$  and  $\frac{1}{4}$ .

**Pattern Activity (Teacher led)**

The teacher asks the children to look at the fractions in the "same as" column.

Can they see any patterns in the numerators (top numbers)?

Can they see any patterns in the denominators (bottom numbers)?

Can they use this pattern to find other fractions that are equivalent to  $\frac{1}{3}$ ? Others that are equivalent to  $\frac{1}{4}$ ? Others that are equivalent to  $\frac{1}{2}$ ?

Ask the children to write down their rule for finding equivalent fractions.

After pupils have looked at the patterns in equivalent fractions, tell the story of Fraction Land and have them make up their own stories using equivalent fractions, that bring out the underlying value.

Once upon a time in Fraction Land there was chaos. All the fractions were constantly arguing with each other.  $\frac{6}{12}$  thought he was the best because he had the biggest numbers on both the top and the bottom, so he was cruel to the fractions with smaller numbers, like  $\frac{2}{4}$  and  $\frac{3}{6}$ .  $\frac{4}{8}$  would not allow his children to play with the children of  $\frac{3}{6}$  because they always cut their food into 6 pieces and  $\frac{4}{8}$  believed that the only proper way was to cut it into 8 pieces – he did not want his children to learn any “wrong” ways of doing things. Mrs.  $\frac{2}{4}$  would shout at Mrs.  $\frac{5}{10}$  in the

	<p>market because Mrs. <math>\frac{5}{10}</math> always bought <math>\frac{5}{10}</math> of a kilogram of everything and Mrs. <math>\frac{2}{4}</math>, who only ever bought <math>\frac{2}{4}</math> of a kilogram, thought she was being very greedy. The <math>\frac{2}{4}</math> family would always cross the street if they saw anyone from the <math>\frac{3}{6}</math> or <math>\frac{4}{8}</math> families approaching them because they looked so different that they thought they must be very bad people indeed.</p> <p>Things became so bad that the fractions all began to pray to their own gods to make their enemies go away. It was no longer a safe or happy place to be. One day a brilliant bright light appeared, and out of it stepped the most beautiful angel the fractions had ever seen. Her dress was painted with golden numbers that said <math>\frac{1}{2}</math>. Suddenly everything went dark and when the lights came on again the fractions looked at each other in great surprise. They all looked exactly the same as each other. Everyone's tops had turned into a 1 and the bottom parts had turned into a 2. What had happened? Were they still the same Fraction Land people they had always been? Or had the angel turned them into different people?</p>
<p><b>Fractions and decimals</b></p>	<p>How zero changes the value of a fraction (e.g. <math>\frac{1}{10}</math> <math>\frac{1}{100}</math>). If you put zero (nothing) onto the tail of a denominator it makes the fraction smaller. If you do nothing (zero) to grow in character you will get smaller and smaller too – the more times you do nothing the smaller you will get.</p>
<p><b>Graphs (pie graphs)</b></p>	<ul style="list-style-type: none"> <li>• Proportions of areas planted with different kinds of seeds: As an extension activity, plant some fast-growing seeds (eg beans). Put some in the classroom where you have your music and silent sitting (PEACE). Put some, as a control, in another classroom (with the same amount of light and water) where there is no music or silent sitting. You can also ask the children during their silent sitting to concentrate on sending loving feelings to one of the plants but not to the others (LOVE). Compare the growth of the different plants over time. What do the results tell us about <u>people's</u> needs?</li> <li>• Make a pie graph showing the different dimensions of a healthy life (time for school, quality time, health/fitness time, time for chores, time for friends, family time, time for helping others, sleep time, time for developing my own special strengths and talents etc.) Ask children to brainstorm about what should be in their circle then ask them to draw their own pie graphs showing what proportion of their time is spent on each aspect. Discuss whether they need to change anything to have a more balanced life.</li> </ul>
<p><b>Income tax</b></p>	<p>From where does the government get funds? The government provides roads etc. For us, so we have some responsibility/moral obligation to give</p>



	<p>something in return, i.e. take taxation as a moral duty towards the society that is doing so much for us, not as a burden.</p> <p>Talk about tax evaders and the effects of increasing the taxes/increasing the burden of the salaried people, therefore the importance of co-operation (RIGHT ACTION/dependability, NON-VIOLENCE/respect for property). Regarding concessions for money given in donations: We are not getting anything out of it so why should we donate? We should give from the heart because we want to and because it is going to benefit some people who we may or may not know. We are not here for ourselves only, we have duties to others. If you don't have money you can do it with your hands, but when it comes to income tax the government encourages you to give money for a good cause. This is the concept of selfless service. Don't be stingy with the amount of money you are prepared to part with, compared to being prepared to spend a lot of money for our own purposes (LOVE/compassion).</p>
<b>Interest (simple and compound)</b>	<p>Some financial advisors suggest that we should immediately save 10% of any income that comes to us before we spend any of it. If you have a monthly income of [insert amount] and you save 10%, and invest it at an interest rate of [insert rate], how much will you have after 1 year? After 10 years? They also suggest that 10% is a small amount that we will not miss, so we can afford to give away 10% of everything we earn to those who are needy. Over a period of 10 years how many people do you think you could help by giving away 10% of all your earnings? (RIGHT ACTION/efficiency, NON-VIOLENCE/benevolence).</p>
<b>Minus</b>	<p>Start the lesson with the following silent sitting. 'Close your eyes and take some slow, deep breaths to relax. .... Now imagine that you are looking at yourself in a mirror, so you can see yourself as other people see you. Imagine that you can see a big "minus" sign above your head in the mirror. Minus means taking away from something, or making something smaller. Look closely at yourself in the mirror and look at your own minus qualities. These are the things that take away from you being the best that you can be, the things that make you a smaller person. As you look at your own minus qualities, one by one tell them to go away and imagine that they are leaving you. See yourself growing bigger and bigger each time one of your minus qualities goes away....'</p>
<b>Money (value of notes and coins; different combinations of coins to make the value of a note; what we</b>	<p>(See also the sections on "Interest" and "Percentage" for further ideas)</p> <ul style="list-style-type: none"> <li>• [if the school has a donation programme] Why should we donate some of our money to poor children? Should we ask for something in return? (leading to the idea of unconditional love) Should we donate or should we keep all of our money for ourselves? What value is related to donating? (unconditional love) What "vice" is associated</li> </ul>



<p><b>can buy for different amounts of money etc.)</b></p>	<p>with keeping it all for ourselves? (greed, selfishness)</p> <ul style="list-style-type: none"> <li>• How do we feel if we use our money wisely? What are good things to spend money on? What are wasteful things?</li> <li>• Value judgements: Is it better to be rich or happy? Is it better to be rich and have a bad character, or poor and have a good character?</li> <li>• Saving: Talk about advice given by finance experts that we should save 10% of whatever we earn</li> <li>• Fermi problems: Ask children to think about how much money their parents spend on them in a day/month/year.</li> </ul>				
<p><b>Multiplication and addition</b></p>	<p><b>Multiplication:</b> “Desires, when fulfilled, multiply and become greed.” Discuss with children what the implications of multiplication are in this context. What can we do to prevent our desires from multiplying to the level where they become greed?</p>				
<p><b>Nine</b> <b>Properties of 9</b> <b>Strategies for adding numbers to 9</b> <b>Multiplying by 9</b></p>	<p>Nine is considered a good number in Chinese culture because it sounds the same as the word ‘long lasting’. It is also associated closely with the Chinese dragon, a symbol of magic and power. [Children can research the 9 aspects of the dragon and the 9 children of the dragon and identify what their strengths and good characteristics are.]</p> <p>Nine appears in the universe. For example, there are nine planets in our solar system.</p> <p>Ask children to identify patterns that occur if you multiply 9 by other whole numbers (1x9, 2x9, 3x9,.....). What happens when you add together the digits in the answer?</p> <p>What is the pattern if you divide successive numbers by 9 (1÷9, 2÷9, 3÷9, etc.)</p> <p>What is the pattern that occurs if you add any number to 9?</p>				
<p><b>Number facts</b></p>	<table border="1"> <thead> <tr> <th data-bbox="488 1577 1182 1646"><u>Game</u></th> <th data-bbox="1182 1577 1463 1646"><u>Values</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="488 1646 1182 1877"> <p>Find patterns in the multiplication tables (especially 9s and 11s). Investigate whether these patterns will continue even with big numbers. Similar patterns can be found with addition and subtraction (eg what pattern do we get when we repeatedly add on 9 to a number? Does this always work? Even with big</p> </td> <td data-bbox="1182 1646 1463 1877"> <p>aesthetic appreciation of patterns and balance in maths</p> </td> </tr> </tbody> </table>	<u>Game</u>	<u>Values</u>	<p>Find patterns in the multiplication tables (especially 9s and 11s). Investigate whether these patterns will continue even with big numbers. Similar patterns can be found with addition and subtraction (eg what pattern do we get when we repeatedly add on 9 to a number? Does this always work? Even with big</p>	<p>aesthetic appreciation of patterns and balance in maths</p>
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	numbers?	
	<p><b>Buzz:</b></p> <p>Children start at one and take turns to count in 1s. Every time they get to a multiple of (say) 2 they say, “Buzz” instead (e.g. 1 - Buzz - 3 - Buzz – 5)</p>	<ul style="list-style-type: none"> <li>• listening skills</li> <li>• speaking clearly to help others to continue the pattern</li> </ul>
	<p><b>Digit Ring:</b></p>	<ul style="list-style-type: none"> <li>• concentration</li> <li>• silence</li> </ul>
	<p><b>Grouping:</b> (to be played in silence)</p> <p>Give each child a card. Some have a multiple of 4, some a multiple of 9 etc. In silence they find the rest of their group and stand in correct sequence</p>	<ul style="list-style-type: none"> <li>• concentration</li> <li>• silence</li> <li>• helping others to achieve group goal</li> </ul>
	<p><b>Circle Pass:</b></p> <p>Sit in a circle and hold hands. As each child has his/her turn the previous child passes on the pulse of loving energy by squeezing his/her hand and sending support that s/he will get the right answer. Start with a number fact, eg 2x4. The next child answers 8, then continues with a new fact, eg (... x 2 = 16 – note that they do not repeat 8 as part of the game is to listen carefully to the number the first time it is said). The game continues until everyone has had a turn. Conclude by having the children talk about their experiences with the game.</p> <p><b>Values for discussion with pupils</b></p> <p>If we send love and support to other people to help them to get the right answer, rather than being</p>	<ul style="list-style-type: none"> <li>• Love and support</li> <li>• listening</li> </ul>

	<p>jealous or hoping they make a mistake, it makes them feel good and it also makes us feel good (LOVE/compassion, selflessness).</p>	
	<p><b>Space-ships:</b></p> <p>Each child is given a number. Teacher starts, e.g. “This is number 2 calling number 4 – come in please number 2”. The children have to recognise what operation the teacher has started with (e.g. doubling) and number 4 calls for the next one, e.g. number 8. When they have reached the highest number, the last child changes the operation so the numbers go down again.</p>	<ul style="list-style-type: none"> <li>• Listening</li> <li>• Supporting each other</li> </ul>
<p><b>Number facts</b></p>	<p>Multiples of 8</p> <p>8x1=8</p> <p>8x2=16 (1+6=7)</p> <p>8x3=24 (2+4=6)</p> <p>8x4=32 (3+2=5)</p> <p>8x5=40 (4+0=4) etc.</p> <p>Suppose the number 8 represents <u>desire</u>. The more you multiply it, the less you get in your final value. (Taken from M. Mazzoleni, <i>A Catholic Priest Meets Sai Baba</i>, Faber, Virginia: Leela Press. 1994.</p>	
<p><b>Number sentences</b></p>	<p>Number sentences, e.g.</p> <p>5+3+2+1=11</p> <p>2+3+5+1=11</p> <p>3+1+5+2=11</p> <p>4+6+1=11</p> <p>2+7+2=11</p> <p>3+3+5=11</p> <p>There are many different ways of arriving at the same answer. What does this mean in relation to people? People may do things in different ways but we should not accuse them of being wrong if their way is different from ours. This discussion can be extended to cultural and</p>	



	religious differences between people (NON-VIOLENCE/respect for diversity).
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<p><b>One</b></p>	<ul style="list-style-type: none"> <li>• The number one represents new beginnings. Let's make a new beginning today by thinking of something that we want to improve about our characters and making a pact with ourselves to work towards this goal.</li> <li>• One also represents unity. Discuss the idea of "strength in unity" (Please refer also to our published SSEHV Poster Support materials for further ideas about this concept). Remind children that the class can become stronger in mathematics if everyone combines their strengths to help and support each other to understand topics.</li> </ul>
<p><b>Percentage</b></p>	<ul style="list-style-type: none"> <li>• Budgeting percentages of pocket money for different purposes (RIGHT ACTION): As a supplementary service project, children can be introduced to the value of "Ceiling on Desires" – that is to develop self-discipline and self-sacrifice rather than expecting to get everything we want. Each child can be asked to sacrifice something that they think they want (e.g. buy less sweets for a month) and discover how much money they save. The teacher can also participate. At the end of the month, the money they have saved can be used to help somebody in need. Discuss with the children how this makes them feel.</li> <li>• Percentage: One teacher introduced the percentage lesson with the scenario, 'In a class of 100 pupils, 17 thought of themselves as truthful children (ie always told the truth and never told a lie). In a class of 200 children, 20 said they were truthful.' As an extension, he did a survey with the children in his class, in which he gave them a list of values and asked them to think carefully and honestly about which of these values applied to themselves. The survey data were used to develop the percentage activities and at the same time encouraged them to self-reflect about their own good qualities or where they needed to improve.</li> <li>• Some financial advisors suggest that we should immediately save 10% of any income that comes to us before we spend any of it. If you have a monthly income of [insert amount] and you save 10%, how much will you have after 1 year? After 10 years? They also suggest that 10% is a small amount that we will not miss, so we can afford to give away 10% of everything we earn to those who are needy. Over a period of 10 years how many people do you think you could help by giving away 10% of all your earnings? (RIGHT ACTION/efficiency, NON-VIOLENCE/benevolence)</li> <li>• Compare statistics of their own and other countries; compare with another class the students who are good in study, sports etc. This is a very important aspect of helping children to develop self-acceptance and self-esteem as well as tolerance of others. We need to emphasise repeatedly that everyone has his/her special gifts/talents and help them to think how they can use these for the good of society. We also need to encourage them to be tolerant of others and to look for the good things</li> </ul>

	that others can do, not at what they cannot do (LOVE)
<b>Perfect numbers</b>	<p>A number is perfect if the sum of its products equals the number itself,</p> <p>e.g. <math>6 = 1+2+3</math></p> <p><math>28 = 1+2+4+7+14</math></p> <p><math>496 = 1+2+4+8+16+31+62+124+248</math></p> <p>How about people? What does it mean to be a ‘perfect’ person? What kinds of qualities should we try to develop in ourselves?</p>
<b>Statistics and Graphing</b>	<p><b>Ms Lin</b></p> <p><b>Graphing and statistics</b></p> <p><b>Grade 1</b></p> <p><u>SSEHV in the lesson content</u></p> <ul style="list-style-type: none"> <li>• The children suggested a variety of ways in which they could do community service to celebrate Children’s Day. They made a graph to show the most popular choice and on Children’s Day they actually went out and performed the chosen service.</li> <li>• This was an excellent example of a lesson designed to encourage children to believe in the importance of serving others – a much more worthwhile way to introduce graphing than some of the more conventional methods. (LOVE)</li> <li>• Children were reminded of good manners – eg to remember the “first come, first served” rule and to wait quietly for their turn. (RIGHT ACTION)</li> <li>• Good problem solving: “What should we do about.....?” Children were encouraged to make creative suggestions. (RIGHT CONDUCT)</li> <li>• This is a secure mathematics environment for children to be in. (LOVE)</li> <li>• Children were asked to pose their own mathematical questions. (THINKING: RIGHT CONDUCT)</li> </ul> <p><u>Further suggestions about opportunities to integrate SSEHV</u></p> <ul style="list-style-type: none"> <li>• Talk to the children about why we help others – that it makes us happy if we forget about ourselves and think about others without expecting something back.</li> <li>• To bridge the gap between SSEHV in the classroom and in daily life it is</li> </ul>



important that the children actually carry out the activities they voted to be the most popular.

- As a second activity the children were asked to collect and graph data about their favourite cartoons. This could be extended to bring in SSEHV. For example, they could talk about why they like the popular choices, what the values are in the favourite choices, the qualities of the main characters that they would like to have, etc. they could also do surveys of the good characteristics of the main characters in their favourite cartoons.

## **MR. WANG DINGQING: MATHEMATICS**

### **Grade 6: Water wastage**

#### Silent Sitting

- The silent sitting was very inspiring and linked well to the topic of water, helping the children to realize and appreciate the beauty and importance of water (NON-VIOLENCE)

#### SSEHV in the lesson content

- The topic of water wastage is a very important one in SSEHV (NON-VIOLENCE/RESPECT FOR THE ENVIRONMENT)
- The teacher made good use of an SSEHV topic in asking the children to collect statistics about the water usage and wastage in their homes.
- It was a good idea to ask why we use so much water – one child, for example, explained that his family raises fish, so they are using the water for this purpose and not in any wasteful way. (LOVE/LOOKING AT OTHERS' POINTS OF VIEW)
- Children were encouraged to make their own decisions about why the wastage behaviours are wrong (RIGHT CONDUCT)
- The teacher used the water theme to practise estimation (how much water flows from a dripping tap) and problem solving (how can we design an experiment to check the accuracy of our estimation). (CRITICAL THINKING/RIGHT CONDUCT). He then compared the amount wasted to the number of bottles of water this amount would fill, and how many years' supply of drinking water it would provide. This really illustrated to the children the amount of water that can be wasted.
- This was an active lesson – the children and teacher were all clearly interested in the topic. (In Educare it's important for the teacher to be interested in what s/he is teaching)
- The teacher went further to explain why it is important to save water

	<p>even in a place like Sichuan where there is a plentiful supply, and emphasized the importance of people with abundance sharing their abundance with those who do not have the same resources.</p> <ul style="list-style-type: none"> <li>• It was good to ask the children their feelings about the results, and to suggest that they persuade others not to waste water, because this related the whole idea of water wastage to themselves.</li> <li>• Follow-up activities included electricity wastage and white pollution.</li> </ul> <p><u>Suggestions for other opportunities to integrate SSEHV</u></p> <ul style="list-style-type: none"> <li>• Sometimes before setting children to a task like designing an experiment or solving a problem, use a quick silent sitting (ie in the middle of the lesson) and ask them to tune in to the higher level of their mind that can help to find solutions to problems. (Tell them about famous scientists and mathematicians who have solved their problems by using this method)</li> <li>• How many ways have classmates helped people this week? (eg carrying shopping for an old person: 6 children; cleaning at home: 8 children; being kind to somebody: 21 children etc).</li> </ul>
<b>Ten</b>	<p>Ten principles for good living:</p> <ul style="list-style-type: none"> <li>• Be patriotic but at the same time do not criticize other countries.</li> <li>• Believe in all cultures and respect them.</li> <li>• Recognize humanity and love all.</li> <li>• Keep your house and surroundings clean to lead a better and healthy life.</li> <li>• In the name of charity we are increasing the number of beggars. Give them food or clothes but not money. Give them some work to stop begging.</li> <li>• Don't give or take a bribe. It's a crime.</li> <li>• Don't stoop to jealousies and hatred to overcome your problems. Do not hurt anybody. Broaden your vision.</li> <li>• Persons who cannot do their own work cannot do social work.</li> <li>• Always love good, hate sin and observe the laws of the society.</li> <li>• No one should trespass the law. Follow the law of the land.</li> </ul>
<b>Three</b>	<ul style="list-style-type: none"> <li>• There are many things that are grouped in numbers of three. For example, Past, Present and Future. This can be used as an opportunity to talk to children about the importance of focusing on the present moment rather than holding on to old hurts from the past or worrying about what</li> </ul>

	<p>might happen in the future.</p> <ul style="list-style-type: none"> <li>• Three is the smallest number of lines that complete a plane figure, so three can be thought of as representing completeness. Discuss with children what “completeness” means in our lives. (It means that we are like a complete circle, able to rely on our own inner strengths and resources rather than being dependent on others and becoming upset or angry if another person does not do what we want.</li> </ul>
	<p>Three things to respect: old age, law, our culture  Three things we love: purity, honesty, hard work  Three things we admire: beauty, intellect, character  Three things to cultivate: courage, contentment, cheerfulness  Three things to maintain: promises, friendship, affection  Three things to develop: purity, perseverance, patience  Three things to avoid: smoking, drinking, gambling  Three things to control: tongue, temper, temptation  Three things to watch: speech, behaviour, action  Three things to prevent: laziness, falsehood, slander  Triple purity: harmony of thought, word and deed  (From B. Shyamala Rao, <i>The Significance of Numbers in Hindu Mythology</i>, New Delhi: Printoindia, 2001)</p>
<p><b>Zero</b></p>	<p>If two numbers are the same their difference is zero (eg <math>4-4=0</math>, <math>3-3=0</math> etc.) If we can find the ways in which people are the same, we can prove that the difference between people is also zero.</p> <p><u>From Sanathana Sarathi, March, 2006, p.72:</u>  Think of the number 1 as the purity within yourself.</p> <p>If you put a zero after the numeral 1, it becomes 10; add one more zero and it will become 100. In this manner, if you go on adding zeros, the value will increase to 1000, 10 000, 1000 000.</p> <p>But if you take away the 1 and leave the zeros by themselves they have no value. They only have value when they are positioned beside the numeral 1.</p> <p>The zeros are like the things we get in life – our house, our job, our husband or wife, our children etc. All of these will have no value unless they are put alongside the goodness/purity/“divinity” within yourself. As long as you are immersed/caught up in acquiring all of these zeros they will not have meaning unless you first put into place your own inner goodness.</p>



	<p>From Swami Rama (1999). <u>Living with the Himalayan Masters</u>, Honesdale, Pennsylvania: The Himalayan Institute Press, p.317:</p> <p>Make a zero first then put one afterwards: 01 Every zero has value if the one is put first, but zero has no value if the one is not put first. All the things of the world are like zeros and without being conscious of the one Reality they have no value at all. When we remember the one Reality, then life becomes worthwhile. Otherwise it is burdensome.</p>
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## MEASUREMENT

<p><b>Area</b></p>	<ul style="list-style-type: none"> <li>Proportions of areas planted with different kinds of seeds: As an extension activity, plant some fast-growing seeds (e.g. beans). Put some in the classroom where you have your music and silent sitting (PEACE). Put some, as a control, in another classroom (with the same amount of light and water) where there is no music or silent sitting. You can also ask the children during their silent sitting to concentrate on sending loving feelings to one of the plants but not to the others (LOVE). Compare the growth of the different plants over time. What do the results tell us about <u>people's needs</u>?</li> </ul> <p><u>Activity</u>: How many students can stand on an area of 1 sq metre?</p> <p>Love: Teamwork and co-operation. Give them a newspaper 1 m<sup>2</sup> and ask them the best way to work as a team to fit the greatest number of students on. (If there is not enough time in class you could ask them to think about it after school and to present their solution to the class after a week.)</p>
<p><b>Area: parallelogram</b></p>	<p>Area of a parallelogram: cutting and rearranging the parallelogram to form a rectangle</p> <p><b>Values for discussion with pupils</b></p> <p>This is an example of Truth (i.e. “that which never changes), that the area will remain the same no matter how the shape is rearranged. It is good for children to develop a sense that some such things have held true forever and will continue to be true forever. Can they think of any other examples of this kind of Truth? (TRUTH)</p>
<p><b>Area and perimeter</b></p>	<p>Give children straws or small squares and ask them to make shapes with a certain perimeter. They will probably make different shapes. Remind them that we can have different shapes but the perimeter is still the same – similarly we have people who come in different</p>

	<p>shapes and sizes and who do things differently from us, but they can also be “right”.</p> <p>Ask the children to find the most efficient method of measuring/calculating a perimeter (or area). “Efficiency” is part of the value of RIGHT CONDUCT.</p>
<b>Comparison with formal units</b>	We need standards/rules so we can all have a unified concept, common ways of looking at things. What are some real-life examples that support this idea? (LOVE/ interdependence).
<b>Comparison with informal units</b>	When we measure with informal units it is difficult to make comparisons because the units are all different. The same applies to our daily lives. If we all do our ‘own thing’ it is difficult to compare and we have chaos – how does this relate to our lives in general? (LOVE/interdependence).
<b>Direct comparison without the use of units</b>	<p>Measurement without the use of units: direct comparison, e.g. comparing children and objects according to height (taller, tallest; bigger, biggest).</p> <p><b>Values for discussion with pupils:</b></p> <p>Does it always mean that the biggest is ‘better’ than the smallest? What is the truth about this? Is the one who is the tallest in the class necessarily the one who is the heaviest? Has the longest armspan? The one who can run the fastest? the one who can hold his/her breath the longest? i.e. we all have some special thing at which we are outstanding. We need to find that special thing and use it wisely. We don’t need to be jealous of others because everyone’s outstanding thing is different. (NON-VIOLENCE/respect for diversity).</p>
<b>Comparison with informal units and introduction of formal units</b>	<p>Comparison with informal units [If we all do our ‘own thing’ it is difficult to compare and we have chaos – how does this relate to our lives in general?]</p> <p>Comparison with formal units [We need standards/rules so we can all have a unified concept, common ways of looking at things. What are some real-life examples that support this idea?]</p>
<b>Estimation</b>	Estimation (establish frames of reference, e.g. for a meter, kilogram etc): [Sometimes we need to be exact and sometimes it is more suitable to approximate. Don’t be afraid to make an ‘educated guess’]

<p><b>Speed, distance and time</b></p>	<p>Leave early, drive slowly, arrive safely.</p> <p>Story – hare and the tortoise – going quickly doesn't necessarily mean you will beat the one who goes slowly and steadily.</p>
<p><b>Time (years/months/days)</b></p>	<p>Time: [from Zhang Yin Xiang] We need to cherish time. Talk to the children about the quotation: 'If you lose your job you can get another one. If you lose your money you can make some more. If you lose your home you can make a new one. But if you lose time you can never get it back'.</p> <p><b>Ms Lin</b></p> <p><b>Time: Years/months/days</b></p> <p><b>Grade 3</b></p> <p>Time flies very fast. If we waste time we can't get it back again. So it is important that we use our time well and appreciate it.</p> <p>Use poems and stories about time to encourage children to appreciate it.</p> <p><u>SSEHV in the lesson content</u></p> <ul style="list-style-type: none"> <li>• Children were encouraged to solve problems for themselves. (RIGHT CONDUCT)</li> <li>• Discussion about significant dates in the calendar: Dates of significance to the children's own culture can help to instill a sense of national pride</li> <li>• Children were asked to make their own judgments and develop their own rules for deciding whether a year is a leap year or not. This develops decision-making (RIGHT CONDUCT)</li> <li>• Discussion about significant dates in the children's memory: The children were asked to recall significant dates that are related to various values. For example, one child described a day when he was learning to walk - his mother let him try by himself and he fell down, but then she picked him up, which taught him that she loves him very much. Another child described a time when he helped somebody, which made him feel good.</li> </ul> <p><u>Suggestions for other opportunities to integrate SSEHV</u></p> <ul style="list-style-type: none"> <li>• cultural understanding: as well as discussing dates important in</li> </ul>



	<p>their own country, include dates important in other countries. Dates of significance to others' cultures can promote cultural understanding. A big calendar can be placed on the wall and children can be asked to record dates that are significant to their own and others' cultures. (PEACE)</p> <ul style="list-style-type: none"><li>• Remind the children from time to time about the values they are developing.</li></ul>
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## PART 3. PROBLEM SOLVING

### Re-wording problems

The easiest way of bringing values into the mathematics lesson is by re-wording problems to set them in a values-related context. This has been discussed further in the Volume 1 of this book. Jumsai (1997) has suggested that even by maintaining constant exposure to positive values in this way, we can be giving children continuous messages about appropriate behaviours. He gave an example of a subtraction problem that appeared in a textbook being used in a lesson he was observing:

*A farmer had 35 cows. A thief stole 14 of them. How many did he have left?*

Jumsai expressed concern that this problem is reinforcing an inappropriate value. He reported, however, that when the teacher reached this problem, he changed it to a more positive context:

*A farmer had 35 cows. He was so generous that he gave away 14 of them to neighbours who were in need. How many did he have left?*

In addition to problem solving, problem posing is an important aspect of mathematics. Pupils are given an answer or an equation, such as:

- $36 - x = 20$
- $x / 5 = 7$
- $x + 5 = 11$
- $6x = 48$

and asked to make up a suitable problem. To bring out the values education theme, they can be asked to relate their problem to a particular value, such as honesty, sharing, persistence or caring for the environment.

Another popular type of problem, which encourages the development of mathematical thinking skills and resourcefulness, is that which does not give enough information. These problems are often called Fermi problems, named after the mathematician who made them popular. When people first see a Fermi problem they immediately think they need more information to solve it. However, common sense and experience can allow for reasonable solutions. The solution of these problems relies totally on knowledge and experience which the students already have. They are problems which are non-threatening, and can be solved in a co-operative environment. These problems can be related to social issues, for example:

- How much money do your parents spend on you in a year?

- How much have they spent on you up till now?
- How much will they have spent on you by the time you finish secondary school?
- How much money will be spent on raising children in the whole country this year?
- How much water do we waste in a year if we leave the tap running while we clean our teeth?
- How much time do we spend in a week saying uplifting things to other people?
- How many starving people could be fed with the grain that is used to raise animals for meat consumption in America?
- How many poor people could we feed with the food we throw away in one day?

**Another example of a problem:**

Use of diesel on a ship for 6 hours – when going out the wind is behind and the speed is 30km/h. When coming back the speed is only 4/5 of what it was on the way out. How far can the ship go before it has to turn back?

Value – Peace: It is easier to ‘go with the flow’ of life than to try to go against it. If we allow the wind of life to get behind us we move forward more quickly. If we struggle into the wind, we move more slowly and use up more energy.

**Some examples of how textbook problems can be re-worded to reflect values**

(Taken from textbook problems used by teachers in China)

Existing problem: There are 8 weeping willow trees in the school and 3 times as many pine trees. How many pine trees are there?

Suggested change: The children in xxx school were concerned about the damage that can happen to the environment if there are not enough trees. [Note- at the beginning of this lesson they can do the silent thinking visualization about the effects of the flood washing away the land because the trees had been cut down and were not there to hold the soil together] They also know that planting even a few trees can help to reduce the poisonous carbon monoxide in the air. So they decided to do something to help their local environment by planting more trees. They saved up their money and in September they were able to buy 8 trees to plant. By next April they were able to plant 3 times as many trees as they planted in September. How many trees did they plant in April?

Existing problem: October 1<sup>st</sup> is National Day and the store is decorated with 3 colours of balloons. There are 17 yellow balloons, the number red balloons is 9 less than the number of yellow ones, and there are 3 times as many flowery balloons as red ones. How many flowery ones are there?

Suggested change: October 1<sup>st</sup> is National Day and it is a time when we can be very proud of the good things our country has achieved. It is especially a time when we can think about how lucky we are that we have [ask children to list the good things they have, eg a nice school, loving teachers] and to think about people who are not as lucky as us. To share our feelings of happiness about National Day our class decided to give some balloons to poor children, to make them feel happy. We gave away 17 yellow balloons.....

Example problem: There are 364 boys in the school and 189 girls. How many children are there altogether?

Suggested change: There are 364 children in the school who are loving and caring and have good characters. There are 189 who are still working on these qualities. How many children are there altogether?

Existing problem. In Huangzhong county cement works there is a total of 455 men and women workers. There are 354 male workers. How many are female? etc

Suggested change: In Huangzhong county cement works there are 455 workers. Of these 354 do some kind of volunteer work to help others. How many still need to be encouraged to be more helpful to others?

Existing problem. There are 14 ducks in Xiao Qing's family. The number of chickens is 5 times the number of ducks. The number of geese is 45 less than the number of chickens. How many geese are there in Xiao Qing's family.

Suggested change: There are 14 ducks in Xiao Qing's family and it is Xiao Qing's responsibility to look after them lovingly, to feed them and make sure they are safe. His cousin is responsible for looking after the chickens – there are 5 times as many chickens as ducks. His aunt is responsible for taking care of the geese. The number of geese is 45 less than the number of chickens. How many geese does his aunt take care of?

Existing problem: A fruit tree is 5 metres high. A poplar tree is 3 times higher than the fruit tree. The biggest tree is 2 metres higher than the poplar tree. How much higher is the biggest tree than the fruit tree?

Suggested change: Our trees do a lot to help us. The fruit tree, which gives us shelter and food, is 5 metres high. A poplar tree, which gives us shelter, is 3 times higher than the fruit tree.....

Existing problem: The elephant carries timber with its nose.....etc

Suggested change: Have you ever thought about what a magnificent animal the elephant is? What are some of the qualities the elephant has that you would like to have? The elephant carries timber with its nose.....etc

Existing problem: Today is the birthday of the elephant in the forest kingdom. Many guests have come to his house to wish him happy birthday. They brought him different



kinds of flowers as gifts. But the animals were disorderly so we have to help the elephant to count them properly (using pictures of the animals to make a graph). The guests all brought flowers as gifts for the elephant.

Suggested change: Today is the birthday of the elephant in the forest kingdom. Because he is a kind and helpful animal, using his strength to help all the other animals, he is very popular and lots of animals came to show him their love..... The elephant wanted to do something to celebrate his birthday so he took some flowers to give to the elderly..... All the guests at the elephant's party lit a candle, to wish him lots of knowledge and wisdom for the coming year.

Existing problem: [for graphing] Which kinds of fruit do classmates like to eat?

Suggested change: All of our classmates are healthy children and they know that it is good for their health to eat fruit every day. Which kinds of fruit do classmates like to eat?

OR What are the special qualities of the children in this class? How many children are good at sport? at study? at creative things? at smiling and being kind to others?

Existing problem: There were three old grandmothers in the old people's home. The one in the middle forgot the number of her room. The first grandmother said 'I live in Room number 3. The second one said 'I live in Room number 5'. Can you think which room the forgetful grandmother lived in?

Suggested change: Ah Ho was going to help in the old people's home. He was going to read to Grandmother Wong but he didn't know her room number. There were two other grandmothers who said 'She lives in the middle of us'. The first grandmother said 'I live in Room number 3. The second one said 'I live in Room number 5'. Which room did Ah Ho need to go to to read to Mrs Wong?

Existing problem: Small Red put 11 red flowers. Small Blue put 3 less flowers than Small Red. How many flowers did Small Blue put?

Suggested change: Small Red gave 11 flowers to his mother to show appreciation for all that she does for him.....

Existing problem: In grade 6, 3 out of 30 students have perfect attendance. In grade 5, 3 out of 20 students have perfect attendance.....

Suggested change: In grade 6, 3 out of 30 students managed to complete a whole week without getting angry. In grade 5, 3 out of 20 students managed to complete a whole week without getting angry.....

Existing problem: Xiaoqiang and Xiaoli leave home at the same time and head for school. Xiaoqiang walks at ... and the other walks at.... After 4 minutes they meet in the school doorway. How many metres apart are their houses?

Suggested change: Xiaoqiang and Xiaoli go to help old Mrs Ho with her garden on

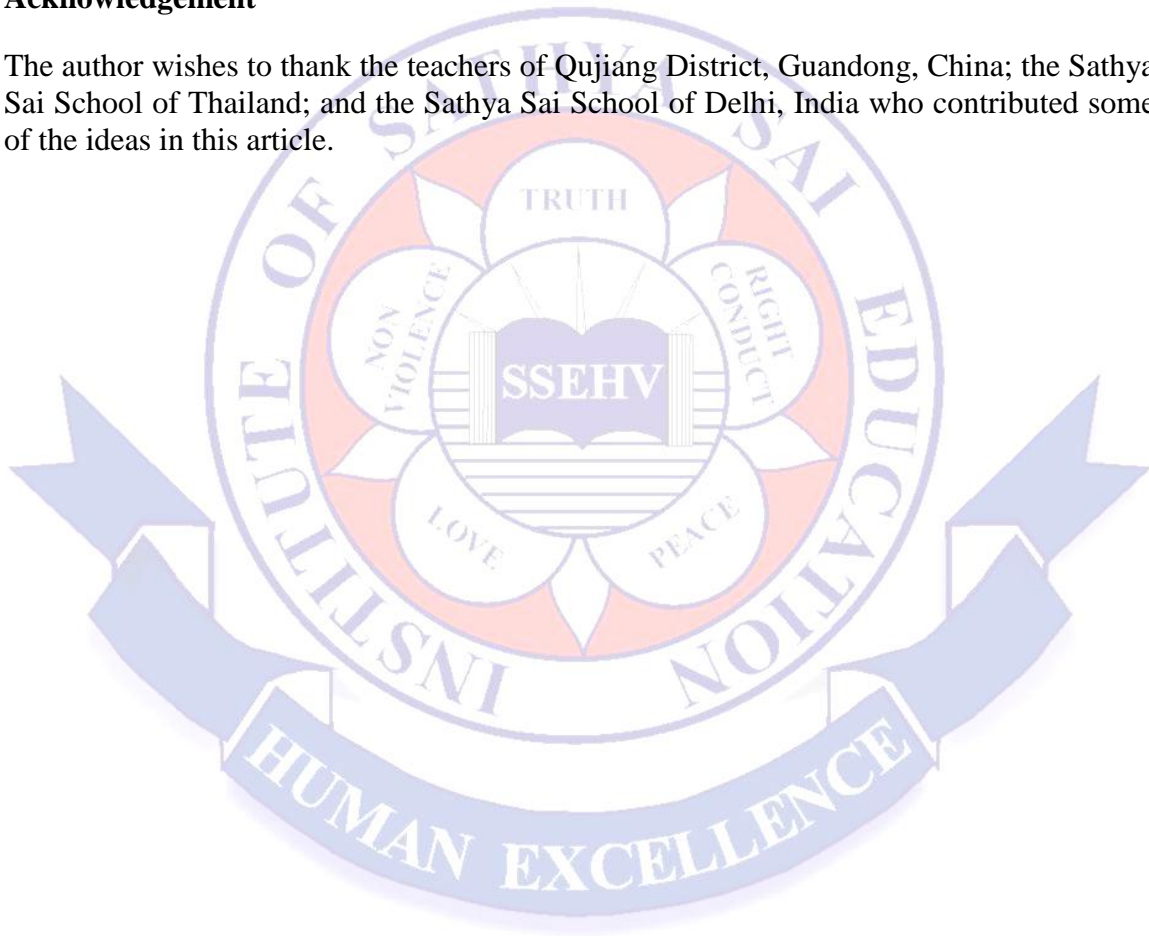
weekends. They leave home at the same time and head for Mrs Ho's house. Xiaoqiang walks at ... and the other walks at.... After 4 minutes they meet at Mrs Ho's house. How many metres apart are their houses?

### **Children making up their own problems**

Problem solving. Give the children an equation (eg  $8 \times 3 =$  ,  $\frac{3}{4} \times 1.2 =$  ). Make a set of cards with the names of different values and sub-values written on them. Each group picks a card and makes up their own problem that has something to do with that value.

### **Acknowledgement**

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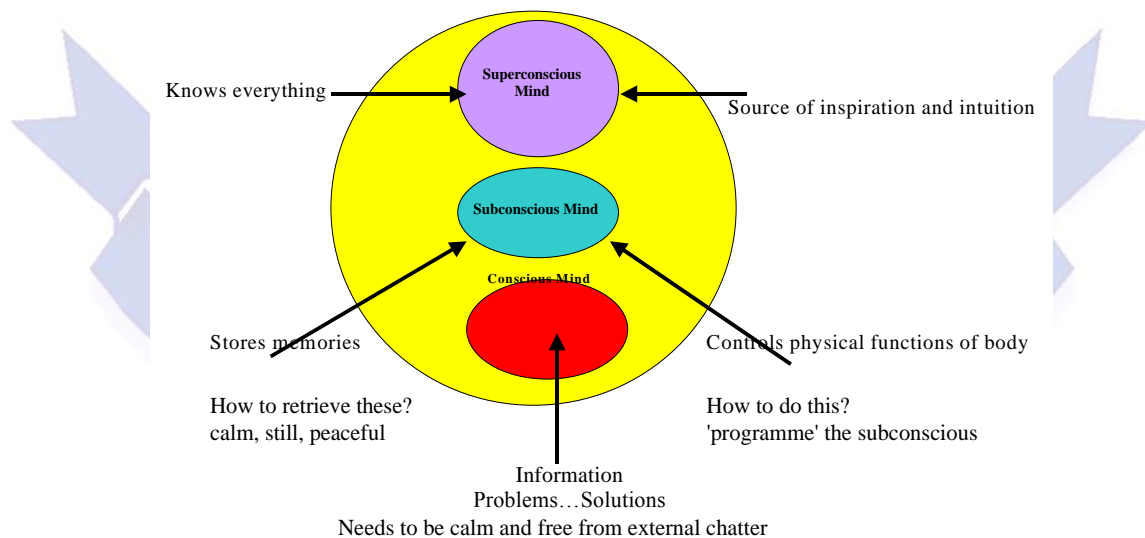


## **PART 4. MATHEMATICS AND “SILENT SITTING”**

We all know that teaching, these days, is becoming increasingly difficult due to increasing problems with discipline, lack of concentration by pupils, and lack of pupil motivation. Just as life is becoming more difficult for teachers, it is also becoming more difficult and complicated for pupils. Therefore, for the sake of both their own well-being and that of their pupils, teachers are constantly searching for ways to address these problems. The purpose of this section is to suggest some ways in which the techniques of

"silent sitting" and "creative visualisation" can be utilised in the mathematics classroom without taking too much time away from other activities. Neither of these techniques needs to take up a lot of time in the classroom - just a few minutes once or twice a day are enough.

The value of silent sitting and creative visualisation was illustrated in Jumsai's (1997) model shown below.



This model considers the three levels of the mind: the conscious, the subconscious and the superconscious. Through the five senses, the conscious mind receives and processes information from the environment in order to create awareness and understanding. The subconscious stores the memories of everything that we have experienced, and feeds these memories to the conscious mind to control the individual's thoughts and actions, and even to color our perceptions of events that happen around us. The superconscious mind is the source of our wisdom, knowledge, conscience and higher consciousness. In a holistically-balanced person, these three levels of the mind interact together to contribute to the physical, mental, emotional and spiritual well-being. Jumsai proposes that there

are two important ingredients for this healthy interaction to occur. The first is to free the three levels of the mind from extraneous ‘chatter’, to enable enhanced concentration and memory. The second is to ensure that the information that is stored in the various levels of the mind is ‘clean’, positive and constructive, since its retrieval will have such a significant effect on the individual’s thoughts and actions which in turn contribute to the presence or absence of holistic well-being. The technique of silent sitting is a useful way to quieten the chatter and hence promote a feeling of inner peace, and that of creative visualisation can programme the mind in a positive, healthy way.

Children need to have time to just sit and get into contact with their inner selves if they are to be able to improve their concentration and maintain balanced physical, mental and emotional health. Children only need to practise silent sitting and inner listening for a few minutes each day to be able to experience its benefits. Five or ten minutes is usually quite enough. Most children appreciate the opportunity to listen to their own inner silence for a while. If they do not find this easy to do, you can help them by playing some soft music that will give them a focal point. In time they will experience the sense of inner calmness and the music will not be as important.

### **REPORTED BENEFITS OF USING SILENT SITTING AT THE BEGINNING OF A LESSON**

Several studies have explored the effects of utilising techniques such as those described above regularly in the classroom. In particular, positive benefits have been derived for disruptive or inattentive pupils (Bealing, 1997). One study found that it helped to improve their decision making and put them in touch with their deeper core values (Rozman, 1994), while another found that it helped them to cope better with stressful events (Rickard, 1994). Further benefits have included decrease in levels of impulsivity, increase in attention span and general improvement in behaviour (Kratte and Hogan, 1982). In the UK, Anita Devi found with her Grade 4 class that regular use of silent sitting led to a significant improvement in the children’s concentration, behaviour and mathematics attainment. When, as a control, she stopped the practice for a month there was a decline in all three of these aspects, and eventually the children themselves asked to start it again.

In other research projects around the world where mathematics teachers have utilized silent sitting at the beginning of lessons, children have typically made comments such as the following:

- It can help me to recall previous knowledge and help me to learn new things.
- It is easier to concentrate and remember what I have learned.
- I am not very easily annoyed or irritated any longer.
- It helps me to forget sad things.



- I can actually find a way to solve a problem by using silent sitting.
- It is quicker to think of answers than with eyes open. Time slows down when my eyes are closed, so there is more time to find a solution.
- I have found myself to be more energetic and clear-minded.
- I have found more interest in learning and study than before. Now I enjoy studying.
- I have made obvious progress in my study since using silent sitting.

In the classroom, it is possible to help pupils to develop strategies for programming their subconscious minds in positive, constructive ways. The following are examples of some visualisations that teachers have led their children through in a relatively short time during silent sitting.

## **VISUALISATIONS FOR STARTING A MATHEMATICS ACTIVITY**

### ***Visualisation 1***

Close your eyes and take some slow, steady breaths. Think very hard about the part of your brain where your mathematics skills are kept. Think of that place in your brain as being like a flower. As you breathe in, imagine that the breath is caressing the flower like a soft gentle breeze. As it touches, the flower starts to open slowly, petal by petal, until it is fully open. This flower is your potential to understand mathematics and to do the problems. Now that the flower is open you will find that the mathematical thinking will come to you quickly and easily. Open your eyes now and you can begin your work.

### ***Visualisation 2***

Close your eyes and imagine that there is a candle burning inside your head. Let the light get brighter and brighter until it fills your whole head. Let it light up your brain so that you will be able to think clearly and well. Imagine that the same light is going from you to everyone in your class, so they will be able to think clearly too.

After this visualization the following points can be discussed with pupils:

- You have the knowledge and ability inside your head already.
- Regular use of this kind of visualization will help to improve your concentration.
- Wishing for classmates what you wish for yourself (i.e. to do well) is more healthy than feeling envy or jealousy.

## **Visualisations for problem solving**

### ***Visualisation 1***

First read the problem. Then put it aside. Close your eyes and just listen to the inner silence of your mind for a few moments. Focus your concentration on the back of your closed eyelids at the point where your eyebrows meet. Don't try to think about anything – just allow your mind to be still and empty, and concentrate on the blankness behind your eyes. When you feel that your mind is completely still, think for a moment about the problem you need to solve. You can either repeat the whole question in your mind, or you can simply say, "I need to find the solution to the problem I am about to tackle." Once you have asked this question, return your attention to focusing on the silent, blank emptiness of your mind behind your closed eyelids for a few more minutes. Then visualise your subconscious mind working like a computer. First it sorts the knowledge you already have to solve the problem. Then it sorts out what else you need to know. Next it puts this knowledge together in a logical way. Finally it sends the output into your conscious mind so it can work on the problem. Take 3 slow, deep breaths, then open your eyes and start to work on the problem.

### ***Visualisation 2***

Take 3 deep, slow breaths. Each time you breathe out, let go of any frustration or anxiety. Each time you breathe in, breathe in inspiration. You can decide what this might look like – might be a light that lights up your mind like a bulb, might be a colour, or might be a shape. Just keep drawing it in each time you breathe. Now imagine that your mind has gone completely blank – as if there has been a power cut and it has been plunged into darkness. Sit there for a few moments in the total blackness. If any thoughts or images come into your head, just let them go and return to thinking about the darkness.

Now imagine that you are going down a long, dark tunnel, right into the deepest part of your mind. This tunnel leads you to your inner mathematician, deep inside your brain. This is the place where you have all the answers and all the techniques you need to solve the problem. All you need to do is unlock the door behind which the inner mathematician is sitting. The door is golden, and in the lock is a big golden key. Slowly turn the key, open the door, and all the knowledge you need can be seen right there. As you return along the tunnel, imagine that you are dragging the knowledge along behind you, bringing it closer and closer to the front of your conscious mind, where you can put it to good use. Now open your eyes – don't worry if the inspiration isn't there immediately, as it will come.

### **\* THE LIGHT VISUALISATION \***

In Sathya Sai Education in Human Values (SSEHV) a particularly powerful and beneficial form of silent sitting is used with children of all ages as well as adults. The Light Visualisation is in fact fundamental to the SSEHV Programme. It allows the child to progress safely through the three stages described by Sathya Sai Baba as necessary for

contacting the superconscious mind: concentration, contemplation and meditation (where meditation simply means the state of being in touch with one's own superconscious mind). The following extract appears in many SSEHV materials but, in this instance, has been taken directly from *The Five Human Values and Human Excellence* by Art-ong Jumsai Na Ayudhya (Bangkok: International Institute of Sathya Sai Education), pp. 83-88.

This is a valuable exercise to do with children on a regular, preferably, daily basis. The light is very important because it is associated with knowledge, wisdom, power and warmth - it literally dispels darkness.

Imagine that there is a light in front of us. If this is difficult to imagine we may light a lamp or a candle and place it in front of us then open our eyes and look at the flame for a short while. Then we should close our eyes and try to visualise this light. Now using our imagination, bring this light to the forehead and into the head. Let the head be filled with light. Then think, "Whenever there is light, darkness cannot be present. I will think only good thoughts". Now bring the light to the area near the heart and imagine that there is a flowerbud there. When the light reaches the bud imagine that it blossoms into a beautiful flower, fresh and pure: "My heart is also pure and full of love". Now let the light travel down the two arms to the hands. Let these hands be filled with light: "Let me do only good things and serve all". Now the light is moved through the body and down the legs to the feet: "Let me walk straight to my destination, let me walk only to good places and to meet with good people". Now bring the light up to the head once again and leave it there for a little while. Now continue to move the light to the eyes and let our two eyes be filled with light. Again concentrating on the light, think "Let me see the good in all things". Slowly move the light to the ears. Let the ears be filled with light and think, "Let me only hear good things". From the ears we move the light to the mouth and tongue. "Let me speak only the Truth, and only what is useful and necessary". Now imagine that the light is radiating from your being to surround your mother and father. They are now full of light. "May my mother and father be filled with peace." Now radiate the light to your teachers and send it out to your relatives and friends and especially to any people who you think are being unkind to you. Let it expand out into the whole world to all beings, animals and plants everywhere. "Let the world be filled with light; let the world be filled with love; let the world be filled with peace". Remain immersed in this light and send it out to every corner of the universe and think to yourself, "I am in the light...the light is in me...I AM THE LIGHT"..... Then take the light back to your heart and let it remain there for the rest of the day.

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