

## TABLE OF CONTENTS

<b>FOREWORD</b> .....	i
<b>LIST OF MATERIALS</b> .....	ii
<b>CHAPTER 1. MATHEMATICS IN ART AND NATURE</b>	
What Is A Rectangle? .....	1
What Is An Angle?.....	1
The Golden Rectangle And The Parthenon.....	2
The Golden Rectangle: A Blend Of Art and Mathematics.....	3
The Golden Ratio.....	3
<b>ACTIVITY #1. GEOMETRIC CONSTRUCTION OF A GOLDEN RECTANGLE</b> .....	4
An Interesting Fact About Golden Rectangles .....	6
<b>ACTIVITY #2. CONSTRUCTING A SPIRAL INSIDE A GOLDEN RECTANGLE</b> .....	6
Spirals In Nature.....	9
Sea-Shells.....	9
Hurricanes.....	9
Galaxies.....	9
<b>ACTIVITY #3. USING GEOMETRY TO CREATE A SPIRAL</b> .....	10
<b>MEMORY CHECK</b> .....	12
<b>CHAPTER 2. A WORLD-FAMOUS NUMBER NAMED <i>PHI</i></b> .....	
Two World-Famous Numbers.....	13
Believe It Or Not, Numbers Can Be Irrational.....	13
The Pythagorean Brotherhood.....	14
The Pentagram.....	14
<b>ACTIVITY #4. CONSTRUCTING A PENTAGRAM INSIDE A PENTAGON</b> .....	15
The Strange And Mysterious Ways Of Mathematics.....	18
Other Sides, Same Result.....	18
<b>MEMORY CHECK</b> .....	19
<b>CHAPTER 3. THE PYTHAGOREAN THEOREM</b> .....	
Right Triangle? Legs? Hypotenuse?.....	20
An Explanation about Squares and Square Roots.....	21
Putting It All Together.....	22
An Important Concept To Master .....	23
Doing It With A Variable [A Letter Representing a Number].....	23
Some Solutions To Equations Have 2 Answers.....	23
<b>ACTIVITY #5. USING <math>c^2 = a^2 + b^2</math> TO CONSTRUCT A MATHEMATICAL SPIRAL</b> .....	24
Using $c^2 = a^2 + b^2$ To Find $c$ For The Remaining Triangles In The spiral.....	25
The Completed Spiral.....	26
Some Fascinating Observations.....	26
Pythagorean Triples.....	26
<b>ACTIVITY #6. AN INFORMAL PROOF OF THE PYTHAGOREAN THEOREM</b> .....	27
Egyptian Rope-Stretchers And Construction Of The Pyramids.....	30
<b>ACTIVITY #7. MAKING A 3-4-5 Right Triangle</b> .....	30
<b>MEMORY CHECK</b> .....	31
<b>CHAPTER 4. LEARNING ABOUT PERIMETERS, AREAS AND GEOMETRIC NUMBERS</b>	
The Ubiquitous Rectangle: Finding Their Perimeters.....	32
<b>ACTIVITY #8. FINDING THE PERIMETERS AND AREAS OF RECTANGLES</b> .....	32

<b>ACTIVITY #9. DERIVING THE FORMULA FOR FINDING THE AREAS OF PARALLELOGRAMS.....</b>	<b>33</b>
All About Polygons.....	35
Words To Know.....	35
<b>ACTIVITY #10. FINDING THE SUM OF THE MEASURES OF THE ANGLES OF A TRIANGLE.....</b>	<b>36</b>
<b>ACTIVITY #11. CONSTRUCTING A TRIANGLE FROM 3 GIVEN LINE SEGMENTS.....</b>	<b>37</b>
<b>ACTIVITY #12. DERIVING THE FORMULA FOR FINDING THE AREAS OF TRIANGLES.....</b>	<b>38</b>
<b>ACTIVITY #13. NUMBERS WITH GEOMETRIC SHAPES.....</b>	<b>39</b>
Triangular Numbers.....	39
Square Numbers.....	40
Cubic Numbers.....	41
<b>THE SOMA CUBE.....</b>	<b>42</b>
<b>ACTIVITY #14. TOYING AROUND WITH SOMA CUBES.....</b>	<b>42</b>
<b>MEMORY CHECK.....</b>	<b>43</b>
<b>CHAPTER 5. MOVING INTO THE THIRD DIMENSION.....</b>	<b>44</b>
What Is The 3 <sup>rd</sup> Dimension?.....	44
The Tetrahedron.....	44
A Picture Is Worth A Thousand Words.....	45
<b>ACTIVITY #15. CONSTRUCTING A TETRAHEDRON.....</b>	<b>45</b>
The Five Regular Polyhedrons.....	45
The Octahedrons Are Coming!.....	46
<b>ACTIVITY #16. CONSTRUCTING AN OCTAHEDRON.....</b>	<b>46</b>
The Many Faces Of Polyhedrons.....	47
<b>ACTIVITY #17. CONSTRUCTING A DODECAHEDRON AND A ICOSAHEDRO.....</b>	<b>47</b>
<b>ACTIVITY #18. CONSTRUCTING A CARDBOARD PYRAMID.....</b>	<b>48</b>
What Is A Pyramid?.....	49
How To Find The Surface Areas Of Pyramids.....	49
Regular Pyramids.....	49
<b>KHUFU’S PYRAMID.....</b>	<b>50</b>
A Polyhedron Used To Discover Sunlight Is Made Up Of Rainbow Colors.....	51
What Are Prisms?.....	51
Uses Of Triangular Prisms.....	51
<b>MEMORY CHECK.....</b>	<b>52</b>
<b>CHAPTER 6. ALL ABOUT CIRCLES, SPHERE AND CONES.....</b>	<b>53</b>
Straight Lines And Curves.....	53
What Is A Sphere?.....	53
<b>ACTIVITY #19. FINDING THE VOLUME OF A SPHERE PHYSICALLY.....</b>	<b>54</b>
A Bit About Circles.....	55
Parts Of A Circle.....	55
Parts Defined.....	55
The Relationship Between Parts Of A Circle.....	56
Finding The Areas Of Circles.....	56
The Surface Areas Of Spheres.....	57

<b>ACTIVITY #20. COMPARING THE CURVED SURFACE OF A HEMISPHERE TO ITS FLAT SURFACE</b> .....	57
<b>INTERESTING CIRCLE AND SPHERE PROBLEMS</b> .....	58
<b>CONES</b> .....	59
<b>ACTIVITY #21. FINDING THE VOLUME OF A CONE PHYSICALLY AND MATHEMATICALLY</b> .....	60
<b>MEMORY CHECK</b> .....	61
<b>CHAPTER 7. RELATING ALGEBRA TO THE REAL WORLD</b> .....	62
A Little Algebra Goes A Long Way.....	62
Absolute Value.....	62
Important: <i>Signs</i> Of Confusion.....	62
<b>ACTIVITY #22. ADDING AND SUBTRACTING SIGNED NUMBERS ON A SLIDE RULE</b> .....	63
<b>A BINOMIAL SQUARE</b> .....	64
What Is A Binomial?.....	64
Binomials May Be Added, Subtracted, Multiplied Or Divided.....	64
As A Matter Of Interest And Edification.....	64
<b>ACTIVITY #23. CONSTRUCTING A “BINOMIAL SQUARE”: <math>(a + b)^2</math></b> .....	65
Going From Arithmetic To Algebra.....	66
Adding The Squares And Rectangles.....	66
Arithmetic Is The Basis Of Much Of Algebra.....	66
Squaring A Binomial Mathematically.....	67
<b>A BINOMIAL CUBE</b> .....	68
<b>ACTIVITY #24. CONSTRUCTING A BINOMIAL CUBE</b> .....	68
<b>MEMORY CHECK</b> .....	70
<b>APPENDIX</b> .....	71
<b>SLIDE RULE CUT-OUT</b> .....	Inside Back Cover