

# Contents

---

Introduction	vii
Key Concepts Matrix	xi
Recommended Reading	xiii
<b>Activities</b>	
<b>1</b> One Equals Zero	1
<b>2</b> Four Equals Five	3
<b>3</b> Every Positive Number Is Greater Than Itself	6
<b>4</b> A Lucky Mistake	8
<b>5</b> A Quadratic Equation with Three Roots	10
<b>6</b> Troubles with the Index Laws	12
<b>7</b> A Solution That Does Not Check Out	14
<b>8</b> Another Solution That Does Not Check Out	18
<b>9</b> Yet Another Solution That Does Not Check Out	20
<b>10</b> The Lost Solution	23
<b>11</b> Another Lost Solution	25
<b>12</b> The Wrong Solution	27
<b>13</b> $2 > 3$ by Logarithms	29
<b>14</b> A Question of Quadratics	31
<b>15</b> A Fault in the Fractions	33
<b>16</b> The Largest Prime	36
<b>17</b> The Bedouin Will	40
<b>18</b> Discount and Sales Tax	44
<b>19</b> All Men Are Bald	46
<b>20</b> The Harder Problem Is Easier to Prove	49
<b>21</b> The Rising Moon Paradox	52
<b>22</b> The Rowboat Paradox	56
<b>23</b> The Angles of a Triangle	58
<b>24</b> Walking Around a Triangle	63
<b>25</b> Congruency Paradox	65
<b>26</b> Every Trapezoid Is a Parallelogram	70
<b>27</b> Every Triangle Is Isosceles	72
<b>28</b> All Obtuse Angles Are Right Angles	76

---

## CONTENTS

<b>29</b>	Two Perpendiculars?	80
<b>30</b>	The Empty Circle	83
<b>31</b>	A Two-Piece Jigsaw	86
<b>32</b>	The Surface Area of a Sphere	89
<b>33</b>	The Lost Square	91
<b>34</b>	Earth Versus a Ping-Pong™ Ball	95
<b>35</b>	A Tangram Paradox	97
<b>36</b>	The Ratio of Surface Area to Volume	101
<b>37</b>	Pick's Paradox	103
<b>38</b>	Which Strip Has the Greatest Area?	109
<b>39</b>	The Average Math Score Paradox	113
<b>40</b>	Whose Average?	116
<b>41</b>	Increasing the Average	119
<b>42</b>	Almost Everybody Is Above Average	121
<b>43</b>	Half the World Is Stupid?	123
<b>44</b>	A Chess Tournament Paradox	125
<b>45</b>	The Dice Paradox	129
<b>46</b>	The Random Chord Paradox	132
<b>47</b>	The Tennis Ball Paradox	137
<b>48</b>	Center of Gravity Paradox	139
<b>49</b>	The Paradox of the Locked Boxes	141
<b>50</b>	The Running Dog	143
<b>51</b>	The Explorer Paradox	145
<b>52</b>	A Surprise Limit	147
<b>53</b>	The Quadratic Formula Revisited	149
<b>54</b>	A Stairway to Paradox	151
<b>55</b>	A Calculus Proof That $1 = 2$	154
<b>56</b>	Two Wrongs Make a Right	156
<b>57</b>	Area, Surface, and Volume	158
<b>58</b>	The Alpenhorn Paradox	161
<b>59</b>	The Surprise Test Paradox	164
<b>60</b>	A Surprise Limit Revisited	166