# HOLDEN LANE PRIMARY SCHOOL



# **POLICY DOCUMENT**

# **Mathematics Calculation Policy**

Date: September 2023

#### Holden Lane Primary School

#### **Mathematics Calculation Policy**

Holden Lane Primary School's calculation policy is taken from the White Rose Maths calculation policy.

White Rose Maths is used to inform each class's long-term curriculum plan and the calculation policy reflects the strategies and methods taught. This ensures consistency and progression of skills and knowledge between year groups.

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# Addition

| Skill                              | Year | Representatio  | ns and models   |  |  |
|------------------------------------|------|--|---|--|--|
| Add two 1-digit<br>numbers to 10   | 1    | Part-whole model<br>Bar model<br>Number shapes                           | Ten frames (within 10)<br>Bead strings (10)<br>Number tracks            |  |  |
| Add 1 and 2-digit<br>numbers to 20 | 1    | Part-whole model<br>Bar model<br>Number shapes<br>Ten frames (within 20) | Bead strings (20)<br>Number tracks<br>Number lines (labelled)<br>Straws |  |  |
| Add three 1-digit<br>numbers       | 2    | Part-whole model<br>Bar model  | Ten frames (within 20)<br>Number shapes                                 |  |  |
| Add 1 and 2-digit numbers to 100   | 2    | Part-whole model<br>Bar model<br>Number lines (labelled)                 | Number lines (blank)<br>Straws<br>Hundred square                        |  |  |

| Skill                              | Year | Representations and models                                      |  |  |  |  |  |  |  |
|------------------------------------|------|---|--|--|--|--|--|--|--|
| Add two 2-digit<br>numbers         | 2    | Part-whole model<br>Bar model<br>Number lines (blank)<br>Straws | Base 10<br>Place value counters<br>Column addition |  |  |  |  |  |  |
| Add with up to 3-digits            | 3    | Part-whole model<br>Bar model                                   | Base 10<br>Place value counters<br>Column addition |  |  |  |  |  |  |
| Add with up to 4-digits            | 4    | Part-whole model<br>Bar model                                   | Base 10<br>Place value counters<br>Column addition |  |  |  |  |  |  |
| Add with more than 4<br>digits     | 5    | Part-whole model<br>Bar model                                   | Place value counters<br>Column addition            |  |  |  |  |  |  |
| Add with up to 3<br>decimal places | 5    | Part-whole model<br>Bar model                                   | Place value counters<br>Column addition            |  |  |  |  |  |  |



















# Subtraction

| Skill                                    | Year | Representatio  | ns and models  |
|--|------|--|--|
| Subtract two 1-digit<br>numbers to 10    | 1    | Part-whole model<br>Bar model<br>Number shapes                           | Ten frames (within 10)<br>Bead strings (10)<br>Number tracks           |
| Subtract 1 and 2-digit<br>numbers to 20  | 1    | Part-whole model<br>Bar model<br>Number shapes<br>Ten frames (within 20) | Bead string (20)<br>Number tracks<br>Number lines (labelled)<br>Straws |
| Subtract 1 and 2-digit<br>numbers to 100 | 2    | Part-whole model<br>Bar model<br>Number lines (labelled)                 | Number lines (blank)<br>Straws<br>Hundred square                       |
| Subtract two 2-digit<br>numbers          | 2    | Part-whole model<br>Bar model<br>Number lines (blank)<br>Straws          | Base 10<br>Place value counters<br>Column subtraction                  |

| Skill                                   | Year | Representation                | s and models  |
|---|------|-------------------------------|---|
| Subtract with up to 3-<br>digits        | 3    | Part-whole model<br>Bar model | Base 10<br>Place value counters<br>Column subtraction |
| Subtract with up to 4-<br>digits        | 4    | Part-whole model<br>Bar model | Base 10<br>Place value counters<br>Column subtraction |
| Subtract with more than<br>4 digits     | 5    | Part-whole model<br>Bar model | Place value counters<br>Column subtraction            |
| Subtract with up to 3<br>decimal places | 5    | Part-whole model<br>Bar model | Place value counters<br>Column subtraction            |















### **Addition and Subtraction**

### **Glossary of Terms**

Addend - A number to be added to another.

**Aggregation -** combining two or more quantities or measures to find a total.

**Augmentation –** increasing a quantity or measure by another quantity.

Commutative – numbers can be added in any order.

**Complement –** in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000

**Difference** – the numerical difference between two numbers is found by comparing the quantity in each group.

**Exchange –** Change a number or expression for another of an equal value.

**Minuend –** A quantity or number from which another is subtracted.

**Partitioning –** Splitting a number into its component parts.

Reduction - Subtraction as take away.

**Subitise –** Instantly recognise the number of objects in a small group without needing to count.

**Subtrahend -** A number to be subtracted from another.

Sum - The result of an addition.

**Total –** The aggregate or the sum found by addition.

# Times tables

| Skill                  | Year | Representatio  | ons and models   |  |  |
|------------------------|------|----------------|------------------|--|--|
| Recall and use         | 2    | Bar model      | Ten frames       |  |  |
| multiplication and     |      | Number shapes  | Bead strings     |  |  |
| division facts for the |      | Counters       | Number lines     |  |  |
| 2-times table          |      | Money          | Everyday objects |  |  |
| Recall and use         | 2    | Bar model      | Ten frames       |  |  |
| multiplication and     |      | Number shapes  | Bead strings     |  |  |
| division facts for the |      | Counters       | Number lines     |  |  |
| 5-times table          |      | Money          | Everyday objects |  |  |
| Recall and use         | 2    | Hundred square | Ten frames       |  |  |
| multiplication and     |      | Number shapes  | Bead strings     |  |  |
| division facts for the |      | Counters       | Number lines     |  |  |
| 10-times table         |      | Money          | Base 10          |  |  |

| Skill   | Year | Representatior                              | ns and models                                     |
|---|------|---|---|
| Recall and use<br>multiplication and<br>division facts for the<br>3-times table | 3    | Hundred square<br>Number shapes<br>Counters | Bead strings<br>Number lines<br>Everyday objects  |
| Recall and use<br>multiplication and<br>division facts for the<br>4-times table | 3    | Hundred square<br>Number shapes<br>Counters | Bead strings<br>Number lines<br>Everyday objects  |
| Recall and use<br>multiplication and<br>division facts for the<br>8-times table | 3    | Hundred square<br>Number shapes             | Bead strings<br>Number tracks<br>Everyday objects |
| Recall and use<br>multiplication and<br>division facts for the<br>6-times table | 4    | Hundred square<br>Number shapes             | Bead strings<br>Number tracks<br>Everyday objects |

| Skill  | Year | Representatio                   | ons and models                       |
|--|------|---------------------------------|--------------------------------------|
| Recall and use<br>multiplication and<br>division facts for the<br>7-times table  | 4    | Hundred square<br>Number shapes | Bead strings<br>Number lines         |
| Recall and use<br>multiplication and<br>division facts for the<br>9-times table  | 4    | Hundred square<br>Number shapes | Bead strings<br>Number lines         |
| Recall and use<br>multiplication and<br>division facts for the<br>11-times table | 4    | Hundred square<br>Base 10       | Place value counters<br>Number lines |
| Recall and use<br>multiplication and<br>division facts for the<br>12-times table | 4    | Hundred square<br>Base 10       | Place value counters<br>Number lines |



| Skill: 5 times table                                 | Year: 2   |
|--|---|
| 0 5 10 15 20 25 30 35 40 45 50 55 60                 | Encourage daily<br>counting in multiples<br>both forwards and<br>backwards. This can                        |
|  | be supported using a<br>number line or a<br>hundred square.<br>Look for patterns in<br>the five times table |
|  | using concrete  |
| 11 12 13 14 15 16 17 18 19 20                        | manipulatives to  |
| 21 22 23 24 25 26 27 28 29 30                        | support. Notice the   |
|  | pattern in the ones as  |
| 41 42 43 44 45 46 47 48 49 50                        | well as highlighting  |
| 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 | the odd, even, odd,<br>even pattern.  |

| Skill: 10 times table |    |    |    |    |    |    |    |    |      |               | Year: 2   |
|-----------------------|----|----|----|----|----|----|----|----|------|---------------|---|
|                       |    |    |    |    |    |    |    |    |      | $\rightarrow$ | Encourage daily<br>counting in multiples<br>both forwards and<br>backwards. This can<br>be supported using a<br>number line or a<br>hundred square. |
|                       | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9 (  | 10            | Look for patterns in  |
|                       | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19   | 20            | the ten times table,  |
|                       | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 ( | 30            | using concrete  |
|                       | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39   | 40            | manipulatives to  |
|                       | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 ( | 50            | support. Notice the   |
|                       | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59   | 60            | pattern in the digits-  |
|                       | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 ( | 70            | the ones are always 0,  |
|                       | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 ( | 80            | and the tens increase   |
|                       | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 ( | 90            | by I ten each time.   |
|                       | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99   | 00            |   |





|              | Skill: 8 times table |          |                                      |                            |   |   |   |  |   |   |   |   |   | Year: 3   |   |
|--------------|----------------------|----------|--------------------------------------|----------------------------|---|---|---|--|---|---|---|---|---|---|---|
| 8<br>8<br>48 |                      | 24<br>64 | 24<br>32<br>72<br>32<br>4<br>32<br>4 | 32<br>40<br>80<br>40<br>80 | 1<br>11<br>21<br>31<br>41<br>61<br>71<br>81<br>91 | 2<br>12<br>22<br>52<br>62<br>62<br>82<br>92 | 3<br>13<br>23<br>33<br>43<br>53<br>63<br>73<br>83<br>93 | 4<br>14<br>34<br>44<br>54<br>6<br>74<br>84<br>94<br><b>X</b><br><b>X</b><br><b>X</b><br><b>X</b><br><b>X</b><br><b>X</b><br><b>X</b><br><b>X</b> | 5<br>15<br>25<br>35<br>45<br>55<br>65<br>75<br>85<br>95 | 6<br>26<br>36<br>46<br>66<br>76<br>86<br>96<br>96 | 7<br>17<br>27<br>37<br>47<br>57<br>67<br>77<br>87<br>97<br>97 | <ul> <li>8</li> <li>18</li> <li>28</li> <li>38</li> <li>68</li> <li>78</li> <li>88</li> <li>98</li> </ul> | 9<br>19<br>29<br>39<br>69<br>79<br>89<br>99 | 10<br>20<br>30<br>50<br>60<br>70<br>80<br>90<br>100 | Encourage daily<br>counting in multiples,<br>supported by a<br>number line or a<br>hundred square.<br>Look for patterns in<br>the eight times table,<br>using manipulatives<br>to support. Make links<br>to the 4 times table,<br>seeing how each<br>multiple is double the<br>fours. Notice the<br>pattern in the ones<br>within each group of<br>five multiples.<br>Highlight that all the<br>multiples are even<br>using number shapes<br>to support |



|         | Skill: 9 times table                           |                  |            |           |                                       |                                       |  |                                 |                                       |                                       |                                       |                                       |   | Year: 4                                |  |
|---------|--|------------------|------------|-----------|---------------------------------------|---------------------------------------|--|---------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---|--|--|
| 9<br>54 | 18<br>63                                       | 27<br>72         | 36<br>81   | 45<br>90  | 1<br>11<br>21<br>31<br>41<br>51<br>61 | 2<br>12<br>22<br>32<br>42<br>52<br>62 | 3<br>13<br>23<br>33<br>43<br>53<br><b>63</b> | 4<br>14<br>24<br>34<br>44<br>64 | 5<br>15<br>25<br>35<br>45<br>55<br>65 | 6<br>16<br>26<br>36<br>46<br>56<br>66 | 7<br>17<br>27<br>37<br>47<br>57<br>67 | 8<br>18<br>28<br>38<br>48<br>58<br>68 | <ol> <li>9</li> <li>19</li> <li>29</li> <li>39</li> <li>49</li> <li>59</li> <li>69</li> </ol> | 10<br>20<br>30<br>40<br>50<br>60<br>70 | Encourage daily<br>counting in multiples<br>both forwards and<br>backwards. This can<br>be supported using a<br>number line or a<br>hundred square.<br>Look for patterns in  |
|         | )<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>)<br>) | <b>)))))</b><br> | <b>2</b> 0 | ○○○○○<br> | 71<br>(8)<br>91<br>3 7                | 82<br>92                              | 73<br>83<br>93<br>                           | 74<br>84<br>94                  | 75<br>85<br>95                        | 76<br>86<br>96                        | 77<br>87<br>97                        | 78<br>88<br>98                        | 79<br>89<br>99  | 80                                     | the nine times table,<br>using concrete<br>manipulatives to<br>support. Notice the<br>pattern in the tens<br>and ones using the<br>hundred square to<br>support as well as<br>noting the odd, even<br>pattern within the<br>multiples. |







# **Multiplication**

| Skill   | Year | Representatio                          | ns and models                                   |  |  |  |
|---|------|--|---|--|--|--|
| Solve one-step<br>problems with<br>multiplication | 1/2  | Bar model<br>Number shapes<br>Counters | Ten frames<br>Bead strings<br>Number lines      |  |  |  |
| Multiply 2-digit by 1-<br>digit numbers           | 3/4  | Place value counters<br>Base 10        | Short written method<br>Expanded written method |  |  |  |
| Multiply 3-digit by 1-<br>digit numbers           | 4    | Place value counters<br>Base 10        | Short written method                            |  |  |  |
| Multiply 4-digit by 1-<br>digit numbers           | 5    | Place value counters                   | Short written method                            |  |  |  |

| Skill                                   | Year | Representations and models      |                                     |  |  |  |  |  |
|---|------|---------------------------------|-------------------------------------|--|--|--|--|--|
| Multiply 2-digit by 2-<br>digit numbers | 5    | Place value counters<br>Base 10 | Short written method<br>Grid method |  |  |  |  |  |
| Multiply 2-digit by 3-<br>digit numbers | 5    | Place value counters            | Short written method<br>Grid method |  |  |  |  |  |
| Multiply 2-digit by 4-<br>digit numbers | 5/6  | Formal written method           |                                     |  |  |  |  |  |









|           |   | Skill:  | Multiply | 2-digit | t numl | pers by | / 2-digit   | num | bers | 6       |   | Year: 5   |
|-----------|---|---------|----------|---------|--------|---------|---|-----|------|---------|---|---|
| 30-       |   |         |          |         |        |         | 10     10       100     100       100     100       100     100       100     100       100     100 |     |      | ) ) ) ) |   | When multiplying a<br>multi-digit number by<br>2-digits, use the area<br>model to help<br>children understand<br>the size of the<br>numbers they are<br>using. This links to<br>finding the area of a |
|           |   |         |          |         |        |         |   |     | н    | т       | 0 | rectangle by finding  |
|           |   |         |          |         | ×      | 20      | 2   |     |      | 2       | 2 | the Base 10.  |
| <br>  1-( | H |         |          |         | 30     | 600     | 60  | ×   |      | 3       | 1 | matches the area  |
|           |   |         |          |         | 1      | 20      | 2   |     |      | 2       | 2 | model as an initial   |
|           |   |         |          |         |        |         |   |     | 6    | 6       | 0 | before moving on to   |
|           | 2 | 22 × 31 | = 682    | 2       |        |         |   |     | 6    | 8       | 2 | the formal written<br>multiplication<br>method.   |

| Skill: Multiply 3-digit nur                            | nbers by | 2-digit | numbe  | rs                         |                            | Year: 5  |
|--|----------|---------|--|----------------------------|----------------------------|--|
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ |          |         | Th     H       2       ×       1       1       7       1       7       4 | T<br>3<br>3<br>6<br>2<br>8 | 0<br>4<br>2<br>8<br>0<br>8 | Children can continue<br>to use the area model<br>when multiplying 3-<br>digits by 2-digits.<br>Place value counters<br>become more<br>efficient to use but<br>Base 10 can be used<br>to highlight the size of<br>numbers. |
|  |          |         |  |                            |                            | Encourage children to move towards the   |
|  | ×        | 200     | 30   |                            | 4                          | formal written   |
|  | 30       | 6,000   | 900  |                            | 120                        | links with the grid  |
| 234 × 32 = 7,488                                       | 2        | 400     | 60   |                            | 8                          |  |

| Skill: Multiply 4-d | Year: 5/6   |   |        |   |  |  |
|---------------------|---|---|--------|---|--|--|
| TTh                 | Th  | н                                       | т      | 0 |  | When multiplying 4-<br>digits by 2-digits,<br>children should be   |
|                     | 2   | 7                                       | 3      | 9 |  | confident in the written method.   |
| ×                   | If they are still struggling with times                             | If they are still struggling with times |        |   |  |  |
| 2                   | 1<br>5  | 9<br>3                                  | 1<br>7 | 2 |  | tables, provide<br>multiplication grids to<br>support when they<br>are focusing on the<br>use of the method. |
| 5                   | 4   | 7<br>1                                  | 8      | 0 |  |  |
| 7                   | Consider where  |   |        |   |  |  |
| 2,739 × 28 = 76,6   | exchanged digits are<br>placed and make<br>sure this is consistent. |   |        |   |  |  |

# Division

| Skill   | Year | Representatio  | ns and models                            |
|---|------|--|--|
| Solve one-step<br>problems with division<br>(sharing)     | 1/2  | Bar model<br>Real life objects                                   | Arrays<br>Counters                       |
| Solve one-step<br>problems with division<br>(grouping)    | 1/2  | Real life objects<br>Number shapes<br>Bead strings<br>Ten frames | Number lines<br>Arrays<br>Counters       |
| Divide 2-digits by 1-<br>digit (no exchange<br>sharing)   | 3    | Straws<br>Base 10<br>Bar model                                   | Place value counters<br>Part-whole model |
| Divide 2-digits by 1-<br>digit (sharing with<br>exchange) | 3    | Straws<br>Base 10<br>Bar model                                   | Place value counters<br>Part-whole model |

| Skill   | Year | Representatio                    | ns and models                              |
|---|------|----------------------------------|--|
| Divide 2-digits by 1-<br>digit (sharing with<br>remainders) | 3/4  | Straws<br>Base 10<br>Bar model   | Place value counters<br>Part-whole model   |
| Divide 2-digits by 1-<br>digit (grouping)                   | 4/5  | Place value counters<br>Counters | Place value grid<br>Written short division |
| Divide 3-digits by 1-<br>digit (sharing with<br>exchange)   | 4    | Base 10<br>Bar model             | Place value counters<br>Part-whole model   |
| Divide 3-digits by 1-<br>digit (grouping)                   | 4/5  | Place value counters<br>Counters | Place value grid<br>Written short division |

| Skill  | Year | Representations and models       |  |  |  |  |  |  |
|--|------|----------------------------------|--|--|--|--|--|--|
| Divide 4-digits by 1-<br>digit (grouping)              | 5    | Place value counters<br>Counters | Place value grid<br>Written short division |  |  |  |  |  |
| Divide multi-digits by<br>2-digits (short<br>division) | 6    | Written short division           | List of multiples                          |  |  |  |  |  |
| Divide multi-digits by<br>2-digits (long division)     | 6    | Written long division            | List of multiples                          |  |  |  |  |  |



| Skill: Solve 1-step problems using division (grouping)  | Year: 1/2   |
|---|---|
| Image: Second state       Image: Second state         Image: Second state       Image: Second state <th>Children solve<br/>problems by grouping<br/>and counting the<br/>number of groups.<br/>Grouping encourages<br/>children to count in<br/>multiples and links to<br/>repeated subtraction<br/>on a number line.<br/>They can use</th> | Children solve<br>problems by grouping<br>and counting the<br>number of groups.<br>Grouping encourages<br>children to count in<br>multiples and links to<br>repeated subtraction<br>on a number line.<br>They can use |
| $20 \div 5 = 4$   | representations in<br>fixed groups such as<br>number shapes which<br>helps to show the link<br>between<br>multiplication and<br>division.   |















|      | Skill: | Divid                                    | e mul               | ti digits           | s by 2-a | ligits (s | hort di | vision) |     | Year: 6  |
|------|--------|--|---------------------|---------------------|----------|-----------|---------|---------|-----|--|
|      | 12     | 0  | 3<br>4 <sub>3</sub> | 6<br>7 <sub>2</sub> |          | 432       | ÷ 12    | 2 = 3   | 6   | When children begin<br>to divide up to 4-<br>digits by 2-digits,<br>written methods<br>become the most<br>accurate as concrete<br>and pictorial<br>representations<br>become less effective.<br>Children can write out<br>multiples to support |
|      |        |  |                     |                     |          | 0         | 4       | 8       | 9   | larger remainders.   |
| 7,33 | 35 ÷   | solve problems with remainders where the |                     |                     |          |           |         |         |     |  |
| 15   | 30     | 45                                       | 60                  | ) 75                | 90       | 105       | 120     | 135     | 150 | quotient can be<br>rounded as<br>appropriate.  |

| Skill: Divide multi-digits by                          | / 2- | -dig | gits       | : (le | ong | g divis | ion)                 | Year: 6  |
|--|------|------|------------|-------|-----|---------|----------------------|--|
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ |      | 0    | <b>4</b> 3 | 8     | · · | 12 =    | = 36                 | Children can also<br>divide by 2-digit<br>numbers using long<br>division.<br>Children can write out<br>multiples to support<br>their calculations with<br>larger remainders. |
|  | 15   | 7    | 3          | 3     | 5   |         | $1 \times 15 = 15$   | Children will also   |
|  | -    | 6    | 0          | 0     | 0   | (×400   | $2 \times 15 = 30$   | solve problems with  |
| $7.335 \div 15 = 489$                                  |      | 1    | 3          | 3     | 5   |         | $3 \times 15 = 45$   | remainders where the   |
|  | -    | 1    | 2          | 0     | 0   | (×80)   | $4 \times 15 = 60$   | quotient can be  |
|  |      |      | 1          | 3     | 5   |         | $5 \times 15 = 75$   | rounded as   |
|  | -    |      | 1          | 3     | 5   | (×9)    | $10 \times 15 = 150$ | appropriate.   |
|  |      |      |            |       | 0   |         |                      |  |

| Skill: Divide multi di | Year: 6 |     |        |                            |                       |        |   |   |   |   |
|------------------------|---------|-----|--------|----------------------------|-----------------------|--------|---|---|---|---|
| $372 \div 15 = 24 r12$ | 1       | 5 - | 3<br>3 | 2<br>7<br>0<br>7<br>6<br>1 | 4<br>2<br>0<br>2<br>2 | r<br>5 | 1 | 2 | $1 \times 15 = 15$<br>$2 \times 15 = 30$<br>$3 \times 15 = 45$<br>$4 \times 15 = 60$<br>$5 \times 15 = 75$<br>$10 \times 15 = 150$<br>$4 \frac{4}{5}$ | When a remainder is<br>left at the end of a<br>calculation, children<br>can either leave it as a<br>remainder or convert<br>it to a fraction.<br>This will depend on<br>the context of the<br>question.<br>Children can also<br>answer questions<br>where the quotient<br>needs to be rounded<br>according to the<br>context. |

### **Multiplication and division**

### **Glossary of terms**

**Array –** An ordered collection of counters, cubes or other item in rows and columns.

**Commutative –** Numbers can be multiplied in any order.

**Dividend –** In division, the number that is divided.

**Divisor** – In division, the number by which another is divided.

**Exchange –** Change a number or expression for another of an equal value.

**Factor** – A number that multiplies with another to make a product.

**Multiplicand –** In multiplication, a number to be multiplied by another.

**Partitioning –** Splitting a number into its component parts.

**Product –** The result of multiplying one number by another.

Quotient – The result of a division

**Remainder –** The amount left over after a division when the divisor is not a factor of the dividend.

**Scaling –** Enlarging or reducing a number by a given amount, called the scale factor