# *Postal Puzzles*                    *P016 scoring rubric*

**Math Domain**

| | | |
|---|---|---|
| ☑ Number/Quantity | ☐ Shape/Space | ☐ Function |
| ☐ Chance/Data | ☑ Arrangement | |

**Math Actions** (possible weights: 0 through 4)

| | |
|---|---|
| ☐ 0 Modeling/Formulating | ☐ 2 Manipulating/Transforming |
| ☐ 2 Inferring/Drawing Conclusions | ☐ 1 Communicating |

**Math Big Ideas**

| | | |
|---|---|---|
| ☐ Scale | ☐ Reference Frame | ☐ Representation |
| ☐ Continuity | ☐ Boundedness | ☐ Invariance/Symmetry |
| ☑ Equivalence | ☐ General/Particular | ☐ Contradiction |
| ☐ Use of Limits | ☐ Approximation | ☐ Other |

**1.** Any combination of four stamps such that some have value 3 and some have value 5 is acceptable. The complete list is given in answer to question **4**.

**2.** The least value is achieved if each of the stamps has the lowest possible value. Since the value of each stamp is 3 tekos or 5 tekos, the lowest value is 3. Therefore, the least amount of postage is obtained when each stamp is a 3-teko stamp:
$3 + 3 + 3 + 3 = 12$

**3.** Similarly, the greatest amount is achieved when each stamp has its greatest possible value, i.e., 5 tekos:
$5 + 5 + 5 + 5 = 20$

**4.** While it is possible to make a long list of possible combinations and then eliminate duplicates, it is much easier to make such a list by finding some organizing properties to it. Since the order of the stamps is not important (the total postage does not change as stamps are rearranged), the only factor is the number of 3-teko and the number of 5-teko stamps. The total number of stamps is four, so knowing the number of one kind of stamp automatically gives the number of the other kind. So the number of 3-teko stamps can be 0, 1, 2, 3, or 4. The totals are:
$5 + 5 + 5 + 5 = 20$
$5 + 5 + 5 + 3 = 18$
$5 + 5 + 3 + 3 = 16$
$5 + 3 + 3 + 3 = 14$
$3 + 3 + 3 + 3 = 12.$

|  | **partial level (1 or 2)** | **full level (3)** |
|---|---|---|
| **Modeling/ Formulating (weight: 0)** | | |
| **Transforming/ Manipulating (weight: 2)** | Student correctly computes some of the postages, and/or correctly identifies the least or the greatest postage amounts. | Student completes all the computations correctly, and identifies the least and the greatest postage amounts that match the list in question **4**. |
| **Inferring/ Drawing Conclusions (weight: 2)** | Student provides partial reasoning in either question **2** or **3** and/or makes a list that is not complete, organized or systematic. | Student completes the list in question **4** in a systematic manner, verifying the completeness of the list and providing reasoning for questions **2** and **3**. |
| **Communicating (weight: 1)** | Makes a partial list of stamp combinations, and/or gives an sample combination only in question **1**. | Student makes a full list of possible stamp combinations. |