

Weighing for the post – Student work samples

Click on the link to see the assessment resource, *Weighing for the post* (NM1336)

The following samples of student work could be used to identify sources of evidence of students' understanding of addition of decimal numbers.

Additive strategies (with decimals): At curriculum level 4 (Year 8) – Note: some with simple calculation errors.

Place value partitioning

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$\begin{aligned} 1 + 2 &= 3 \\ 0.2 + 0.9 &= 1.1 \\ 0.01 + 0.046 &= 0.056 \\ 3 + 1.1 + 0.056 &= 4.156 \end{aligned}$$

Total weight: 4.156 kg

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$\begin{aligned} 0.00 + 0.006 + 0.0 \\ 0.01 + 0.04 + 0.0 \\ 0.2 + 0.0 + 0.9 \\ 1.0 + 2 + 0 \\ 0.006 + 0.04 + 1.1 + 3 &= 4.146 \end{aligned}$$

Total weight: 4.146 kg

$$2.96 \text{ kg} + 3.57 \text{ kg} + 1.04 \text{ kg}$$

$$\begin{aligned} 2 + 3 + 1 &= 6 \\ 0.96 + 0.04 &= 1 \\ 6 + 1 &= 7 \\ 7 + 0.57 &= 7.57 \end{aligned}$$

Total weight: 7.57 kg

Selective addition – finding compatible numbers

$$2.96 \text{ kg} + 3.57 \text{ kg} + 1.04 \text{ kg}$$

$$\begin{aligned} &= 2.96 + 3.57 + 1.04 \\ 2.96 + 1.04 &= 4.0 \\ 4.0 + 3.57 &= 4.57 \end{aligned}$$

Total weight: 4.57 kg

Additive strategies (with decimals): *Early curriculum level 4 (Year 7)* – Vertical algorithm and writing in the zero place holders do not sufficiently indicate a "flexible" part-whole strategy. Some students made recombination errors around the *tenths to ones* – especially with decimals with different numbers of decimal places.

Writing out the decimals with zero place holders

$$0.16 \text{ kg} + 0.4 \text{ kg} + 0.306 \text{ kg}$$

$$0.160 + 0.400 + 0.306 = 0.866 \text{ kg}$$

Total weight: 0.866 kg

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$1.210 + 2.046 + 0.900$$

$$1 + 2 = 3$$

$$210 + 46 + 900 = 1.156$$

$$3 + 1.156 = 4.156$$

Total weight: 4.156 kg

Vertical algorithm

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$\begin{array}{r} 2.046 \\ 0.900 \\ +1.210 \\ \hline 4.156 \end{array}$$

Total weight: 4.156 kg

Recombining error

$$2.96 \text{ kg} + 3.57 \text{ kg} + 1.04 \text{ kg}$$

$$1.04 + 2.96 = 3.100 + 3.57 = 6.157 \text{ kg}$$

Total weight: 6.157 kg

$$2.96 \text{ kg} + 3.57 \text{ kg} + 1.04 \text{ kg}$$

$$\begin{aligned} 2.96 \text{ kg} + 3.52 \text{ kg} \\ = 5.148 \text{ kg} \\ + 1.04 \text{ kg} \\ = 6.52 \text{ kg} \end{aligned}$$

Total weight: 6.52 kg

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$1.210 + 2.046 + 0.900 = 3.1156$$

$$1 + 2 = 3$$

$$210 + 46 + 900 = 1156$$

Total weight: 3.1156 kg

$$2.96 \text{ kg} + 3.57 \text{ kg} + 1.04 \text{ kg}$$

add 1.04 onto 2.96 which = 3.00 or 3 then
+ 3.00 onto 3.57 and that equals 6.57

Total weight: 6.57 kg

Additive strategies (with decimals): *At curriculum level 3 (Year 6) – losing decimal place value, but indication of part-whole strategies. It is likely that students can add decimals with the same number of decimal places without recombination.*

Loses place value of digits (Uses compensation and additive identity)

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$1.21 \text{ kg} + 0.9 \text{ kg} = 1.80 \text{ kg} + 2.046 \text{ kg} = 2.176 \text{ kg}$$

Total weight: 2.176 kg

$$1.21 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$2.046 + 1.21 = 3.067 + 0.9 = 3.076 \text{ kg}$$

Total weight: $\overset{0.76}{\cancel{3.76}}$ kg

$$0.16 \text{ kg} + 0.4 \text{ kg} + 0.306 \text{ kg}$$

$$0.16 + 0.4 = 0.20 \text{ then add } 0.20 \text{ onto } 0.306 \text{ then it equals } 0.326$$

Total weight: 0.326 kg

Other part-whole strategy involving place value error

$$2.1 \text{ kg} + 2.046 \text{ kg} + 0.9 \text{ kg}$$

$$2 \text{ kg} + 1 \text{ kg} = 3 \text{ kg}$$

$$3 \text{ kg} + 0.9 \text{ kg} + 0.1 \text{ kg} = 4 \text{ kg}$$

$$0.20 \text{ kg} + 0.046 \text{ kg} = 0.246 \text{ kg}$$

$$4 \text{ kg} + 0.246 \text{ kg} = 4.246 \text{ kg}$$

Total weight: 4.246 kg

1.21 kg + 2.046 kg + 0.9 kg

$$\begin{array}{r}
 1.21 \\
 2.046 \\
 0.9 \\
 \hline
 \end{array}
 \begin{array}{l}
 +1 \\
 +2 \\
 +0 \\
 \hline
 = 3.
 \end{array}
 \begin{array}{r}
 .2 \\
 .0 \\
 .9 \\
 \hline
 = 1.1
 \end{array}
 \begin{array}{r}
 .01 \\
 .04 \\
 .00 \\
 \hline
 = .05
 \end{array}
 + 0.6$$

= 3. + 1.1 + .05 + 0.6 = 5.2

Total weight: 5.2 kg

0.16 kg + 0.4 kg + 0.306 kg

$$\begin{array}{l}
 0.16 + 0.4 + 0.306 = \\
 16^{-6} + 4^{+6} + 306 = \\
 10 + 10 + 306 =
 \end{array}
 \begin{array}{l}
 10 + 10 + 306 = \\
 320 + 6 = \\
 = 326
 \end{array}$$

Total weight: 0.326 kg

Additive strategies (not using decimals): *Below curriculum level 3 (<Year 6)*

Adding the decimals as whole numbers

0.16 kg + 0.4 kg + 0.306 kg

$$16 \text{ Kg} + 4 \text{ Kg} + 306 \text{ Kg} =$$

Total weight: 325 kg

Adding only the decimal components as whole numbers

1.21 kg + 2.046 kg + 0.9 kg

$$21 \text{ Kg} + 46 \text{ Kg} + 9 \text{ Kg} =$$

Total weight: 76 kg