

Algebra Prior Assessment Questions 1 and 2

Objective: I can find the value of amounts expressed with algebra symbols.

NC A3: express missing number problems algebraically

Teacher Input Ideas:

This lesson is an introduction to algebra and expressing unknown values as symbols such as letters.

Algebra can be introduced in many ways, but a good way to introduce algebra is to introduce the need and often this can be linked to real life situations. The children need to understand that letters are used to represent missing values of things. Using food or real-life situations such as shopping, can help the children to understand better the purpose of algebra.

A shop could be set up in the classroom using different foods or fruit labelled with prices less than £1. Model to the children recording items that are bought. For example: I buy an apple, a banana and some grapes. How much do they come to all together? Model writing down what has been bought, this could be a receipt. Model writing the items fully. Encourage the children to notice that this takes a while so use letters as symbols such as $a + b + g = 1.60$. Ask the children to choose items from the shop and to record those items as an algebraic sentence such as $a + b + p = 95$ pence.

Once the children are familiar with using symbols, introduce a problem such as: I went to the shop to buy some items for myself and my friend. I bought 2 apples and one banana. My friend wanted the banana. I know the total of the shopping and I can remember how much an apple cost, however I am unsure how much the banana costs and the friend would like to give me the money. How can I work this out? Model writing as an equation:

$$2a + b = 95 \text{ pence}$$

One apple costs 30p. How much did 2 apples cost?

$$2 \times 30 = 60$$

How can I use this information to work out the cost of the banana?

$$60 + b = 95$$

$$95 - 60 = 35$$

Model to the children how this can be recorded and encourage the children to work this out. Repeat with other items in the shop. Encourage the children to suggest the use of different mental strategies when trying to work out the answers.

Practice Activities

Purple Practice: most suited for children who made errors in most of the prior assessment and have very little understanding of algebra. They would benefit from visual representations.

This activity follows on from the introduction of expressing unknowns as letters, using fruit as a stimulus. The children are given visual pictures of fruits with prices. In the first section of the task, the children are required to express the pictures using letters creating an algebraic equation. They are then required to work out the total of the amounts. This also provides the opportunity to consolidate using mental methods to add.

The second part of the task requires the children to find missing amounts using the values they have from other fruits. The children should be able to look at the images and the recorded equation to calculate the cost of the missing priced fruit.

Green Practice: most suited for children who made errors in Question 1 & 2 of the prior learning assessment.

This task provides the children with different equations using letters. The children are to work out the value of the missing amounts by using the inverse operation and using knowledge of the information they are provided with. The children also have the opportunity to apply the use of mental calculation methods.

The second part of the task requires the children to think of their own suggestions for missing values by using their knowledge of number facts, factors, multiples and divisors. Encourage the children to discuss how they found the combinations and use key vocabulary when reasoning their choices.

Yellow Practice: most suited for children who demonstrated some accuracy in Q1 and 2 of the prior learning assessment.

For the yellow task, the children are presented with more challenging equations which include the use of squared and cubed numbers, squared root and brackets.

In the second part of the task, the children are presented with missing values in fractions. The children are required to use their knowledge of equivalent fractions to work out the value of the missing amounts.

Mastery: The children are provided with a problem where they must find the missing side or height of rectangles and parallelograms. The children are given the area and one measurement. They are to find the value of s and h in the different equations.

There is also the opportunity for children to apply other skills such as drawing the shapes with accuracy and using a scale factor. The children could be given rulers and protractors to accurately draw the length and angles correctly. Additionally, the children are challenged with using the scale factor of 1cm to represent every 2m of the shapes.

Answers:

Purple: 1) 49p

2) 81p

3) £1.53

4) 39p

5) £1.34

6) £2.13

Challenge: cucumber = 45p

kiwi = 17p

nectarine = 35p

Green: 1) $b = 9$

2) $m = 72$

3) $a = 9$

4) $0 = 17$

5) $p = 36$

6) $n = 5$

7) $c = 20$

8) $s = 100$

9) $g = 3$ (a was found in question 3)

10) $t = 8$

Challenge: 1) Accept any factors of 24

2) Accept any number bonds to 100

3) Accept any multiple of 4 and the other factor pair. Such as: 36 divided by 9 = 4

Yellow

$a = 8$

$b = 5$

$c = 24$

$d = 2$

$e = 3$

$f = 6$

$g = 32$

$h = 9$

$i = 49$

$j = 13$

$k = 12/24$

$l = 11/44$

$m = 30/45$

$n = 24/40$

Mastery

1) $s = 12$

2) $s = 3$

3) $h = 4$

4) $h = 4.5$

Also look for accurate measuring and use of scale factor if children are ready to apply this skill.

Samia visits her local fruit shop. Below are the prices of different fruits. Using the pictures in each question, work out the total cost of her fruit combinations and record the sum as an algebraic equation. Look at the example in question 1.



apple 18p



banana 13p

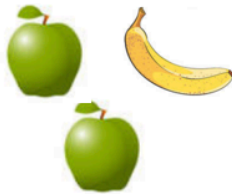


pear 30p



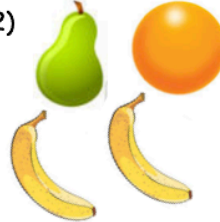
Orange 25p

1)

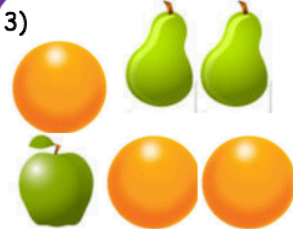


$$2a + b = 49 \text{ pence}$$

2)



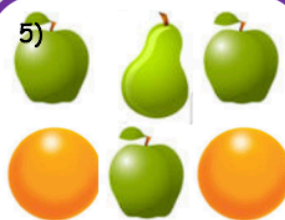
3)



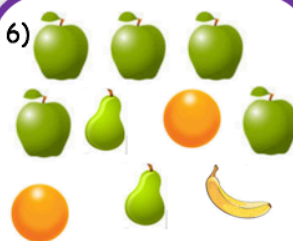
4)



5)



6)



Challenge:

Samia cannot see a price for some fruits. Use the information below to work out the price of other fruits.



$$a + c = 63 \text{ pence}$$

$$18 + c = 63$$

cucumber costs:



$$2o + k = 67 \text{ pence}$$

kiwi costs:



$$n + k + p = 82 \text{ pence}$$

nectarine costs:

Lo: I can find the value of amounts expressed with algebra symbols.

Look at each question and work out the value of the missing amounts.

1) $b + 15 = 24$

$b =$

2) $84 - m = 12$

$m =$

3) $81 \div a = 9$

$a =$

4) $4o = 68$

$o =$

5) $15 + 2p = 89$

$p =$

6) $n^2 = 25$

$n =$

7) $53 - 2c = 13$

$c =$

8) $3s - 89 = 211$

$s =$

9) $5g + 71 + a = 95$

$g =$

10) $80 + t + 12 = 100$

$t =$

Challenge:

Suggest suitable values for the missing amounts. Think of 3 different values for each letter:

$d \times e = 24$

$d =$

$e =$

$f + h = 100$

$f =$

$h =$

$i \div j = 4$

$i =$

$j =$

Explain what knowledge you have used to help you to think of different possibilities.

LO: I can find missing values in algebraic equations

Find the missing value in each equation.

1) $3a + 6 = 5 \times 6$

a =

2) $b^2 + 2 = 3 \times 9$

b =

3) $25 + c = 7^2$

c =

4) $3 \times (2d + 5) = 27$

d =

5) $2 \times (5e \div 3) = 10$

e =

6) $24 \div (f - 3) = 8$

f =

7) $g + g = 4^3$

g =

8) $h = \sqrt{81}$

h =

9) $i - 10 - 3 = 12 \times 3$

i =

10) $25 - j - 2 = 2 \times 5$

j =

Find the missing value in each fraction:

11) $\frac{k}{24} = \frac{1}{2}$

k =

12) $\frac{L}{44} = \frac{1}{4}$

l =

13) $\frac{30}{m} = \frac{2}{3}$

m =

14) $\frac{n}{40} = \frac{3}{5}$

n =

Harry has been designing different plans for vegetable patches in his school. The vegetable patches are either rectangle or parallelogram shaped. He has written one measurement in each drawing, but has forgotten to write the height of his parallelograms and one of the sides in his rectangles. He has already worked out the area for each design. Use the equations he has written below to find the length of the missing side or the height.

(s = missing side for the rectangles)



$$1) 3 \times s = 36 \text{ m}^2$$

(h = missing height in parallelogram)



$$2) 5 \times s = 15 \text{ m}^2$$

$$3) 12 \times h = 48 \text{ m}^2$$

$$4) 4 \times h = 18 \text{ m}^2$$

Draw each rectangle and parallelogram, labelling all the sides and the height for Harry.

Challenge: Can you draw the shapes to scale?

Use the scale factor:

1cm:2m