Samples of a pupil's work

6   A piece of rope 5 metres long is cut into two pieces.
One piece is x metres long.
How long is the other piece?   ......2.5.metres..................

$y = 3$ = 72 hours.

There are 24 hours in one day.
How many hours are there in y days? ....y.×.24 = 24hours.......

It costs £140 to hire a coach.
This cost is shared equally among n people. $\frac{14}{n}$
How much does each person pay?   ......n ÷ 14 : £10 each...

A plumber charges £30 to come to your house plus an extra £20 for each
hour that the job takes.
A job takes x hours.
How much does the plumber charge?   ...$x = 3$...........£90,...........

7.   What can you say about x if $x + y = 10$ and x is less than y?

   $x = 4$ $y = 6$ $4 + 6 = 10$.
....

9   A piece of rope 60 metres long is cut into two pieces.
One piece is x metres long and the other is y metres long.

Write down two equations.
Each equation should use x, y and 60.

.....$x + y$............. = 60

$x =$ ...30...................

13.   If $y = 1 + 4x$ and $x = 3$
then $y =$ ...$1 + 4 = 5 × 3 = 15$...........

If $A = 3r^2$ and $r = 4$
then $A =$ ...~~3×3×3~~ $4 + 4 + 4 = 12^2 = 144$.

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Commentary on the pupil's work

The pupil's answers to questions 6, 7 and 9 show that she does not recognise that letters represent variables. In every case, she substitutes particular values for the letter. In questions 6, 7 and 9, she substitutes 3, 4 and 30 for x, so there is some realisation that x can take different values in different questions, but she does not allow for this within a single question.

Notice also how she has let $n = 14$ in question 6. This is presumably because n is the 14th letter in the alphabet. This is reminiscent of children's secret codes, where $a = 1$, $b = 2$ and so on.

Her responses reveal a general reluctance to leave operations in answers. She appears to think that if an operation is present then something still needs to be done.

Her answer to question 13 shows that she does not recognise the conventions of algebra: that multiplication precedes addition and that squaring should precede multiplication.

Her use of the equals sign is idiosyncratic. As with many pupils, she writes such things as $1 + 4 = 5 \times 3 = 15$ while evaluating an expression. This tendency is consistent with an interpretation of the '=' symbol as meaning 'makes' – a signal to evaluate what has gone before. This is the same meaning as the button with this label on a calculator.

Key Stage 3 test questions

1 Simplify these expressions.

$5k + 7 + 3k = $ _____

$k + 1 + k + 4 = $ _____

2 Solve these equations.

$8k - 1 = 15$ $k = $ _____

$2m + 5 = 10$ $m = $ _____

3 You can work out the cost of an advert in a newspaper
by using this formula:

$C = 15n + 75$

C is the cost in pounds.
n is the number of words in the advert.

(a) An advert has 18 words.
Work out the cost of the advert.

Show your working.

£ _____

(b) The cost of an advert is £615.
How many words are in the advert?

Show your working.

_____