Year 7 Term 2 Homework

Student Name: _____	**Grade**: _____
Date: _____	**Score**: _____

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This edition was printed on October 6, 2010.

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4 Year 7 Term 2 Week 4 Homework

4.1 Number Patterns and Pronumerals

4.1.1 The algebraic symbol system

- letters of the alphabet can be used as symbols to represent numbers
- the use of letters in this way is called algebra
- these letters are called pronumerals
- a pronumeral many also be called a variable
- algebraic statements that do not contain an equal sign are called expressions ($2x - 3, 3y + 6$)
- statements that contain equal signs are called equations ($x = 8, a = 5$)

4.1.2 Modelling products and sums

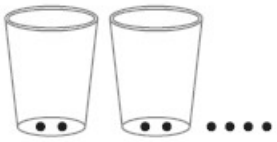
When writing algebraic expressions such 3x, it is common to leave out the multiplication sign.

Example 4.1.1

If $d = 2$ is modelled by  show the models for: **a** $3d$ **b** $2d + 4$

Solutions

a 

b 

Exercise 4.1.1

1. *The difference between two numbers is 2.4. What is the large number if the smaller number is x?*

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2. *Linda has n stamps. Linda and George have 108 stamps altogether. How many stamps does George have?*

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3. *The sum of two numbers is 8.3 and their difference is 1.1 What are the 2 numbers?*

4.1.3 Algebraic conversions

- When multiplying expressions, we leave out of the multiplication signs.
- When dividing one expression by another, we write the division as a fraction.
- When a pronumeral is multiplied by itself, we write the product in index form.
- When a pronumeral is multiplied by a numeral, the numeral must be written first.

Exercise 4.1.2 Write each of these expressions without any multiplication or division signs:

1. $a \times (5 \div b + 1 \div c) \times d$ _____
2. $2 \times (4 \times p + q \times 6) - r \times 8$ _____
3. $[(5 \times a + 5) - b] \div [c \times (5 \times d - 4)]$ _____
4. $(3 \times a - b \times 4 + c \times d) \times (e \times 3 - f \times 3 \times g \times h) \div (a - b \times c + 5)$ _____

Exercise 4.1.3 Write each expression as a fraction

1. $(a + b - 5) \div 3$ _____
2. $5b \div (2c + 4d)$ _____
3. $(a + b - c) \div (3a - 4b)$ _____
4. $(1 + u) \div (1 - u)$ _____

Exercise 4.1.4 Insert only division signs and grouping symbols to show the meaning of:

1. $\frac{c+d}{5}$ _____
2. $\frac{u+1}{u-1}$ _____
3. $\frac{12-3k}{5m-9}$ _____
4. $\frac{1}{x+y}$ _____

4.1.4 Number patterns

Exercise 4.1.5 Write down in words a rule that describes each number pattern, then write the next two terms.

1. *210, 182 , 154, 126* _____ , _____

2. *2, 5, 10, 17 26,* _____ , _____

3. *3, 10, 31, 94,* _____ , _____

4. *3, 6, 15, 42,* _____ , _____

Exercise 4.1.6 Write down in words the two stage rule which describes the relationship between the terms in the pattern below, then write the next two terms.

1. *2, 5, 4, 7, 6, 9,* _____ , _____

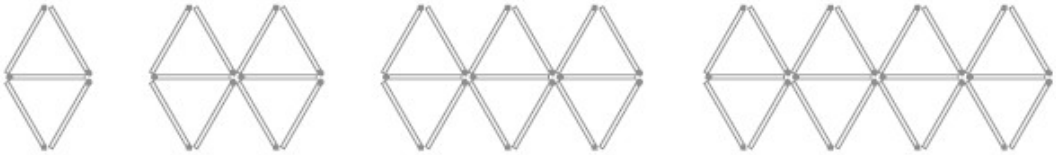
2. *10, 13, 11, 14, 12, 15,* _____ , _____

3. *8, 6, 12, 10, 20, 18,* _____ , _____

4. *6, 18, 8, 24, 14, 42* _____ , _____

4.1.5 Describing the relationship between two quantities

Example 4.1.2 Consider this geometric pattern that has been form using matchsticks.



1. *Complete the table of values.*

Step number	*1*	*2*	*3*	*4*	*5*	*6*
Number of matches	*5*	*10*	*15*	*20*	*25*	*30*

2. *Describe in at least ways, the pattern formed by the number of matches.*
   ***Solution**: The pattern formed by the number of matches could be describe as: increasing by 5 or adding 5 each time or multiples of 5.*

3. *Write down a rule that relates the number of matches to the step number in each figure.*
   ***Solution**: The number of matches = $5\times$ the step number.*

4. *How many matches would be needed to make the figure in step 20?*
   ***Solution**: In the step 20, the number of matches = $5 \times 20 = 100$.*

Exercise 4.1.7 Consider this geometric pattern which has been formed using matchsticks.

1. *How many matches need to be added to extend each figure?* _____

2. *Complete a table of values that shows the number of matches in each figure:*

Number of squares	*1*	*2*	*3*	*4*	*5*
Number of matches					

3. *Write down a rule that could be used to determine the number of matches in each step.*

   _____

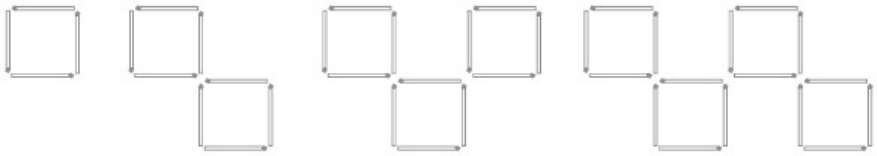
4. *How many matches would be needed to make the figure in step 25?*

   _____

   _____

4.1.6 Using pronumerals to describe relationships

Example 4.1.3 Consider this pattern that has been formed using matchsticks.



1. *Form a table of values for this pattern.*

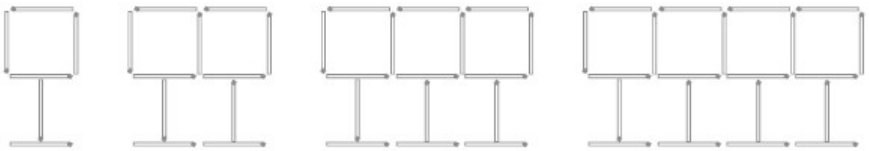
Number of step	*1*	*2*	*3*	*4*	*5*
Number of matches	*4*	*8*	*12*	*16*	*20*

2. *Write down a rule in words for the pattern.*
   ***Solution**: Adding 4 , Multiples of 4.*

3. *Rewrite this rule using pronumerals, where n stands for the number of matches and x stands for the step number.*
   ***Solution**: The number of matches = 4 $\times$ the number of step. $\therefore n = 4x$*

4. *How many matches would be needed to make the figure in step 50?*
   ***Solution**: $n = 4 \times x = 4 \times 5 = 200$*

Exercise 4.1.8 Consider this pattern that has been formed using matchsticks.



1. *Form a table of values for this pattern.*

Number of squares	*1*	*2*	*3*	*4*	*5*
Number of matches					

2. *Write down a rule in words for the pattern.*

   _____

3. *Rewrite this rule using pronumerals, where n stands for the number of matches and x stands for the step number.*

   _____

4. *How many matches would be needed to make the figure in step 50?*

   _____

4.1.7 Problem Solving

Exercise 4.1.9

1. *A school has 658 pupils. There are 384 pupils in Year 9 or above and 376 in Year 9 or below. How many pupils are there in Year 9 in this school?*

2. *Kevin had $4.20 less than Mike. If Kevin gave $0.40 to Mike, Mike would have trice as much money as Kevin. How much money had Mike at first?*

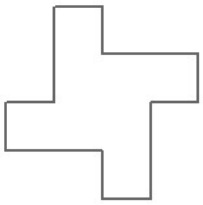
3. *Alice had $20 more than Emma. Emma gave Alice $72. Now Emma has only $\frac{1}{6}$ as much money as Alice . How much money had Alice at first?*

4. *A moment ago, Linda had $240 less than Cathy. Linda gave Cathy $80. Now the ratio Linda's money to Cathy's money is 3:5. How much money had each of them at first?*

4.2 Maths Challenge

Exercise 4.2.1

1. *The figure shown below has an area of 200 cm^2. If all its long sides are the same length and each is twice as long as each of the short sides. The angles are all right angles. What is the perimeter of the figure?*



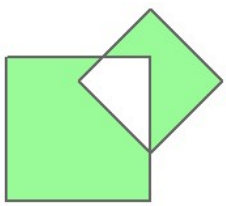
2. *In a school photo the 630 pupils are arranged in rows. Each row contains three more pupils than the row in front of it. What number of rows is not possible?*

   A. 3 *B. 4* *C. 5* *D. 6* *E. 7*

3. *Think of any number. Double it and add five. Double this answer again and then add two to it. Now subtract the number you first thought of. Then, no matter which number you start with, your answer will always be:*

   A. even *B. odd* *C. a multiple of 3* *D. a multiple of 5* *E. a multiple of 6*

4. *In the figure shown below, $\frac{3}{4}$ of the small square is shaded and $\frac{6}{7}$ of the larger square is shaded. What is the ratio of the shaded area of the smaller square to the shaded area of the larger square?*



4.3 Miscellaneous Exercises

Exercise 4.3.1

1. *Jason, Peter and James have 85 marbles altogether. If Jason has x marbles and Peter has y marbles, how many marbles does James have?*

2. *Four children took some cookies to a party. Emma took h cookies each of mass 15 g. Alice took k cookies each of mass 20 g. and Cathy and Joyce each took p cookies each mass 25 g. Write down an expression in terms of h, k and p, for:*

   (a) *the total number of cookies taken to the party,*

   (b) *the total mass of the cookies.*

3. *If $a = 2\frac{1}{3}$, $b = 3\frac{2}{5}$, $c = 4\frac{1}{2}$ and $d = 5$ evaluate the following:*

   (a) $\frac{a \times b}{d}$

   (b) $\frac{a+b}{c-d}$

   (c) $a(b - c) + d$

Exercise 4.3.2

1. *Given that $p = 4$ and $q = -3$, evaluate the following:*

   (a) $2p + 3q$

   (b) $3p - q^2$

   (c) $\frac{p-q}{p+q}$

2. *Simplify the following:*

   (a) $10a + b - 15a + 4b - 2a$

   (b) $2(a + b) - 5(2a - 2b)$

   (c) $\frac{1}{3}(2x - y) - \frac{5}{6}x + \frac{1}{4}y$

   (d) $5x - 4[2x - (6x - 3y)]$