

# PRACTICE IN SIMPLIFYING ALGEBRAIC EXPRESSIONS VERSION 1.0





# x.act: Practice in simplifying algebraic expressions

These materials were produced by the Wits Maths Connect Secondary (WMCS) project at the University of the Witwatersrand.

Visit us at www.witsmathsconnectsecondary.co.za

Team members: Craig Pournara (Project leader) Micky Lavery, Wanda Masondo, Vasantha Moodley, Yvonne Sanders and Fatou Sey, with thanks to Danell Herbst, Sheldon Naidoo and Shikha Takker

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# About this booklet

The 31 worksheets in this booklet provide practice in simplifying algebraic expressions – a critical skill in introductory algebra at Grade 8 level. The worksheets also include answers for each question.

The pack is called  $\mathcal{X}$ . aCt for two reasons: algebra requires you to *act* and algebra requires you to be *exact*. To become good at algebra, you have to make sense of operating on letters, to show determination in getting used to new symbols, and to practise regularly. You also need to pay attention to the structure of algebraic expressions. In this pack we pay attention to all these issues.

We assume learners have been taught the content of introductory algebra so that they can use these worksheets to practise algebraic simplification. We provide a 7-page summary of the basics of simplifying algebraic expressions where we explain important concepts, terminology, notation and procedures with illustrative examples. We also include some discussion on what makes algebra confusing and what must be done to overcome these difficulties. We have written this summary in simple language for Grade 8 learners.

Our research in South African schools shows that learners have particular difficulty when algebraic expressions involve subtraction and negatives. They also struggle when expressions contain brackets. We developed the worksheets with these issues in mind. Some worksheets focus first on addition and positives before extending to negatives and subtraction. We also draw specific attention to the meaning of brackets in expressions. We encourage learners to look carefully at expressions before they rush to simplify them. This encourages them to pay attention to the structure of expressions – to notice what operations are being performed between terms, and to see the impact of minor variations between examples. Here is one such task:

In v	vhich expressions:	5x(6+x)
a)	can you simplify terms outside the bracket before	5 + x + (1 - x)
	you deal with the bracket?	5 + x(1 - x)
b)	are the brackets unnecessary?	x - x(6 + x)
0	are you required to apply the distributive law?	x - x + (6 + x)
~/	are you required to apply the distributive law.	1 + 5 - 6(1 + x)

The worksheets are arranged in 4 sections as outlined below. Almost all worksheets were designed in pairs so that learners can work on 2 very similar worksheets, covering the same content and with very similar question types.

Section	#Wksts	Content
1	8	Distinguishing like and unlike terms, simplifying simple algebraic expressions, matching verbal and algebraic expressions, and using substitution to test whether expressions have been simplified correctly.
2	3	Evaluating simple algebraic expressions to emphasise that a letter can stand for a single number, and sometimes it can stand for many numbers.
3	10	Applying the distributive law, with particular attention to multiplying monomials by binomials.
4	10	Sets of mixed examples with several terms, different uses of brackets and more difficult examples that include the distributive law.



# NOTES ON INTRODUCTORY ALGEBRA

In these notes we explain important concepts, terminology and notation in introductory algebra. We also provide examples to illustrate these. We have written these notes in simple language for Grade 8 learners. After the notes we discuss some instances where algebraic notation can be confusing.

#### 1) Using variables in algebra

In algebra we use letters and numbers to represent quantities. We combine these with other symbols to represent the *relationships between* these quantities. For example, say we have 2 packets of sweets and we know that altogether there are 53 sweets.



If we say the number of sweets in the small packet is m and the number of sweets in the large packet is n, then the relationship can be expressed in algebra as m + n = 53. We say m + n is an *algebraic expression* and we say that m + n = 53 is an *algebraic equation*. We can also refer to m + n = 53 as an *algebraic statement*.

In primary school we use a place holder,  $\Box$ , or a "space", \_\_\_, to represent an unknown value, e.g.  $\Box + 6 = 15$  and \_\_\_\_ - 5 = 2. In high school we use letters, e.g. x + 6 = 15 and a - 5 = 4. We can even have two letters in a statement, e.g. a - 5 = b.

Sometimes the letter has only *one* value that will make the statement true. In x + 6 = 15, the statement will only be true if x = 9. Sometimes the variable can have *more than one* value. In a - 5 = b, the value of a affects the value of b. So, once we know the value of a, we can work out a value of b. Here are some possible combinations of a and b: a = 12 and b = 7; a = 6 and b = 1; a = 5 and b = 0; a = 4 and b = -1;  $a = 6\frac{1}{2}$  and  $b = 1\frac{1}{2}$ . As you can see, the b-values can be worked out using substitution, e.g. if a = 12 then b = 12 - 5 = 7. If we know the b-value, then we can calculate the a-value, e.g. if b = 3, then a = 8; if b = 7, then a = 12. In all these examples we have shown that letters stand for numbers.

In the example with the sweets we have the algebraic equation (or statement): m + n = 53. If there are 20 sweets in the small packet then there must be 33 sweets in the large packet. This means m = 20 and n = 33. If there are 15 sweets in the small packet, how many sweets will there be in the large packet:  $m = \_$  and  $= \_$ ? As you can imagine, m and n can have many different values but, in this case, they will always be whole numbers because we don't talk about a negative number of sweets or a fraction of a sweet.

#### 2) Naming the components of an algebraic expression

Algebraic expressions are made up of *terms*. Each term contains letters or numbers or both. Terms are separated by the operations of addition or subtraction. Consider the algebraic expression 3p + 4k + 5. It consists of 3 terms which can be listed as 3p; 4k; 5.



The arrows indicate the separate terms.



- The letters are called *variables* because their values can change. In the example, variables are *p* and *k*. See colour coding in the diagram.
- Numbers that are multiplied by variables are called *coefficients*. In the example, the coefficient of p is 3 and the coefficient of k is 4. Mathematicians write the numbers before the letters, like 3p and 4k. It is not wrong to write p3 but the convention is to write the numbers first. If the coefficient of a variable is +1 or -1, we don't write the 1 (see example below).
- Numbers without a variable are called *constants* because their value does not change. In the example, the constant is 5.

Here is another example: -2x + y - 1This example has 3 terms: -2x; y and -1The variables are x and y The coefficient of x is -2, the coefficient of y is +1The constant is -1

Refer to No. 7a for more details on expressions that involve subtraction and have negative coefficients and constants.

# 3) Describing algebraic expressions in words

Algebraic expressions can be described in words. We will call these *verbal expressions*. For example, if we have the algebraic expression 3x + 5, we can create several verbal expressions that are slightly different. Here are four examples:

- The product of 3 and a number increased by 5
- The product of 3 and *x* increased by 5
- The product of 3 and *x*, add 5
- 3*x* add 5

We can also start with the verbal expression and then create the algebraic expression. For example, "the sum of 7 and a number, then multiplied by 2" can be written algebraically as  $(7 + n) \times 2$ . Usually we will write it as 2(7 + n) or 2(n + 7). We know that addition is commutative, that is n + 7 is the same as 7 + n so they are written interchangeably.

	Algebraic expression	n Examples of verbal expressions	
F	3p + 4k + 5	٠	The product of 3 and $p$ , add to the product of 4 and $k$ , then add 5
		٠	Three $p$ add four $k$ add 5
ſ	3p - 6 + (-2)	٠	The product of 3 and $p$ , subtract 6 add negative 2
		٠	3p subtract 6 add negative 2
Ī	$x^2 - x + 2$	٠	A number squared subtract that number, then add 2
		•	A number squared subtract itself and add 2

Here are 3 more examples of algebraic and their equivalent verbal expressions:



# 4) The language of operations and signs

In the worksheets we make a clear distinction between operations and signs. We do not use the words *plus* and *minus* because they don't tell us whether we are referring to a sign or an operation. Pay attention to this in the following examples:

For operations, we say:	<b>add</b> and <b>subtract</b>	5 + 8 10 - 4	5 add 8 10 subtract 4
For signs, we say:	positive and negative	-4 - 3 -4 - (+3) 4 - (-3) 4 + (-3)	negative 4 subtract 3 negative 4 subtract positive 3 4 subtract negative 3 4 add negative 3

Sometimes we talk about the *plus symbol* (+) and the *minus symbol* (-). When we do this, we are referring only to the symbol. We are not referring to its meaning as a sign or an operation. For example, in 4 + (-3) the plus symbol (+) tells us to add and the minus symbol (-) tells us that 3 is negative. Refer to No. 7a for more details on expressions that involve subtraction and negatives.

#### 5) Like and unlike terms

In algebra there are two interesting words: *like* and *unlike*. Both words are familiar on social media but they have different meanings in maths to their use on social media!! In maths we use them when we refer to terms. We speak of *like terms* and *unlike terms*.

Like terms have the same (i.e. like) variables with the same (i.e. like) exponents for the variables. Unlike terms have different variables or different exponents even if they have the same variables.

Like terms	Notes	Unlike terms	Notes
k + 3k	Same variable k, same exponent 1	3 + 3k	Term with variable and term with constant
5a – 7a	Same variable <i>a</i> , same exponent 1	5a - 7b	Two different variables
3x + 7x	Same variable x, same exponent 1	$3x + 7x^2$	Same variable but different exponents
$x^2 - 2x^2$	Same variable x, same exponent 2	$k^{3} - x^{3}$	Same exponents but different variables
5ab + 2ba	Same variables and exponents – it	7k - 7x	Two different variables (does not matter that
	does not matter that the order of the		coefficients are the same)
	variables is different because	5ab + 2b + 7a	3 terms don't have same combination of variables
	multiplication is commutative		

# 6) Operating on like and unlike terms

# a) Adding and subtracting terms

We can add and subtract like terms. We cannot add and subtract unlike terms. We speak of *collecting like terms* which means we add or subtract the like terms to get a simpler answer.

Expressions can be simplified by adding or	Expressions cannot be simplified by adding or	Expressions can be partly simplified
subtracting because they contain like terms	subtracting because there are no like terms	because they have some like terms
2a + 3a = 5a	2a + 3b	2a+b+7b=2a+8b
2a + a = 3a	2a - 2b	2a+2b-2a+3b=5b
5k - 3k = 2k	2a - 2	2a - 2 - a = a - 2
p + p = 2p	a + 4	a + 4 + a - 3 = 2a + 1
2p - p = p	$3a^2 - 3a - 3$	$3a^2 - a^2 - 3 = 2a^2 - 3$
$4a^2 + 6a^2 = 10a^2$	5a - 2ab	$ab + ba + a^2b = 2ab + a^2b$
m - 5m = -4m		



- b) Multiplying terms
  - We can multiply like and unlike terms
  - When we multiply letters, we use the addition law of exponents:
    - When we multiply powers with the same base, then we add the exponents
  - Here are some examples:

$5p \times 4 = 20p$	$5p^3 \times 4p = 20p^{3+1} = 20p^4$
$5p \times (-4) = -20p$	$5a \times 4b = 20ab$
$p \times p = p^{1+1} = p^2$	$5a \times 4ab = 20a^2b$

- c) Dividing terms
  - We can divide like and unlike terms
  - When we divide terms with variables, we use the subtraction law of exponents: When we divide powers with the same base, then we subtract the exponents
  - Here are some examples (assume the denominators are not zero):

$$\frac{12p}{4} = 3p \qquad \qquad \frac{12p^3}{3p} = 4p^{3-1} = 4p^2$$
$$\frac{12p^2}{-4} = -3p^2 \qquad \qquad \frac{6ab}{2b} = 3a$$

d) Distributive law

We apply the distributive law when we multiply a monomial by an expression containing two or more unlike terms. A monomial consists of one term, e.g. 7a;  $2a^2$ ; 6ab; 12. In Grades 8 and 9 you will often encounter binomials (e.g. x + 3 and 2m - 5) and trinomials (e.g. 2a + 3b - 4c).

We need to use brackets to show that the monomial is multiplied by all terms in the binomial or trinomial. For example, 2(x + 3) means the 2 must be multiplied by each term in the bracket. However, the example could also be written as: (x - 3)2. In both cases the 2 is multiplied by the binomial. We illustrate the distributive law with three examples.

Example 1	Example 2	Example 3
2(x+3)	(2m-5)4m	-3(2a+3b-4c)
= 2(x) + 2(3)	= 4m(2m) + 4m(-5) or $4m(2m) - 4m(5)$	= (-3)(2a) + (-3)(3b) + (-3)(-4c)
= 2x + 6	$= 8m^2 - 20m$	or $(-3)(2a) + (-3)(3b) - (-3)(4c)$
		= -6a - 9b + 12c

e) Working with brackets

Brackets can have several different uses in algebra. For example:

- i. We use brackets when we substitute numbers into expressions
- ii. We use brackets to separate signs and operations
- iii. We can use brackets instead of the multiplication sign (×) as we did with the distributive law
- iv. We use brackets to group terms
- v. Sometimes we need to use brackets to make our meaning clear



Brackets for substitution	Brackets to separate signs and operations	Brackets to show multiplication
Calculate the value of	4 subtract positive 3: $4 - (+3)$	$2(5)$ is the same as $2 \times 5$ which is the same as
i) $a-b$	4 subtract negative 3: $4 - (-3)$	5 + 5.
ii) $2a + b$		In the same way:
if $a = 3$ and $b = 4$ .	4x subtract positive 3: $4x - (+3)$	$2(3x + y)$ is the same as $2 \times (3x + y)$ which
	4x subtract negative $3x$ : $4x - (-3x)$	is the same as $(3x + y) + (3x + y)$
i) $a-b$		
= (3) - (4) = -1		Using the distributive law:
		2(3x + y)
ii) $2a + b$		= 2(3x) + 2(y)
= 2(3) + (4)		= 6x + 2y
= 6 + 4 = 10		

Brackets to group terms	Using brackets to make the meaning clear
Compare the following examples:	When we write $-3^2$ does it mean $(-1) \times 3 \times 3$ or $(-3) \times (-3)$ ?
1) $7-5+1=3$	Based on mathematical conventions, we take $-3^2$ to mean $(-1) \times 3 \times 3 = -9$
2) $(7-5)+1=2+1=3$ 3) $7-(5+1)=7-6=1$	If we want to represent "negative 3 squared", we must use brackets: $(-3)^2 = 9$
	A similar problem arises with the distributive law:
In example 2, the brackets do not affect the answer. However, in example 3 the grouping	These two expressions are the same $2(x + 5)$ and $(x + 5)^2$ because multiplication is commutative.
with brackets means that 5 and 1 are added first and then their sum is subtracted from 7.	In both expressions, the 2 must be multiplied by both terms in the bracket.
	BUT if we have negatives, then we need to be careful:
We can also use brackets to emphasise the	Say we have the expressions: $-2(x + 5)$ and $(x + 5) - 2$
structure of an expression: 1) $(a+b) + (a+b)$	These two expressions are different.
2)  a+b+a+b	-2(x+5) means that both terms in the bracket are multiplied by $-2$
	BUT $(x + 5) - 2$ does not represent multiplication. It represents: "x add 5
The brackets make it easy to see that we are adding the same binomial, i.e. $a + b$	subtract 2" and $x + 5 - 2 = x + 3$
	When we put the $-2$ on the right of the bracket, the meaning of the minus symbol changes from "negative" to "subtract".
	If we want to multiply, then we must put the $-2$ in brackets: $(x + 5)(-2)$
	= -2x - 10

#### 7) What makes algebraic notation and terminology confusing?

Here we discuss four cases that illustrate ways in which algebraic notation and terminology can be confusing.

#### a) Sometimes a symbol represents a sign, sometimes it represents an operation

We have already noted that the minus symbol can represent a sign or an operation. Here we focus on the possible confusions with sign and operation in algebraic notation.

#### Consider the expression: 4 - 3x

We say "4 subtract 3x". This sounds as if the minus symbol does not belong to 3x. We say the expression has two terms that are separated by the operation of subtraction. This also suggests that the minus symbol does not belong to the 3x. But then we say the terms are 4 and -3x (four and negative three x) which means the minus symbol *is* connected to the 3x. We also say "the coefficient of x is negative 3". Once again, this indicates that the minus symbol belongs to the 3.



This is confusing because sometimes we are separating the minus symbol from the 3 and sometimes we are attaching it to the 3. Part of learning algebra involves learning when to combine the minus (or plus) symbol with the letter or number and when to separate it from the letter or number.

Note that if the expression were 4 - x, everything we have said above would still apply. The coefficient of x is -1, and the terms are 4 and -x.

# b) Different meanings and uses for the word "term"

The way we use the word *term* can be confusing. We discuss two different situations below.

*i)* Counting the number of terms in an expression

Consider the terms 3x and 5y. We can represent their sum as 3x + 5y which is an expression with two terms. The same applies for subtraction: the expression 3x - 5y has two terms. In both cases the terms are separated by addition or subtraction. However, if we multiply the terms, we write (3x)(5y). Then this is only <u>one</u> term because the 3x and 5y are not separated by addition or subtraction. The same applies for division:  $\frac{3x}{5y}$  is treated as one term.

Now take 3x + 5y and multiply the expression by 4. We write this as 4(3x + 5y). This new expression consists of only <u>one</u> term. Why does this happen? Firstly, (3x + 5y) is considered as one term when 3x and 5y are put in brackets, and 4 is a single term. So then we have two single terms that are multiplied. This is treated as one term because there is no addition or subtraction separating 4 and (3x + 5y).

But, when we apply the distributive law, we get 4(3x + 5y) = 12x + 20yNow we have two terms again because 12x and 20y are separated by the operation of addition.

*ii) Referring to terms in brackets* 

We have just noted that 4(3x + 5y) is one term.

When we look inside the bracket, we refer to 3x as the *first term in the bracket* and 5y as the *second term in the bracket*. But, if you are asked how many terms in 4(3x + 5y), the correct answer is **one**!!! This may seem weird but it's how we talk about terms in algebra.

# c) Seeing the equal sign in two different ways

When you first learned about the equal sign, you treated it as "gives me", e.g.  $4 + 5 = \Box$ . Here we say "4 add 5 *gives me* 9". But when you have a statement like:  $4 + 5 = 3 + \Box$ , you need to reason as follows: "4 add 5 *is the same as* 3 add something". The left side adds to 9 so the right side must also add to 9. This means the place holder must have a value of 6. So we have 4 + 5 = 3 + 6 and we say "4 add 5 is the same as 3 add 6".

Here is another example:  $4 + 5 = \Box - 2$ .

Once again, we have to see the equal sign as "is the same as". So we need to say "4 add 5 is the same as something subtract 2". If the left side adds to 9, then the right side must also add to 9. This means the place holder must have a value of 11. We can also write this as an equation in x: 4 + 5 = x - 2



# d) Thinking that an answer must consist of one term only

When we operate on numbers, we always expect to get one number as the answer. For example: 15 - 2(1 + 3) = 15 - 2(4) = 15 - 8 = 7. Although we may show several steps, the final answer is 7. We know we are finished because there are no more operations to perform.

Algebra can be confusing because we seldom get a single term for an answer. For example, if we simplify the expression 5 + 3x + 2 - x, we get 3x - x + 5 + 2 = 2x + 7.

The answer 2x + 7 may seem unfinished because there is an addition operation in the answer. It is tempting to write 2x + 7 = 9x but **this is not correct because we cannot add unlike terms**. So the final answer remains as 2x + 7.

When we simplify *numeric* expressions, we are finished a calculation when we have performed all the operations. When we simplify *algebraic* expressions, we are finished when we have performed the operations *on the like terms*.

In this worksheet you will focus on: the difference between like and unlike terms, adding and subtracting 2 like terms, and using substitution to check answers.

1) Write in simplest form: (e.g. $3 \times a = a + a + a = 3a$ and $a \times a = a^2$ )a) $2 \times x =$ b) $x \times x =$ c) $2 \times x \times x =$ d) $2x^2$ and $x^2$ d) $2x^2$ and $2x^2$ d) $2x^2$ and $2x^2$ d) $2x^2$ and $2y^2$ d) Write down the unlike term in each list of terms.a) $7xr$ ; $7x$ ; $7rx$ b) $6y$ ; $10$ ; $10y$ c) $3x$ ; $2x^3$ ; $-3x$ 4) Identify the like terms in each list. Then add the like terms in each list.a) $4x^2$ ; $3; 3x^2$ b) $7xr$ ; $7x; 8xr$ c) $6; 6y; 10$ 5) Say whether each statement is TRUE or FALSE. If the statement is false, change the right side of the equal sign to make it true.a) $6a + 2a = 8a$ b) $5k^2 + 2k^2 = 7$ c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ e) $5ab + 6a = 11aba$ f) $7ab + 2ba = 8a3b$ i) What is the value of $6a + 2a$ if $a = 3$ ?ii) What is the value of $6a + 2a$ if $a = 3$ ?iii) What is the value of $8a$ if $a = 3$ ?iii) What is the value of $8a$ if $a = 3$ ?
a) $2 \times x =$ b) $x \times x =$ c) $2 \times x \times x =$ 2) Look at each pair of terms. Say whether they are like terms or unlike terms. Give reasons for each answer.a) $2x$ and $x^2$ b) $2x^2$ and $3x^2$ c) $2$ and $2x$ 3) Write down the unlike term in each list of terms.a) $7xr; 7x; 7rx$ b) $6y; 10; 10y$ c) $3x; 2x^3; -3x$ 4) Identify the like terms in each list. Then add the like terms in each list.a) $4x^2; 3; 3x^2$ b) $7xr; 7x; 8xr$ c) $6; 6y; 10$ 5) Say whether each statement is TRUE or FALSE. If the statement is false, change the right side of the equal sign to make it true.a) $6a + 2a = 8a$ d) $6a - 2 = 4a$ b) $5k^2 + 2k^2 = 7$ e) $5ab + 6a = 11aba$ c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5:a) Focus on Q5a: $6a + 2a = 8a$ b) Focus on Q5d: $6a - 2 = 4a$ i) What is the value of $6a + 2a$ if $a = 3$ ?i) What is the value of $6a - 2$ if $a = 1$ ?ii) What is the value of $8a$ if $a = 3$ ?ii) What is the value of $4a$ if $a = 1$ ?
2) Look at each pair of terms. Say whether they are like terms or unlike terms. Give reasons for each answer. a) $2x$ and $x^2$ b) $2x^2$ and $3x^2$ c) $2$ and $2x$ d) $2x^2$ and $2y^2$ 3) Write down the unlike term in each list of terms. a) $7xr$ ; $7x$ ; $7rx$ b) $6y$ ; $10$ ; $10y$ c) $3x$ ; $2x^3$ ; $-3x$ 4) Identify the like terms in each list. Then add the like terms in each list. a) $4x^2$ ; $3$ ; $3x^2$ b) $7xr$ ; $7x$ ; $8xr$ c) $6$ ; $6y$ ; $10$ 5) Say whether each statement is TRUE or FALSE. If the statement is false, change the <i>right</i> side of the equal sign to make it true. a) $6a + 2a = 8a$ b) $5k^2 + 2k^2 = 7$ c) $5ab + 6a = 11aba$ c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5: a) Focus on Q5a: $6a + 2a = 8a$ b) Focus on Q5d: $6a - 2 = 4a$ i) What is the value of $6a + 2a$ if $a = 3$ ? ii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $4a$ if $a = 1$ ?
answer.a) $2x$ and $x^2$ b) $2x^2$ and $3x^2$ c) $2$ and $2x$ d) $2x^2$ and $2y^2$ 3) Write down the <i>unlike</i> term in each list of terms.a) $7xr$ ; $7x$ ; $7rx$ b) $6y$ ; $10$ ; $10y$ c) $3x$ ; $2x^3$ ; $-3x$ 4) Identify the <i>like</i> terms in each list. Then add the like terms in each list.a) $4x^2$ ; $3$ ; $3x^2$ b) $7xr$ ; $7x$ ; $8xr$ c) $6$ ; $6y$ ; $10$ 5) Say whether each statement is TRUE or FALSE. If the statement is false, change the <i>right</i> side of the equal sign to make it true.a) $6a + 2a = 8a$ d) $6a - 2 = 4a$ b) $5k^2 + 2k^2 = 7$ e) $5ab + 6a = 11aba$ c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5:a) Focus on Q5a: $6a + 2a = 8a$ b) Focus on Q5d: $6a - 2 = 4a$ i) What is the value of $6a + 2a$ if $a = 3$ ?ii) What is the value of $6a - 2$ if $a = 1$ ?ii) What is the value of $8a$ if $a = 3$ ?iii) What is the value of $4a$ if $a = 1$ ?
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3) Write down the <i>unlike</i> term in each list of terms.a) $7xr; 7x; 7rx$ b) $6y; 10; 10y$ c) $3x; 2x^3; -3x$ 4) Identify the <i>like</i> terms in each list. Then add the like terms in each list.a) $4x^2; 3; 3x^2$ b) $7xr; 7x; 8xr$ c) $6; 6y; 10$ 5) Say whether each statement is TRUE or FALSE. If the statement is false, change the <i>right</i> side of the equal sign to make it true.a) $6a + 2a = 8a$ d) $6a - 2 = 4a$ b) $5k^2 + 2k^2 = 7$ e) $5ab + 6a = 11aba$ c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5:a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ?ii) What is the value of $8a$ if $a = 3$ ?iii) What is the value of $8a$ if $a = 3$ ?
a) $7xr; 7x; 7rx$ b) $6y; 10; 10y$ c) $3x; 2x^3; -3x$ 4) Identify the <i>like</i> terms in each list. Then add the like terms in each list. a) $4x^2; 3; 3x^2$ b) $7xr; 7x; 8xr$ c) $6; 6y; 10$ 5) Say whether each statement is TRUE or FALSE. If the statement is false, change the <i>right</i> side of the equal sign to make it true. a) $6a + 2a = 8a$ b) $5k^2 + 2k^2 = 7$ c) $6pr - pr = 5pr$ d) $6a - 2 = 4a$ e) $5ab + 6a = 11aba$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5: a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ? ii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $4a$ if $a = 1$ ?
<ul> <li>4) Identify the <i>like</i> terms in each list. Then add the like terms in each list. <ul> <li>a) 4x<sup>2</sup>; 3; 3x<sup>2</sup></li> <li>b) 7xr; 7x; 8xr</li> <li>c) 6; 6y; 10</li> </ul> </li> <li>5) Say whether each statement is TRUE or FALSE. If the statement is false, change the <i>right</i> side of the equal sign to make it true. <ul> <li>a) 6a + 2a = 8a</li> <li>b) 5k<sup>2</sup> + 2k<sup>2</sup> = 7</li> <li>c) 6pr - pr = 5pr</li> </ul> </li> <li>6) We are going to use substitution to check 2 statements in Q5: <ul> <li>a) Focus on Q5a: 6a + 2a = 8a</li> <li>i) What is the value of 6a + 2a if a = 3?</li> <li>ii) What is the value of 8a if a = 3?</li> </ul> </li> <li>b) Focus on Q5d: 6a - 2 = 4a</li> <li>ii) What is the value of 8a if a = 3?</li> <li>iii) What is the value of 4a if a = 1?</li> </ul>
a) $4x^2$ ; 3; $3x^2$ b) $7xr$ ; $7x$ ; $8xr$ c) 6; $6y$ ; 105) Say whether each statement is TRUE or FALSE. If the statement is false, change the <i>right</i> side of the equal sign to make it true. a) $6a + 2a = 8a$ b) $5k^2 + 2k^2 = 7$ c) $6pr - pr = 5pr$ d) $6a - 2 = 4a$ e) $5ab + 6a = 11aba$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5: a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ? ii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $4a$ if $a = 1$ ?
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b) $6a + 2a = 8a$ d) $6a - 2 = 4a$ b) $5k^2 + 2k^2 = 7$ e) $5ab + 6a = 11aba$ c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5:a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ?ii) What is the value of $8a$ if $a = 3$ ?iii) What is the value of $8a$ if $a = 3$ ?
a) $6a + 2a = 8a$ b) $5k^2 + 2k^2 = 7$ c) $6pr - pr = 5pr$ d) $6a - 2 = 4a$ e) $5ab + 6a = 11aba$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5: a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ? ii) What is the value of $6a + 2a$ if $a = 3$ ? ii) What is the value of $8a$ if $a = 3$ ? ii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $4a$ if $a = 1$ ?
b) $5k^2 + 2k^2 = 7$ c) $6pr - pr = 5pr$ e) $5ab + 6a = 11aba$ f) $7ab + 2ba = 8a3b$ e) We are going to use substitution to check 2 statements in Q5: a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ? ii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $8a$ if $a = 3$ ? iii) What is the value of $4a$ if $a = 1$ ?
c) $6pr - pr = 5pr$ f) $7ab + 2ba = 8a3b$ 6) We are going to use substitution to check 2 statements in Q5:a) Focus on Q5a: $6a + 2a = 8a$ i) What is the value of $6a + 2a$ if $a = 3$ ?ii) What is the value of $6a + 2a$ if $a = 3$ ?iii) What is the value of $8a$ if $a = 3$ ?iii) What is the value of $4a$ if $a = 1$ ?
<ul> <li>6) We are going to use substitution to check 2 statements in Q5:</li> <li>a) Focus on Q5a: 6a + 2a = 8a</li> <li>i) What is the value of 6a + 2a if a = 3?</li> <li>ii) What is the value of 6a + 2a if a = 3?</li> <li>iii) What is the value of 8a if a = 3?</li> <li>iii) What is the value of 4a if a = 1?</li> </ul>
<ul> <li>6) We are going to use substitution to check 2 statements in Q5:</li> <li>a) Focus on Q5a: 6a + 2a = 8a</li> <li>i) What is the value of 6a + 2a if a = 3?</li> <li>ii) What is the value of 8a if a = 3?</li> <li>iii) What is the value of 8a if a = 3?</li> <li>iii) What is the value of 4a if a = 1?</li> </ul>
a) Focus on Q5a: $6a + 2a = 8a$ b) Focus on Q5d: $6a - 2 = 4a$ i) What is the value of $6a + 2a$ if $a = 3$ ?i) What is the value of $6a - 2$ if $a = 1$ ?ii) What is the value of $8a$ if $a = 3$ ?ii) What is the value of $4a$ if $a = 1$ ?
i) What is the value of $6a + 2a$ if $a = 3$ ?i) What is the value of $6a - 2$ if $a = 1$ ?ii) What is the value of $8a$ if $a = 3$ ?ii) What is the value of $4a$ if $a = 1$ ?
ii) What is the value of $8a$ if $a = 3$ ? ii) What is the value of $4a$ if $a = 1$ ?
iii) What is the value of $6a + 2a$ if $a = 5$ ? iii) What is the value of $6a - 2$ if $a = 5$ ?
iv) What is the value of $8a$ if $a = 5$ ? iv) What is the value of $4a$ if $a = 5$ ?
y) Repeat the checks for the following $y$ Repeat the checks if $a = 3$ , $a = -1$ and
values of $a$ : $a = 1$ $a = -2$ and $a = 0$ a = 0
vi) Can you think of any value of <i>a</i> where vi) You should have found one value for <i>a</i>
6a + 2a will NOT be equal to $8a$ ? where $6a - 2$ is equal to $4a$ . Can you find
Explain. any other values that will make $6a - 2$
equal to $4a$ ? Explain your answer using t
ideas of like and unlike terms.

Worksheet 1.1	
Answors	

Questions							Answers					
1) Write in simplect form:												
1)	write in simplest form: $(a = 2 \times a = a + a + a = 2 = a = d = \times a = a^2)$											
	(e.g. $3 \times a = a$											
	a) $2 \times x =$	b	) $x \times x =$	c)	$2 \times x \times$	a	) 2	x	b)	<i>x</i> <sup>2</sup>	c)	$2x^{2}$
					x =							
2)	Look at each pa	ir of terms. Say	whether they a	ire	2)							
	like terms or un	like terms. Give	e reasons for ea	ch	a) 2	2x and	$1x^2$ are	e unlike ter	ms. Th	e variable o	of the 1 <sup>st</sup>	term is of
	answer.				(	degree	e one. I	he variable	e of the	2 <sup>nd</sup> term is	s of degr	ee two.
	a) $2x$ and $x^2$	2			b) 4	2x <sup>2</sup> an	1d 3x <sup>2</sup>	are like ter	ms. In	e variables	of both t	erms are of
	b) $2x^2$ and 3:	τ-			() ()	Jegree	e two.	unlika tarm	. The	1st torm is	a consta	et The 2nd
	c) $2 \operatorname{and} 2x^2$ and $2x^2$	,,2			C) 1	∠ anu ⊿ orm h	2x are	unlike term	is. The		aconsta	nt. The 2 <sup>rd</sup>
	$d = 2\lambda a d d z_1$	Y			, (h	$2x^2$ and	as a vand $2v^2$	are unlike t	erms	The 1 <sup>st</sup> terr	n has the	$\mathbf{v}$ variable $\mathbf{x}$
					u, . ;	and the	e 2 <sup>nd</sup> te	erm has the	variab	ole v.	in nus the	
3)	Write down the	unlike term in	each list of tern	ns.			3)					
-,	a) $7xr: 7x: 7$	7rx b)	6v: 10: 10v	c)	$3x: 2x^3:$	-3x	-, a)	7 <i>x</i>	b)	10	c)	$2x^3$
			09, 10, 109	0)	<i>5x</i> , <i>2x</i> ,	<i>on</i>	ς,		2)	10	c,	27
4)	Identify the <i>like</i>	terms in each	list. Then add th	e like t	erms in eac	h	4)					
	list.	2								-		6
	a) $4x^2$ ; 3; 32	¢² b)	7xr; 7x; 8xr	C)	6; 6y; 10		a)	$4x^2 + 3x^2$	b)	7xr + 8x	cr c)	6 + 10
								$=7x^{2}$		= 15xr		= 16
5)	Say whether ea	ch statement is	TRUE or FALSE		5)							
	If the statemen	t is false, chang	e the <i>right</i> side	of the	a) $6a + 2a = 8a$ TRUE e) $5ab + 6a = 11aba$ FALSE					aba FALSE		
	equal sign to m	ake it true.	-		b) $5k^2 + 2k^2 = 7$ FALSE $5ab + 6a = 5ab + 6a$					b + 6a		
	a) $6a + 2a =$	: 8a d)	6a - 2 = 4a		$5k^2 + 2k^2 = 7k^2$ f) $7ab + 2ba = 8a3b$ FALS					Ba3b FALSE		
	b) $5k^2 + 2k^2$	= 7 e)	5ab + 6a = 3	11aba	c)	6pr	-pr :	= 5pr TRU	E	7ab +	2ba = 9	)ab
	c) $6pr - pr$	= 5 <i>pr</i> f)	7ab + 2ba =	8a3b	, d)	6a -	-2 = 4	4a FALS	SE			
						6a -	-2 = 0	6a – 2				
6)	Answer to a)				<b>I</b>	6) Answer to b)						
	a) Focus on C	₹5a: 6a + 2a =	8a				b) F	ocus on Q5	d: 6a	-2 = 4a		
	i) 6(3)	+2(3) = 24					i	) 6(1) -	2 = 4			
	ii) 8(3)	$= 24 \therefore$ Equal for	or $a = 3$ since e	xpress	ions in		i	i) 4(1) =	:4 ∴ Eo	qual for $a =$	= 1	
	Q6a(i	) and Q6a(ii) bo	th equal 24.									
							i	ii) 6(5) —	2 = 2	8		
	iii) 6(5)	+2(5) = 40					i	v) $4(5) =$	: 20 :	Not equal f	for $a = 5$	
	iv) 8(5)	$= 40 \therefore$ Equal for	or $a = 3$					since O	(6b(iii)	and Q6b(iv	) have di	fferent
	v)						Ň	/)	J			
	(1) F	or $a = 1, 6a + 1$	-2a = 8 and $8a$	$\iota = 8$				(1) Fo	or $a =$	3, 6a – 2 =	= 16 and	4a = 12
	(2) F	or $a = -2, 6a$	+2a = -16 a	nd 8a :	= -16			(2) Fc	or $a =$	-1, 6a - 2	2 = -8 a	nd 4 $a = -4$
	(3) F	For $a = 0, 6a + $	-2a = 0 and $8a$	u = 0				(3) Fc	or $a =$	0, 6a – 2 =	= -2 and	d 4 $a = 0$
									only	alua that a	tivoc +h -	camo
	VI) NO. I	ie statement is	aiways true, no	o matte	er what				cica-	vaiue tiidt § – 1	sives tile	Sallie
	value	or a you choos	e. o <i>u</i> and <i>2a</i> ar	e like t	erms,			answer 6a ard	3 IS U =	– 1. o upliko to:	ma that	connot ho
	their	Suill IS OU						DUP NO	—∠ af	e unike tël	ms, they	
								auueu.				



In this worksheet you will focus on: the difference between like and unlike terms, adding and subtracting 2 like terms, and using substitution to check answers.

Qu	Questions										
1)	1) Write in simplest form:										
	a) $2 \times y =$ b) $y \times y =$	c) $4 \times y \times y =$									
2)	2) Look at each pair of terms. Say whether they are like terms or unlike terms. Give reasons for each										
	answer.										
	a) $2y \text{ and } y^2$ b) $3x^2 \text{ and } x^2$	c) 3 and 3x d) $2m^2$ and $2n^2$									
3)	Write down the <i>unlike</i> term in each list.										
	a) 5 <i>x</i> ; 5 <i>xy</i> ; 7 <i>yx</i> b) 6 <i>y</i> ; 6; 10	$3y$ c) $3y$ ; $2y^3$ ; $-3y$									
4)	Identify the like terms in each list. Then add the like	e terms in each list.									
	a) $4y^2$ ; 3; $3y^2$ b) $7mn$ ; $7m$	; 8mn c) 5; 5y; 10y									
5)	Say whether each statement is TRUE or FALSE.										
	If the statement is false, change the <i>right</i> side of the	ne equal sign to make the statement true.									
	a) $8a + 2a = 10a$ c) $6pr - 2p$	r = 4pr e) $7ab + 6a = 13aba$									
	b) $5k^2 + 5k^2 = 10$ d) $9a - 2 =$	7a f) $11ab + 2ba = 11a2b$									
6)	We are going to use substitution to check 2 statem	ents in Q6:									
	a) Focus on Q6a: $8a + 2a = 10a$	b) Focus on Q6d: $9a - 2 = 7a$									
	i) What is the value of $8a + 2a$ if $a = 1$ ?	i) What is the value of $9a - 2$ if $a = 1$ ?									
	ii) What is the value of $10a$ if $a = 1$ ?	ii) What is the value of $7a$ if $a = 1$ ?									
	iii) What is the value of $8a + 2a$ if $a = 3$ ?	iii) What is the value of $9a - 2$ if $a = 32$									
	iv) What is the value of $10a$ if $a = 3$ ?	iv) What is the value of $7a$ if $a = 3$ ?									
	v) Repeat the checks if	v) Repeat the checks if $a = -3$ , $a = -1$ and									
	a = -3, $a = -1$ and $a = 0$ .	a = 0.									
	vi) Can you think of any value of $a$ where	vii) You should have found only one value for									
	8a + 2a will NOT be equal to $10a$ ?	a where $9a - 2$ is equal to $7a$ . Can you									
	Explain your answer using the ideas of	find any other values that will make									
	like and unlike terms.	9a - 2 equal to $7a$ ? Explain your answer									
		using the ideas of like and unlike terms.									



AII	Swels					
Que	estions	Inswers				
1)	Write in simplest form: a) $2 \times y = b$ ) $y \times y = c$ ) $4 \times y \times y = c$	1) a) $2y$ b) $y^2$ c) $4y^2$				
2)	Look at each pair of terms. Say whether they are like terms or unlike terms. Give reasons for each answer.2)a) $2y$ and $y^2$ bb) $3x^2$ and $x^2$ bc) $3$ and $3x$ cd) $2m^2$ and $2n^2$ cWrite down the <i>unlike</i> term in each list of terms.	<ul> <li>2y and y<sup>2</sup> are unlike terms. The variable of the 1<sup>st</sup> term is of degree one. The variable of the 2<sup>nd</sup> term is of degree two.</li> <li>3x<sup>2</sup> and x<sup>2</sup> are like terms. The variables of both terms are of degree two.</li> <li>3 and 3x are unlike terms. The 1<sup>st</sup> term is a constant. The 2<sup>nd</sup> term has a variable of degree one.</li> <li>2m<sup>2</sup> and 2n<sup>2</sup> are unlike terms. The variables of the terms are different.</li> </ul>				
5)	a) $5x$ ; $5xy$ ; $7yx$ b) $6y$ ; $6$ ; $10y$ c) $3y$ ; $2y^3$ ; -	$3y$ a) $5x$ b) $6$ c) $2y^3$				
4)	Identify the <i>like</i> terms in each list. Then add the like terms in each list a) $4y^2$ ; 3; $3y^2$ b) $7mn$ ; $7m$ ; $8mn$ c) 5; 5y; $10y$	4) a) $4y^2 + 3y^2$ b) $7mn + 8mn$ c) $5 + 10$ $= 7y^2$ $= 15mn$ $= 15$				
(	If the statement is false, change the <i>right</i> side of the equal sign to make it true. a) $8a + 2a = 10a$ d) $9a - 2 = 7a$ b) $5k^2 + 5k^2 = 10$ e) $7ab + 6a = 13aba$ c) $6pr - 2pr = 4pr$ f) $11ab + 2ba = 11a2b$	a) $8a + 2a = 10a$ TRUE b) $5k^2 + 5k^2 = 10$ FALSE FALSE $5k^2 + 5k^2 = 10k^2$ c) $6pr - 2pr = 4pr$ TRUE d) $9a - 2 = 7a$ FALSE 9a - 2 = 9a - 2 e) $7ab + 6a = 13aba$ FALSE 7ab + 6a = 7ab + 6a 7ab + 6a = 7ab + 6a 11ab + 2ba = 11ab 11ab + 2ba = 11ab				
6)	Answer to a)	6) Answer to b)				
6)	Answer to a) a) Focus on Q6a: $8a + 2a = 10a$ i) $8(1) + 2(1) = 10$ ii) $10(1) = 10 \therefore$ Equal for $a = 1$ iii) $8(3) + 2(3) = 30$ iv) $10(3) = 30 \therefore$ Equal for $a = 3$ v) (1) For $a = -3$ , $8a + 2a = -30$ and $10a = -30$ (2) For $a = -1$ , $8a + 2a = -10$ and $10a = -10$ (3) For $a = 0$ , $8a + 2a = 0$ and $10a = 0$ vi) No. The statement is always true – you can test an value of $a$ . $8a$ and $2a$ are like terms, their sum is 1	b) Focus on Q6d: $9a - 2 = 7a$ i) $9(1) - 2 = 7$ ii) $7(1) = 7 \therefore$ Equal for $a = 1$ iii) $9(3) - 2 = 25$ iv) $7(3) = 21 \therefore$ Not equal for $a = 3$ v) (1) For $a = -3$ , $9a - 2 = -29$ and $7a = -21$ (2) For $a = -1$ , $9a - 2 = -11$ and $7a = -7$ (3) For $a = 0$ , $9a - 2 = -2$ and $7a = 0$ vi) No. The only value that gives the same answers is $a = 1$ . $9a$ and $-2$ are unlike terms, they cannot be added. $7a$ is the result of adding 9 and $-2$ (or subtracting 2 from 9).				



In this worksheet you will focus on: working with verbal and algebraic expressions, the difference between like and unlike terms, adding and subtracting 2 like terms, and using substitution to check answers.

# Questions

- 1) In the table below the letter *g* represents any number.
  - e.g. The verbal expression "a *number increased by 2*" is written as g + 2 but it could also be written as 2 + g. Match the columns. There may be more than one correct answer for some options!

Verbal expression							
1.	8 add a number						
2.	A number multiplied by 8						
3.	8 subtract a number						
4.	A number divided by 8						
5.	A number decreased by 8						

Algebraic expression						
А	8 + <i>g</i>					
В	8 <i>g</i>					
С	<i>g</i> + 8					
D	g-8					
Ε	g(8)					
F	$8 \div g$					
G	8-g					
Η	$g \div 8$					

A verbal expression is written in words. e.g. Add 3 to a number. An algebraic expression uses symbols for operations  $(+; -; x; \div)$  and variables to replace "a number". e.g. x + 3So here we have replaced the words "a number" with x and we have used the symbol + in place of "add".

2)

a) For each row, shade the like terms in the same colour.

Α.	3 <i>x</i>	$4x^{2}$	3	$3x^2$	
В.	B. $7q^2$ $7q^2r$		8qr	8	-8rq
C.	2(3 <i>b</i> )	$3b^2$	9b		
D.	5a <sup>2</sup>	5a	2a <sup>3</sup>	3a <sup>2</sup>	9a

b) Add the like terms you shaded in Q2a for A, B and C. Solve for each row separately.

3) Say whether each statement is TRUE or FALSE. If the statement is false, change the part on the *right* of the equal sign to make the statement true.

a)  $5a + 7a = 12a^2$ 

b) 2m - m = 2m

- c) 7 3b = 4b
- d) 5a + 6b = 11ab



# Worksheet 1.3 continued

Qu	Questions								
4)	In t	nis question we substitute values to check if expressions are equal							
	a) We will focus on the expressions from Q3c: $7 - 3b$ and $4b$								
	i) What is the value of $7 - 3b$ if $b = 2$ ?								
	ii) What is the value of $4b$ if $b = 2$ ? iii) What is the value of $7 - 3b$ if $b = -2$ ?								
	iv) What is the value of $4b$ if $b = -2$ ?								
		v) Check if $7 - 3b = 4b$ is true when $b = 1$ and then if $b = 0$ .							
		vi) Can we say that $7 - 3b = 4b$ ? Justify your answer.							
	b)	In Q3d we must compare the expressions $5a + 6b$ and $11ab$ to see	e if they are always equal.						
		i) Show that they are not equal if $a = 3$ and $b = -2$ .							
		ii) Show that they are not equal if $a = 10$ and $b = 10$ .							
		iii) Are the expressions equal if $a = 1$ and $b = 1$ ?							
		iv) Choose another set of your own values for $a$ and $b$ and check	if the expressions are equal.						
		v) Can we conclude that the statement $5a + 6b = 11ab$ is true?	Why/why not?						
5)	Fill	in the missing spaces to make the algebraic statements true:							
	a)	$2x + 4x = \_\_$							
	b)	$2x - 4x = \_\_$							
	c)	$2 + 3x + 4 = \+ 6$							
	d)	$2 + 3x - 4x = -x + \_$							
	e)	$-3x + 4 + \_\_ = 2x + \_\_$							
	f)	+ - 4 = 5x - 4							
6)	Co	ect like terms and simplify:							
		e.g. $2p + 4 - p$	For the answer:						
		= 2p - p + 4	Write the variable term first,						
		= p + 4	then write the constant term.						
	a)	2 + 3x + 4x + 5							
	b)	2 + 3x - 4x + 5							
	c)	2-3x+4-5x							
	d)	2-3x-4+5x							



An	Answers														
Questions								Answers							
1)	) In the table below the letter $g$ represents any number.									1)					
	e.g. The verbal expression "a number increased by 2" is written as							tten as	g -	F					
	2 bi	ut it co	ould also b	oe written	as $2 + g$ .	Match the	e columns.	There i	ma	у	1. /	А; C			
	be i	more	than one o	correct and	swer for so	ome optio	ns!				2. E	B; E			
	Ver	rbal e	xpression			Algeb	raic expre	ssion			3. (	G			
	1.	8 ac	ld a numb	er		А	8 + <i>g</i>				4. H	H			
	2.	Αnι	umber mu	ltiplied by	8	В	8 <i>g</i>				5. I	J			
	3.	8 su	ıbtract a n	umber		С	<i>g</i> + 8								
	4.	Αnι	umber divi	ided by 8		D	g-8								
	5.	Αnι	umber dec	reased by	8	E	<i>g</i> (8)								
						F	$8 \div g$								
						G	8-g								
						н	<i>g</i> ÷ 8								
2)									2	2)					
,	a)	Fore	each row,	shade the	like terms	in the sa	me colour.			, a)					
		Α.	3 <i>x</i>	$4x^{2}$	3	$3x^2$	]	-	ſ	A.	3 <i>x</i>	$4x^{2}$	3	3 <i>x</i> <sup>2</sup>	
		В.	$7q^2$	$7q^2r$	8qr	8	-8rq			В.	7q <sup>2</sup>	7q²r	8qr	8	-8rq
		C.	2(3b)	3 <i>b</i> <sup>2</sup>	9 <i>b</i>					C.	2(3 <i>b</i> )	$3b^2$	9b		
		D.	5a <sup>2</sup>	5a	2 <i>a</i> <sup>3</sup>	3a <sup>2</sup>	9a			D.	5a <sup>2</sup>	5a	2a <sup>3</sup>	3a <sup>2</sup>	9a
								-							
	b)	Add	the like te	erms you s	haded in C	2a for A,	B and C. S	olve		b)					
		for e	each row s	eparately.						-	A. 4x <sup>2</sup> -	$+3x^2 = 7$	$x^2$		
											В. 8qr +	-(-8rq) =	= 0		
											C. 2(3b)	+9b = 1	.5 <i>b</i>		
3)	Say	whet	her each s	tatement	is TRUE or	FALSE. If	the staten	nent is	(1)	3)					
	fals	e, cha	nge the pa	art on the	<i>right</i> of th	e equal si	gn to make	e the		a)	False:	5a + 7a	= 12a		
	stat	temen	t true.							b)	False:	2m - m	= m		
	a)	5a +	+7a = 12	a²						c)	False:	7 - 3b =	= 7 - 3b		
	b)	2m	-m = 2n	n						d)	False:	5a + 6b	= 5a + 6	b	
	C)	7 — 5 —	3b = 4b	- 1-											
	a)	5a -	-0v = 11	uD											
									1						



# **Answers continued**

Qu	Questions					
4)	In t	his question we substitute values to check if expressions are	4)			
	equ	ial.		a)		
	a)	We will focus on the expressions from Q3c: $7-3b$ and $4b$			i)	7 - 3(2) = 1
		i) What is the value of $7 - 3b$ if $b = 2$ ?			ii)	$4(2) = 8 \therefore$ Not equal for $b = 2$
		ii) What is the value of $4b$ if $b = 2$ ?				
					iii)	7 - 3(-2) = 13
		iii) What is the value of $7 - 3b$ if $b = -2$ ?			iv)	$4(-2) = -8$ $\therefore$ Not equal for $b = -2$
		iv) What is the value of $4b$ if $b = -2$ ?				
					v)	
		v) Check if $7 - 3b = 4b$ is true when $b = 1$ and then if				(1) For $b = 1$ , $7 - 3(1) = 4$ and
		b = 0.				4(1) = 4 :: True for $b = 1$
		vi) Can we say that $7 - 3b = 4b$ ? Justify your answer.				(2) For $b = 0$ , $7 - 3(0) = 7$ and
						$4(0) = 0$ $\therefore$ Not true for $b = 0$
	b)	In Q3d we must compare the expressions			vi)	It is true for $b = 1$ . But it is not true for all
		5a + 6b and $11ab$ to see if they are always equal.				values of b.
		i) Show that they are not equal if $a = 3$ and $b = -2$ .		b)		
		ii) Show that they are not equal if $a = 10$ and $b = 10$ .			i)	5(3) + 6(-2) = 3 and
		iii) Are the expressions equal if $a = 1$ and $b = 1$ ?				11(3)(-2) = -66 :: not equal
		iv) Choose another set of your own values for <i>a</i> and <i>b</i> and			ii)	5(10) + 6(10) = 110 and
		check if the expressions are equal.				$11(10)(10) = 1100 \div not equal$
		v) Can we conclude that the statement $5a + 6b = 11ab$			iii)	They are equal if $a = 1$ and $b = 1$
		is true? Why/why not?			iv)	Many possible solutions: e.g.: For $a = 0$
						and $b = 1$ then $5(0) + 6(1) = 6$ and
						11(0)(1) = 0 :: not true
					v)	The statement is only true when $a = 1$ and
						b = 1. So we conclude that the statement
						is not true (for all values of $a$ and $b$ )
5)	Fill	in the missing snaces to make the algebraic statements true.	5)			
3,	a)	2x + 4x =	5)	a)	2+	4x = 6x
	ي. b)	2x - 4x =		b)	2x	-4x = -2x
	c)	2 + 3x + 4 = + 6		c)	2 +	3x + 4 = 3x + 6
	, d)	$2 + 3x - 4x = -x + \$		d)	2 +	3x - 4x = -x + <b>2</b>
	e)	$-3x + 4 + \_\_= 2x + \_\_$		e)	-3	x + 4 + <b>5</b> x = 2x + <b>4</b>
	f)	+ - 4 = 5x - 4		f)	Son	ne possibilities to get $5x$ .
					e.g.	2x + 3x - 4 = 5x - 4 or
					(	5x + (-x) - 4 = 5x - 4
6)	Col	lect like terms and simplify:	6)			
		e.g. $2p + 4 - p$		a)	3 <i>x</i>	+4x + 2 + 5 = 7x + 7
		=2p-p+4		b)	3 <i>x</i>	-4x + 2 + 5 = -x + 7
	٦١	= p + 4 2 + 3r + 4r + 5		c)	-3	x - 5x + 2 + 4 = -8x + 6
	a) b)	2 + 3x - 4x + 5		d)	-3	x + 5x + 2 - 4 = 2x - 2
	c)	2 - 3x + 4 - 5x				
	d)	2-3x-4+5x				



In this worksheet you will focus on: working with verbal and algebraic expressions, the difference between like and unlike terms, adding and subtracting 2 like terms, and using substitution to check answers.

# Questions

In the table below the letter g represents any number.
 e.g.: The verbal expression "a *number increased by 2*" is written as g + 2 but it could also be written as 2 + g. Match the columns. There may be more than one correct answer for some options!

Verbal expression							
1.	A number increased by 6						
2.	A number multiplied by 6						
3.	6 subtract a number						
4.	A number decreased by 6						
5.	A number divided by 6						

Algebraic expression								
А	6 + <i>g</i>							
В	6 <i>g</i>							
С	g + 6							
D	g - 6							
E	<i>g</i> (6)							
F	$6 \div g$							
G	6-g							
Н	$g \div 6$							

2)

a) For each row, shade the like terms in the same colour.

Α.	$7x^{2}$	2 <i>x</i>	7	$2x^2$	
В.	4 <i>p</i> <sup>2</sup>	$4p^2$ $4p^2r$		5	-5rp
C.	3(5 <i>b</i> )	3 <i>b</i> <sup>2</sup>	9 <i>b</i>		
D.	6a <sup>2</sup>	4a	2a <sup>3</sup>	2 <i>a</i> <sup>2</sup>	7a

b) Add the like terms you shaded in Q2a for A, B and C. Solve for each row separately.

3) Say whether each statement is TRUE or FALSE. If the statement is false, change the part on the *right* of the equal sign to make the statement true.

a)  $2a + 5a = 7a^2$ 

- b) 2p p = 2p
- c) 10 3b = 7b
- d) 8a + 2b = 10ab



# Worksheet 1.4 continued

Qu	stions
4)	<ul> <li>in this question we substitute values to check if expressions are equal.</li> <li>a) Focus on the expressions from Q3c: 10 - 3b and 7b</li> <li>i) What is the value of 10 - 3b if b = 1?</li> <li>ii) What is the value of 7b if b = 1?</li> <li>iii) What is the value of 10 - 3b if b = 4?</li> <li>iv) What is the value of 7b if b = 4?</li> <li>v) Repeat the checks for these 3 values: b = -2, b = -1 and b = 0.</li> <li>vi) You should have found one value for b where 10 - 3b is equal to 7b. Can you find any other values of b that will make 10 - 3b equal to 7b? Explain your answer using the idea of like</li> </ul>
	and unlike terms. b) In Q3d we must compare the expressions $8a + 4b$ and $12ab$ to see if they are always equal. i) Show that they are equal if $a = 1$ and $b = 1$ . ii) Show that they are <u>not</u> equal if $a = 2$ and $b = 1$ . iii) Will the statements be equal if $a = -1$ and $b = -1$ ? iv) Find another pair of values where the expressions are not equal. v) Choose another pair of values for $a$ and $b$ and check if the expressions are equal. vi) In general, is the statement $8a + 4b = 12ab$ always true? Why/why not?
5)	Fill in the missing spaces to make the algebraic statements true: a) $k + 4k = \ b) 3k - 5k = \ c) 1 + 4k + 4 = \ + 5 d) 3k - 4k + 2 = 2 - \ e) -3k + 5 + \ = 4k + \ f) \ + \ 4 = 3k - 4$
6)	Collect like terms and simplify: e.g.: $2p + 4 - p$ = 2p - p + 4 = p + 4 a) $3 + 2y + 5y + 6$ b) $3 + 2y - 5y + 6$ c) $3 - 2y + 5 - 6y$ d) $3 - 2y - 5 + 6y$



An	Answers														
Questions								Α	nswe	rs					
1)	In t	he table	below the	e letter $g$ i	represents	any nun	nber.		1)						
	e.g.	: The ve	erbal expre	ssion "a <i>n</i>	umber inc	reased by	/ 2" is writte	en as		1.	A; C				
	<i>g</i> +	2 but i	t could also	o be writte	en as $2 + g$	g. Match	the columr	ıs.		2.	B; E				
	The	re may	be more tl	han one co	orrect answ	wer for so	ome option	s!		3.	G				
										4.	D				
	Ve	rbal ex	pression			Alge	braic expre	ssion		5.	Н				
	1.	A nur	nber incre	ased by 6		A	6 + <i>g</i>								
	2.	A nur	nber multi	iplied by 6		В	6 <i>g</i>								
	3.	6 sub	tract a nui	mber		С	<i>g</i> + 6								
	4.	A nur	nber decre	eased by 6		D	<i>g</i> – 6								
	5.	A nur	nber divid	ed by 6		E	g(6)								
						F	$6 \div g$								
						G	6 - g								
						н	<i>g</i> ÷ 6								
2)	a)	For ea	ch row sh	ade the lil	e terms ir	the sam	e colour		2)	a)					
	ű,	A.	$7x^2$	2 <i>x</i>	7	$2x^2$				A.	$7x^2$	2 <i>x</i>	7	$2x^{2}$	
	Ī	В.	4 <i>p</i> <sup>2</sup>	$4p^2r$	5pr	5	-5rp			В.	$4p^{2}$	$4p^2r$	5pr	5	-5 <i>rp</i>
	Ī	C.	3(5 <i>b</i> )	3 <i>b</i> <sup>2</sup>	9b					C.	3(5 <i>b</i> )	3 <i>b</i> <sup>2</sup>	9b		
		D.	6a <sup>2</sup>	4a	2a <sup>3</sup>	2a <sup>2</sup>	7a			D.	6a <sup>2</sup>	4a	2 <i>a</i> <sup>3</sup>	2a <sup>2</sup>	9a
	b)	Add th	ne like tern	ns you sha	ided in Q2	a for A, B	and C. Solv	e for		b)					
		each r	ow separa	tely.							A. 7:	$x^2 + 2x^2$	$=9x^{2}$		
											В. 57	r + (-5)	pr) = 0		
								C. 3(	(5b) + 9b	p = 24b					
0															
3)	3) Say whether each statement is TRUE or FALSE. If the statement is false change the part on the <i>right</i> of the equal sign to make the					3)									
	stat	ement	true.		,			-		۱د	Falco		2a + 5a	= 7a	
	a)	2a + 2	$5a = 7a^2$							a) hì	False		2n - n =	u = n	
	b)	2p - p	p = 2p							رد دا	False		$\frac{-p}{10} = 3h$	Р = 10 –	3 <i>b</i>
	с)	10 - 3	3b = 7b $2b = 10c^{1}$	h						d)	False		8a + 2h	= 8a +	2 <i>b</i>
	uj	0u T 1	20 – 10 <i>01</i>	,						u)	1 0150.			u I	



# **Answers continued**

Qu	estio	ns		Ans	swer	5	
4)	In t	his q	uestion we substitute values to check if expressions are	4)	a)		
	equ	ıal.				i)	10 - 3(1) = 7
	a)	Foc	us on the expressions from Q3c: $10 - 3b$ and $7b$			ii)	$7(1) = 7 \therefore$ Equal for $b = 1$ ,
		i)	What is the value of $10 - 3b$ if $b = 1$ ?			iii)	10 - 3(4) = -2
		ii)	What is the value of 7b if $b = 1$ ?			iv)	$7(4) = 28 \therefore \text{Not equal}$
						v)	
		iii)	What is the value of $10 - 3b$ if $b = 4$ ?			v)	(1) $h = 2 \cdot 10 \cdot 2(\cdot 2) = 16$ and
		iv)	What is the value of 7b if $b = 4$ ?				(1) $b = -2, 10 - 3(-2) = 10$ and
			Device the she had for these 2 values				$7(-2) = -14$ $\therefore$ Not equal.
		V)	Repeat the checks for these 3 values $h = -2$ $h = -1$ and $h = 0$				(2) $b = -1,10 - 3(-1) = 13$ and
		vi)	D = -2, $D = -1$ and $D = 0$ . You should have found one value for h where $10 = 3h$				$7(-1) = -7 \therefore$ Not equal.
		vij	For should have found one value for <i>b</i> where $10 - 3b$				(3) $b = 0$ , $10 - 3(0) = 10$ and
			is equal to 7b. Can you find any other values of b that				$7(0) = 0$ $\therefore$ Not equal.
			will make $10 - 3b$ equal to 7b? Explain your answer			vi)	No other values of $b$ will make $10 - 3b$
			using the idea of like and unlike terms.				equal to 7b. 10 and $-3b$ are unlike terms
							and cannot be subtracted.
	b)	In C	And the expressions $8a + 4b$ and $12ab$		b)		
		to s	ee if they are always equal.			i)	8(1) + 4(1) = 12 and $12(1)(1) = 12$
		i)	Show that they are equal if $a = 1$ and $b = 1$ .			.,	∴ Equal
		II) 	Show that they are <u>not</u> equal if $a = 2$ and $b = 1$ .			ii)	8(2) + 4(1) = 20 and $12(2)(1) = 24$
		111) is A	Will the statements be equal if $a = -1$ and $b = -1$ ? Find another pair of values where the expressions are			,	O(2) + I(1) = 20 and $I2(2)(1) = 21$
		10)	not equal				(1) + 4(1) = 12 and
		V)	Choose another pair of values for $a$ and $b$ and check if			111)	0(-1) + 4(-1) = -12 and 12(-1)(-1) = 12 No the summary table
		•,	the expressions are equal.				12(-1)(-1) = 12. No they won't be
		vi)	In general, is the statement $8a + 4b = 12ab$ always				equal.
			true? Why/why not?			iv)	Many possible solutions: e.g. If $a = 1$ and
							b = 0 then $8(1) + 4(0) = 8$ and
							12(1)(0) = 0 :: not equal.
						v)	Many possible solutions: e.g. $a = -2$ and
							b = 2, 8(-2) + 4(2) = -8 and
							12(-2)(2) = -48 :: not equal.
						vi)	Not always true. It is only true when $a = 1$
							and $b = 1$ . Also $8a + 2b$ are unlike terms
							so cannot be added; $10ab$ is the result of
							adding coefficients of $a$ and $b$ getting rid
							of the addition operation
5)	Fill	in th	e missing spaces to make the algebraic statements true	5)			
5,	a)	k +	4k =	5,	a)	k +	4k = 5k
	b)	3 <i>k</i>	-5k =		h)	31	-5k2k
	c)	1+	$4k + 4 = \+ 5$		c)	5 <i>n</i> 1 ⊥	4k + 4 - 4k + 5
	d)	3k	$-4k + 2 = 2 - \_$		d)	21/	-Ak + 2 - 2 - k
	e)	-3	$k + 5 + \_\_\_ = 4k + \_\_\_$		u)	2	$-4\kappa + 2 - 2 - \kappa$
	f)		$+ \ 4 = 3k - 4$		e) fi	-3	$\mathbf{x} + \mathbf{y} + \mathbf{x} - \mathbf{x} + \mathbf{y}$
					1)	1VId	$4 \text{ or } \mathbf{\Gamma} \mathbf{k} + (2 \mathbf{k}) = 4 - 2\mathbf{k} + \mathbf{k} - 4 - \mathbf{k}$
()	6-1	<b>4</b> 19	Le Assure and store P.C.			эк	$-4013\kappa + (-2\kappa) - 4 = 3\kappa - 4$
6)	COL	ect li	Ke territs and simplify: $2n \pm 4 = n$	6)	- 1	2.	+ 5 $x$ $+$ 2 $+$ 6 $-$ 7 $x$ $+$ 0
		e.g.	2p + 4 - p - 2n - n + A		a)	<i>2y</i>	+5y+3+6=7y+9
			$= 2p \cdot p + 3$		(a	2 <i>y</i>	-5y + 3 + 6 = -3y + 9
	a)	3+	2y + 5y + 6		C)	-2	y - 6y + 3 + 5 = -8y + 8
1	b)	3 +	2y - 5y + 6		d)	-2	y + 6y + 3 - 5 = 4y - 2
1	c)	3 –	2y + 5 - 6y				
1	d)	3 –	2y - 5 + 6y				
				1			



In this worksheet you will focus on: working with verbal and algebraic expressions, adding and subtracting 3 or 4 like terms, and using substitution to check answers.

Qu	estior	าร			
1)	In th	e table below the letter $m$ represents any number. Match	the colur	nns. Th	ere may be more than
	one	correct answer for some options!			· · · · · ]
	Ve	rbal expression		Alge	ebraic expression
	e.g	. The product of a number and 5 is then increased by 2		e.g	. 5 <i>m</i> + 2
	1.	Add 4 to the product of a number and 5		A	5m + m
	2.	Subtract 4 from the product of a number and 5		В	-4 + 5m
	3.	Add a number to the product of that number and 5		С	5m - 4
	4.	Subtract a number from the product of that number and	5	D	m-5m
	5.	Add a number to the product of that number and negative	ve 5	Е	5m-m
				F	-5m+m
				G	5m + 4
2)	Writ	e a verbal expression for each of the following:			
	a)	y-3 b) $y+20$ c) $3y+20$	d) 20-	3 <i>y</i>	e) 3 <i>y</i> − <i>y</i>
3)	Simp	lify each expression:			
	a)	6 + 6y + 10 - 5y c) $5d + 3e + 12f + 2d - e$	-2f	For the	answers:
	b)	9ab + 7b + 4b - 2ab d) $cd + 5cd + c - cd$		Write th	e variable term or
	c)	$7x^2 + 3 - 3x^2 + 6$ e) $k - m + m - k + km$		variable	first, then write the
				constan	t term. Write the
				variable	s in alphabetical order
4)	In th	is question we will use substitution to check the simplifica	tion of 2 e	express	ions in Q3.
	a) F	Focus on Q3a: $6 + 6y + 10 - 5y$			
	i	) Determine the value of the unsimplified expression if $\mathfrak I$	v = 3		
	i	i) Determine the value of your answer to Q3a if $y = 3$			
	i	ii) Choose another value for $y$ and check if you get the sa	me answe	ers for t	he unsimplified
		question and for your answer to Q3a.			
	b) F	Focus on Q3c: $7x^2 + 3 - 3x^2 + 6$			
	i	) Nikita says: $7x^2 + 3 - 3x^2 + 6 = 10x^2 + 3$			
		Choose 3 values for x to show her that her answer is r	not correc	t.	
	i	i) Nikita says that if $x = 1$ or $x = -1$ then her answer is	correct.		
		(1) Check by substituting $x = 1$ and for $x = -1$ .	25 1 .		
		(2) Does this mean that $10x^2 + 3$ is the correct answe	er? Explaii	า.	
5)	Say v	whether each statement is TRUE or FALSE. If the statemen	t is false,	change	the expression on the
	left c	of the equal to sign to make the statement true. You can su	ubstitute	values t	to check.
	a)	6a + 2b + 3a = 11ab c) $6pr -$	5 + pr =	= 6pr +	- 5
	b)	$5k^2 - 2k^2 + k^2 = 4k^2$ d) $4c - 4$	4c + 8c =	8 <i>c</i>	



Ans	wers		
Que	stions		Answers
1)	In the table below the letter <i>m</i> represents any numb correct answer for some options!	er. Match the colum	ins. There may be more than one 1)
	Verbal expression		Algebraic expression
	e.g. The product of a number and 5 is then increase	ed by 2	e.g. 5 <i>m</i> + 2
	1. Add 4 to the product of a number and 5		$\begin{array}{c c} \hline A & 5m+m \\ \hline \end{array}$
	2. Subtract 4 from the product of a number and	5	B -4 + 5m 2. B and
	3. Add a number to the product of that number	and 5	C  5m-4
	4. Subtract a number from the product of that r	number and 5	$\begin{array}{c c} \hline D & m-5m \\ \hline \end{array}$
	5. Add a number to the product of that number	and negative 5	$\begin{array}{c c} \hline E & 5m - m \\ \hline \end{array} \qquad \qquad$
			F $-5m + m$ 5. F
			G $5m + 4$
2)	Write a verbal averagion for each of the following:	2) Delow are co	
2)	while a verbal expression for each of the following: x = 3	2) Below are so	t 2 from a number
	a) $y = 5$ b) $y \pm 20$	a) Subtrac	
	c) $3y + 20$	b) Add 20	to the product of 2 and a number
	d) $20 - 3y$	d) Subtrac	t the product of 3 and a number from 20
	e) $3y - y$	e) Subtrac	t a number from the product of 3 and that same
		number	, a number from the product of 5 and that same
21	Circulify and automation.		2)
3)	Simplify each expression: $a_{1} = (a_{1} + 1) = (a_{2} + 1) = (a_{1} + 2) = (a_{2} + 1) = (a_{2} $	$f \downarrow 2d = 2f$	3) $(1 + 16) + (1 + ($
	a) $0 + 0y + 10 - 5y$ a) $3u + 3e + 12$ b) $9ab + 7b + 4b - 2ab$ b) $cd + 5cd + c$	j + 2a - e - 2j	a) $y + 10$ a) $7a + 2e + 10j$ b) $7ab + 11b$ c) $5cd + c$
	b) $5ub + 7b + 4b - 2ub$ e) $cu + 3cu + c$ c) $7r^2 + 3 - 3r^2 + 6$ f) $k - m + m - m$	-ca $k \perp km$	c) $4r^2 \pm 9$ f) km
	$c_{j} = x_{j} + b_{j} = b_{j} + b_{j$	K   KIII	
4)	Answer to Q4a and Q4b(i)		4) Answer to Q4b(ii)
-	a) Focus on Q3a: $6 + 6y + 10 - 5y$		b)
	i) $6 + 6(3) + 10 - 5(3) = 19$		ii)
	ii) $(3) + 16 = 19$		(1) $7(1)^2 + 3 - 3(1)^2 + 6 = 13$ and
	iii) Many possible solutions. The answers to the	e unsimplified	$10(1)^2 + 3 = 13$
	and simplified expressions will always be the	ne same.	Correct for if $x = 1$
	e.g. if $y = 2$ , then $6 + 6(2) + 10 - 5(2) = 10$	= 18 and	$7(-1)^2 + 3 - 3(-1)^2 + 6 = 13$ and
	(2) + 16 = 1	.8.	$10(-1)^2 + 3 = 13$
	b) Focus on Q3c: $7x^2 + 3 - 3x^2 + 6$		Correct for if $x = -1$
	<ul> <li>Many possibilities to show Nikita is not cor</li> </ul>	rect.	(2) No. We have used three values to
	e.g. If $x = 0, x = 2, x = -2$ then		show that Nikita is incorrect. Since
	$7(0)^2 + 3 - 3(0)^2 + 6 = 9$ and $10(0)^2 + 6$	3 = 3,	there are only two values that make
	$7(2)^2 + 3 - 3(2)^2 + 6 = 25$ and $10(2)^2 + 6$	-3 = 43,	her statement true, it is not true for
	$7(-2)^2 + 3 - 3(-2)^2 + 6 = 25$ and $10(-2)^2 + 6 = 25$	$(2)^2 + 3 = 43$	all values of x. So $10x^2 + 3$ cannot
			be the correct answer.
5)	TRUE or FALSE. If false, change the expression on the	e left of the equal	5) Answers a) and d)
	sign to make the statement true.		a) False. Many possible solutions.
	a) $6a + 2b + 3a = 11ab$ c) $6pr - 5 + p$	r = 6pr + 5	e.g. $6a \times 2b - ab = 11ab$ or
	b) $5k^2 - 2k^2 + k^2 = 4k^2$ d) $4c - 4c + 8$	c = 8c	6ab + 2ab + 3ab = 11ab
			d) False. Many possible solutions.
	Answers Q5b and Q5c b) True c)	True	e.g. $5pr + 5 + pr = 6pr + 5$ or
			7pr + 5 - pr = 6pr + 5



In this worksheet you will focus on: verbal and algebraic expressions, adding and subtracting 3 or 4 like terms and checking solutions.

Qu	estions						
1)	In the table below the letter $m$ represents any number. Match the column	ns. There may be more than					
	one correct answer for some options!						
	Algebraic						
	Verbai expression	expression					
	e.g. The product of a number and 6 is then increased by 3	e.g. 6 <i>m</i> + 3					
	1. Add 2 to the product of a number and 7	A $7m+m$					
	2. Subtract 2 from the product of a number and 7	B $-2 + 7m$					
	3. Add a number to the product of that number and 7	C 7 <i>m</i> - 2					
	4. Subtract a number from the product of that number and 7	D $m-7m$					
	5. Add a number to the product of that number and negative 7	E 7 <i>m</i> - <i>m</i>					
		F = -7m + m					
		G 7 <i>m</i> + 2					
2)	Write a verbal expression for each of the following:						
2)	a) $n-4$ b) $n+15$ c) $5n+15$ d) $15-5v$	e) $5y - y$					
		c) by y					
3)	Simplify each expression:						
-	a) $4 + 4y + 11 - 3y$ d) $6a + 4b + 11c + 2a - b - 2a$	2 <i>c</i>					
	b) $9pr + 7p + 4r - 2pr$ e) $7cd + cd + 2c - cd$						
	c) $8y^2 + 2 - 2y^2 - 5$ f) $r - s + s - r + sr - sr$						
4)	In this quastion use substitution to shack the simplification of two of over	nnlos from 02					
4)	In this question use <u>substitution</u> to thete the simplification of two of exa	npies nom Q3.					
	a) For Q3a, Jabu says: "4 add 4 add 11 subtract 3 gives me 16. So the an	swer is 16 <i>y</i> ".					
	i) Substitute $y = 3$ to show Jabu that his answer is not correct.						
	ii) Jabu then says to you: "Check for $y = 1$ , it works!" Is Jabu correct	?					
	iii) Show how would you convince Jabu that the correct answer is 15	+ <i>y</i> .					
	b) The correct answer for Q3f is zero!						
	i) Choose any values for s and r, and check that $r - s + s - r + sr$	-sr = 0					
	ii) Choose another pair of values and check again.						
	iii) Thabi and Dumi tried to write the expression by changing the ord	er of some terms. Check if					
	their expressions are correct:						
	Thabi: $r - r - s + s + sr - sr$						
	Dumi: $sr - sr + r - 2s - r$						
5)	Say whether each statement is TRUE or FALSE. If the statement is false, ch	nange the expression on the					
5,	<i>left</i> of the equal sign to make the statement true. You can substitute value	es to check.					
	a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$						
	b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$						



QuestionsAnswers1) In the table below the letter <i>m</i> represents any number. Match the columns. There may be more than one correct answer for some options!1)1. $\overline{\underline{Verbal expression}}_{\underline{e}, \underline{C}, The product of a number and 73. Add a number to the product of that number and 75. Add a number to the product of that number and 75. Add a number to the product of that number and 75. Add a number to the product of that number and 76. 7m + 21)1.2)Write a verbal expression for each of thefollowing:a) p - 4b) p + 15c) 5y + 15d) 15 - 5ye) 5y - y2)Possible verbal expressionsa) 3butract 1 from a numberc) Add 15 to a numberc) Add 15 to a numberc) Add 15 to a numberc) 3wtract the product of 5 and a numberfrom 153)9n + 4b) 9n + 7p + 4r - 2prc) 9yr + 7p + 4r - 2prc) f) r - s + s - r + sr - sr3)3)Simplify each expression:a) 4 + 4(3) + 11 - 3(3) = 18and 16 + 44 + 11 - 3(3) = 12and 15 + (3) = 12; 12 = 12Your answer is 16(0) = 0; 15 \neq 04)Solution to 4[ii] continuedme substituted into 4 + 4y + 11 - 3y and15 + (3) = 12; 12 = 12Your answer is 16(0) = 0; 15 \neq 04)Solution to 4[ii] continuedme substituted into 4 + 4y + 11 - 3y and15 + (0) = 15; 15 = 15Your answer is 16(0) = 0; 15 \neq 04)Solution to 4[ii] continuedme substituted into 4 + 4y + 11 - 3yand 15 be the spressions gave the same answer onlyin the rower is 16(0) = 0; 15 \neq 04)Solution to 24if x = 0; My answer is 16(0) = 0; 15 \neq 05)3)3) p + 15a) 10 = 04)Solution to 24if x = 0; My answer is 16($	An	swers			
1)In the table below the letter m represents any number. Match the columns. There may be more than one correct answer for some options!1)Image: Some options of the product of a number and 6 is then increased by 3 1. Add 2 to the product of a number and 7 2. Subtract 1 from the product of that number and 7 5. Add a number to the product of that number and 7 5. Add a number to the product of that number and 7 5. Add a number to the product of that number and 7 7. Add a number to the product of that number and 7 7. Add a number to the product of that number and 7 8. Add a number to the product of that number and 7 8. Add a number to the product of that number and 7 8. Add a number to the product of that number and 7 8. Subtract a number from 15 9. Subtract 16 9. Subtract 16 9. Subtract 17 9. Subt	Que	stions			Answers
one correct answer for some options! $ \frac{1 \cdot 1}{2 \cdot 3} \frac{1}{2 \cdot $	1)	In the table below the letter $m$ represents any nu	mber. Match the col	umns. There may be more than	1)
Image: Solution to QaImage: Constant of the statement is factor of a number and 7Image: Constant of the product of a number and 7Image: Constant of number of the product of that number and 7Image: Constant of the product of that number and 7Image: Constant of number to the product of that number and 7Image: Constant of the product of that number and 7Image: Constant of the product of that number and 7Image: Constant of the product of that number and 7Image: Constant of the product of the product of that number and 7Image: Constant of the product of the product of the product of 5 and a numberImage: Constant of the product of the product of 5 and a numberImage: Constant of 5 and a number from 15Image: Constant the product of 5 and that same numberImage: Constant the product of 5 and a number from 15Image: Constant the product of 5 and that same numberImage: Constant the product of 5 and a number from 15Image: Constant the product of 1 and number of 1 and 11		one correct answer for some options!			
Vector expressione.g. Fibe product of a number and 6 is then increased by 31Add 2 to the product of a number and 72.Subtract 2 from the product of that number and 74.Subtract 3 from the product of that number and 75.Add a number to the product of that number and 76.7m - m7.17.18. $p - 4$ 9. $p + 15$ 9. $p - 4$ 9. $p + 15$ 9. $p - 7$ 9. $p - 4$ 9. $p + 15$ 9. $p - 7$ 9. $p -$		Verbal expression			1. G
$\frac{1}{2}$ , $\frac{1}$		e.g. The product of a number and 6 is then incr	asod by 3	Algebraic expression $\rho_{\rm c}$ $6m \pm 3$	2. B and C
1Note only product of a number and 72.Subtract 2 from the product of that number and 73.Add a number to the product of that number and 74.Subtract a number from the product of that number and 75.Add a number to the product of that number and 75.Add a number to the product of that number and 76.7m + 271718. $p - 4$ 9. $p + 15$ c) $5p - 15$ d)15 - 5ye)5y - y3.Simplify each expression:a) $4 + 4y + 11 - 3y$ e) $5y - y$ 3.Simplify each expression:a) $4 + 4y + 11 - 3y$ e) $5y - y$ 3.Simplify each expression:a) $4 + 4y + 11 - 3y$ b) $9p + 7p + 4r - 2pr$ b) $9p + 7p + 4r - 2pr$ c) $8p^2 + 2 - 2y^2 - 5$ f) $r - s + s - r + sr - sr$ a) $23a + 4p + 11 - 3y$ ii) $Convincing Jabu: 4 + 4(3) + 11 - 3(3) = 18$ a) $8a + 41 - 3(1) = 16$ and $16(1) = 16$ $y = 3ba is correct when y = 1fi x = -3: My answer is4 + 4(0) + 11 - 3(0) = 15 and15 + (0) = 15; 15 = 15Your answer is 16(-3) = -48; 12 + -48fi x = -3: My answer is4 + 4(0) + 11 - 3(0) = 15 and15 + (0) = 15; 15 = 15Your answer$		1 Add 2 to the product of a number and 0 is then include	eased by 5	$\Delta  7m + m$	3. A
3.Add a number to the product of that number and 73.Add a number to the product of that number and negative 72.)Write a verbal expression for each of the following: a) $p-4$ b) $p+15$ c) $5p+15$ 		2 Subtract 2 from the product of a number	and 7	$\begin{array}{c c} \hline & & \\ \hline \\ & & \\ \hline \\ \hline$	4. E
111 <th< th=""><th></th><th>3. Add a number to the product of that num</th><th>ber and 7</th><th>C 7m - 2</th><th>5. F</th></th<>		3. Add a number to the product of that num	ber and 7	C 7m - 2	5. F
Image: Second state of the statement true.Add a number to the product of that number and negative 7Image: Second state statement true.11 <td< th=""><th></th><th>4. Subtract a number from the product of the</th><th>at number and 7</th><th>D m - 7m</th><th></th></td<>		4. Subtract a number from the product of the	at number and 7	D m - 7m	
Image: the set of the following: (a) $p-4$ (b) $p+15$ (c) $5p+15$ (d) $15-5y$ (e) $5y-y$ 2)Possible verbal expressions (a) $subtract 4 from a number(b) Add 15 to a number(c) 5p+15(d) 15-5y(e) 5y-y2)Possible verbal expressions(a) Add 15 to the product of 5 and a number from 15(c) Subtract a number from the product of 5 and a number(c) Add 15 to the product of 5 and a number(c) Add 15 to the product of 5 and a number from 15(e) Subtract a number from the product of 5 and a number(c) By^2 + 2 - 2y^2 - 5(c) By^2 + 11 - 3y(d) By - 44 + 4(3) + 11 - 3(3) = 18(d) By - 44 + 4(3) + 11 - 3(3) = 18(d) By - 44 + 4(3) + 11 - 3(3) = 18(f) A = (4, 1) + 11 - 3(3) = 12, 12 = 12(f) Bu $		5. Add a number to the product of that num	ber and negative 7	E $7m-m$	
Image: constraint of the following:Image: constraint of the following:Image: constraint of the following:a) $p-4$ b) $p+15$ constraint of the following:a) Subtract 4 from a numberb) $p+15$ constraint of the following:a) Subtract 4 from a numberc) $5y+15$ constraint of the following:b) $Add 15$ to a numberd) $15-5y$ constraint of the following:b) $Add 15$ to the product of 5 and a numberd) $3$ subtract the product of 5 and a number from 15e) $5y-y$ constraint of the following:a) $4+4y+11-3y$ constraint of the following:a) $4+4y+11-3y$ constraint of the following:b) $9pr+7p+4r-2pre) 7c+r+s-r+sr-src) 6y^2+2-2y^2-5f) r-s+s-r+sr-srd) 3a_{32} + 4y+11-3ya) a_{33} + 4y + 11-3yi) 4+4(3) + 11-3(3) = 18 and 16(3) = 48,f) convincing labult + 4(3) + 11-3(3) = 18ii) 4+4(1) + 11-3(1) = 16 and 16(1) = 16f) b convince following is incorrect.ii) 4+4(1) + 11-3(-3) = 12 andf) 5+y both expressions gave the same answer eachiii) a + 4(3) + 11-3(-3) = 12 andf) convincing labult + 4(3) + 11-3(3) = 12iii) 18 = 18 your answer is 16(-3) = -48, 12 \pm -48if x = 0: My answer isf) b = 15; 15 = 15Your answer is 16(-3) = -48; 12 \pm -48if x = 0: My answer is4+4(0) + 11-3(0) = 15 and15 + y both expressions gave the same answer onlyiii) Thabi: e.g. using r = 2; s = 1Your answer is 16(-3) = -48; 12 \pm -48if x = 0: My answer is4+4(0) + 11-3(0) = 1$				F $-7m+m$	
2) Write a verbal expression for each of the following: a) $p-4$ b) $p+15$ c) $5p+15$ d) $15-5y$ e) $5y-y$ 2) Possible verbal expressions a) Subtract 4 from a number b) Add 15 to a number c) Add 15 to a number from 15 e) Subtract the product of 5 and a number from 15 e) Subtract a number from the product of 5 and that same number3) Simplify each expression: a) $4+4y+11-3y$ c) $8x^2+2-2y^2-5$ f) $r-s+s-r+sr-sr$ 3) a) $y+15$ d) $8x+3b+9c$ b) $9pr+7p+4r-2pr$ e) $7cd+cd+2c-cd$ c) $8y^2+2-2y^2-5$ f) $r-s+s-r+sr-sr$ 3) a) $y+15$ d) $8x+3b+9c$ b) $7pr+7p+4r$ e) $7cd+2c$ c) $6y^2-3$ f) $0$ 4) Solution to Q4 a) Q3a: $4+4y+11-3y$ (i) $4+4(3)+11-3(3)=18$ and $16(3)=48$ , $18 + 48$ Jabu's answer of 16 y is incorrect. ii) $4+4(1)+11-3(3)=16$ and $16(1)=16$ Yes Jabu is correct when $y=1$ and my answer $15+(3)=18$ ; $18 = 18 your answer is 4+4(-3)+11-3(-3)=12 and15+(-3)=12;12=12Your answer is 16(-3)=-48;12 \pm -48if x=-3: My answer is4+4(0)+11-3(0)=15;15=15Your answer is 16(-3)=-48;12 \pm -48if x=0. My answer is16(0)=0;15 \pm 04)Solution to 4a(ii) continuedwhen we substituted into 4+4y+11-3yand 16y both expressions gave the same answer anlyance that was when y=115+(-3)=-12;12=12Your answer is 16(-3)=-48;12 \pm -48if x=0. My answer is16(0)=0;15 \pm 04)Solution to 4a(iii) continued10 Own choice. e.g. r=2;s=1 gives(2)-(1)+(1)-(2)+(1)(2)-(1)(2)=0which is correct2)-(1)+(1)+(1)(2)-(1)(2)=0which is correct2)-(1)+(1)+(1)(2)-(1)(2)=02)-(1)+(1)+(1)(2)-(1)(2)=0which is correct2)-(1)+(1)+(1)(2)-(1)(2)=0which is correct2)-(1)+(1)+(1)(2)-(1)(2)=0which is correct2)-(2)-(1)+(1)+(1)+(1)(2)-(1)(2)=03) false 4x+3y4x+3y-3x=7xy$				G 7 <i>m</i> + 2	
2)Write a verbal expression following: a)2)Possible verbal expressions a)a) $p - 4$ b) $p + 15$ c) ( $5 + 15$ d)15 - 5y e)a)Subtract 4 from a number c)Add 15 to a number c)c) $5y + 15$ d) $15 - 5y$ e) $5y - y$ b)Add 15 to a number c)Add 15 to a number c)d) $15 - 5y$ e) $5y - y$ $2x$ $3x$ $3$			1		
Tollowing: a)p - 4 b)a)Subtract 4 from a numbera) $p + 15$ ( $2 + 5 + 15$ ( $1 + 5 - 5y$ ( $e + 5y - y$ )b)Add 15 to the product of 5 and a number from 15 ( $2 + 2p + 15$ ) ( $2 + 2p - y$ )c)b)3)Simplify each expression: ( $a + 4y + 11 - 3y$ ) ( $c + 3y + 2 - 2y^2 - 5$ ( $b + 9pr + 7p + 4r - 2pr$ ) ( $e + 3y^2 + 2 - 2y^2 - 5$ ( $b + 2pr + 7p + 4r - 2pr$ ) ( $c + 3y^2 + 2 - 2y^2 - 5$ ( $b + 2pr + 7p + 4r - 2pr$ ) ( $c + 3y^2 + 2 - 2y^2 - 5$ ( $b + 2pr + 7p + 4r - 2pr$ ) ( $c + 3y^2 + 2 - 2y^2 - 5$ ( $b + 2pr + 7p + 4r - 2pr$ ) ( $c + 3y^2 + 2 - 2y^2 - 5$ ( $b + 2pr + 7p + 4r$ ) ( $c + 3y^2 + 2 - 2y^2 - 5$ ( $b + 2pr + 7p + 4r$ ) ( $c + 3y^2 + 2 - 2y^2 - 5$ ( $b + 7pr + 7p + 4r$ ) ( $b + 2pr + 7pr + 4r$ ) ( $b + 7pr + 7p + 4r$ ) ( $b + 7pr + 7pr + 4r$ ) ( $b + 7pr + 7pr + 4r$ ) ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 7pr + 4r + 1 - 3y$ ( $b + 4r + 4r + 11 - 3(3) = 18$ ( $a + 4(1 + 11 - 3(3) = 18$ ( $a + 4(1 + 11 - 3(3) = 18$ ( $a + 4(1 - 3) + 11 - 3(3) = 18$ <br< th=""><th>2)</th><th>Write a verbal expression for each of the</th><th>2) Possible verb</th><th>al expressions</th><th></th></br<>	2)	Write a verbal expression for each of the	2) Possible verb	al expressions	
a) $p - 4$ b) $p + 15$ c) $5p + 15$ d) $15 - 5y$ e) $5y - y$ 3) Simplify each expression: a) $4 + 4y + 11 - 3y$ b) $9pr + 7p + 4r - 2pr$ c) $8y^2 + 2 - 2y^2 - 5$ b) $9pr + 7p + 4r - 2pr$ c) $7cd + cd + 2c - cd$ c) $8y^2 + 2 - 2y^2 - 5$ f) $r - s + s - r + sr - sr$ d) Subtract a number from the product of 5 and a number number 1 Subtract the product of 5 and a number from 15 e) Subtract the product of 5 and a number from 15 e) Subtract a number from the product of 5 and that same number 3 a) $y + 15$ d) $8a + 3b + 9c$ b) $7pr + 7p + 4r$ e) $7cd + 2c$ c) $6y^2 - 3$ f) $0$ 4) Solution to Q4a a) $03a: 4 + 4y + 11 - 3y$ ii) $4 + 4(3) + 11 - 3(3) = 18$ and $16(3) = 48$ , 18 = 48 Jabu's answer of 16y is incorrect. ii) $4 + 4(1) + 11 - 3(1) = 16$ and $16(1) = 16$ Yes Jabu is correct when $y = 1$ iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer 15 $4 \cdot (3) = 12$ ; $12$ and 15 + (-3) = 12; $12 = 12Your answer is 16(-3) = -48; 12 \neq -48if x = 0: My answer is4 + 4(0 + 11 - 3(0) = 15$ and 15 + (-3) = 12; $12 = 12Your answer is 16(-3) = -48; 12 \neq -48if x = 0: My answer is4 + 4(0) + 11 - 3(0) = 15$ and 15 + (-3) = 12; $12 = 12Your answer is 16(0) = 0; 15 \neq 05) TRUE or FALSE. If the statement true.a) 7x + 3y - 3x = 7xy () 4ab - 5 + ab = 4ab - 5b) 6m^2 - m^2 + 4m^2 = 9m^2 d) 3p - 3p + 7p = 7pb) 6m^2 - m^2 + 4m^2 = 9m^2 d) 3p - 3p + 7p = 7p$		following:	a) Subtract	4 from a number	
a) $p + 15$ (1)(c) $Add 15 to the product of 5 and a number(a)15 - 5y(b)5y - y(c)3b tract a number from the product of 5 and a number(a)5y - y(c)3b tract a number from the product of 5 and a number(a)5b tract a number from the product of 5 and a number(b)9pr + 7p + 4r - 2pr(c)6a + 4b + 11c + 2a - b - 2c(c)8y^2 + 2 - 2y^2 - 5(f)r - s + s - r + sr - sr(a)9pr + 7p + 4r - 2pr(c)6a + 4b + 11c + 2a - b - 2c(c)8y^2 + 2 - 2y^2 - 5(f)r - s + s - r + sr - sr(d)Solution to Q4a(d)(d)(e)8a + 3b + 9c(f)(f)4 + 4(3) + 11 - 3(3) = 18(f)(f)4 + 4(3) + 11 - 3(3) = 18(f)(f)4 + 4(3) + 11 - 3(3) = 16(f)a - 3i + 3y - 3s = 12; 12 = 12(f)Your answer is 46.18 + -48(f)r - 3i + 3p - 3p - 12; 12 = 12(f)Your answer is 16(-3) = -48; 12 + -48(f)r - 3i + 3p - 3s = 12; 12 = 12Your answer is 16(-3) = -48; 12 + -48(f)r = 0; 15; 15 = 15Your answer is 16(0) = 0; 15 \neq 0(f)15 + (0) = 15; 15 = 15Your answer is 16(0) = 0; 15 \neq 0(f)7x + 3y - 3x = 7xy(g)7x + 3y - 3x = 7xy$		a) $p - 4$ b) $n + 15$	b) Add 15 t	to a number	
a)15 - 5y (a)b)b)b)b)c)<		c) $5n + 15$	c) Add 15 t	to the product of 5 and a number	
e)Subtract a number from the product of s and that same number3)Simplify each expression: a)4)Solution to $24$ 3)a) $4 + 4y + 11 - 3y$ c) $9pr + 7p + 4r - 2pr$ e) $7cd + cd + 2c - cd$ c) $9pr + 7p + 4r - 2pr$ e) $7cd + cd + 2c - cd$ c) $9pr + 7p + 4r - 2pr$ e) $7cd + cd + 2c - cd$ c) $9pr + 7p + 4r - 2pr$ e) $7cd + cd + 2c - cd$ c) $9pr + 7p + 4r - 2pr$ e) $7cd + 2d - 2c$ c) $9pr + 7p + 4r$ e) $7cd + 2c$ c) $9pr + 7p + 4r$ $9pr + 7p + 4r$ e) $7cd + 2c$ c) $9pr + 7p + 4r$ $e)$ $7cd + 2c$ c) $9pr + 7p + 4r$ $e)$ $7cd + 2c$ c) $9pr + 7p + 4r$ $e)$ $7cd + 2c$ c) $9pr + 7p + 4r$ $e)$ $7cd + 2c$ c) $9pr + 7p + 4r$ $e)$ $7cd + 2c$ c) $6pr + 4pr + 11 - 3pr + 3pr + 15 - 3pr + 3pr + 15 - 3pr + 3pr + 15 - 3pr + 3pr + 4qr + 4(3) + 11 - 3(3) = 18$ and $16p$ both expressions gave the same answer each time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16p$ both expressions gave the same answer only once that was when $y = 1$ $11r + (-3p - 1) = 12r and$ $15r + (-3) = 12r and$ $15r + (-3) = 12$		d) $15 - 5y$	d) Subtract	the product of 5 and a number fro	om 15
3) Simplify each expression:3)a) $4 + 4y + 11 - 3y$ $9pr + 7p + 4r - 2pr$ $e) 7cd + cd + 2c - cdc) 8y^2 + 2 - 2y^2 - 5f) r - s + s - r + sr - sr3)4) Solution to Q4aa) Q3a: 4 + 4y + 11 - 3y13 \neq 4 + 4(3) + 11 - 3(3) = 18 and 16(3) = 48,18 \neq 48 Jabu's answer of 16y is incorrect.ii) 4 + 4(1) + 11 - 3(3) = 16 and 16(1) = 16Yes Jabu is correct when y = 1iii) Convincing Jabu' 4 + 4(3) + 11 - 3(3) = 18and my answer 15 + (3) = 16 and 16(1) = 16Yes Jabu is correct when y = 14) Solution to 4a(iii) continued and solution to Q4b15 + y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3y and15 + y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3y and15 + y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3y and16(y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we substituted into 4 + 4y + 11 - 3yand 16y both expressions gave the same answer eachtime BUT when we s$		e) $5y - y$	e) Subtract	t a number from the product of 5 a	nd that same
3) Simplify each expression: a) $4 + 4y + 11 - 3y$ d) $6a + 4b + 11c + 2a - b - 2c$ b) $9pr + 7p + 4r - 2pr$ e) $7cd + cd + 2c - cd$ c) $8y^2 + 2 - 2y^2 - 5$ f) $r - s + s - r + sr - sr$ 4) Solution to Q4 a) Q3a: $4 + 4y + 11 - 3y$ i) $4 + 4(3) + 11 - 3(3) = 18$ and $16(3) = 48$ , ii) $4 + 4(3) + 11 - 3(3) = 18$ and $16(1) = 16$ Yes Jabu is correct when $y = 1$ iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer $15 + (3) = 18$ ; $18 = 18$ Your answer is $48.18 \neq -48$ if $x = -3$ : My answer is 4 + 4(-3) + 11 - 3(-3) = 12 and 15 + (-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ if $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(-3) = -48; 12 \neq -48$ if $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(-3) = -48; 12 \neq -48$ if $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(-3) = -48; 12 \neq -48$ if $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$	2)		number		
a) $4+4y+11-3y$ b) $9pr+7p+4r-2pr$ c) $8y^2+2-2y^2-5$ f) $r-s+s-r+sr-sr$ 4) Solution to Q4a a) Q3a: $4+4y+11-3y$ ii) $4+4(3)+11-3(3) = 18$ and $16(3) = 48$ , $18 \neq 48$ Jabu's answer of 16y is incorrect. ii) $4+4(1)+11-3(1) = 16$ and $16(1) = 16$ Yes Jabu is correct when $y = 1$ iii) Convincing Jabu's $+4(3)+11-3(3) = 18$ and my answer $15+(3) = 18$ ; $18 = 18$ Your answer is $48.18 \neq -48$ If $x = -3$ : My answer is 4+4(-3)+11-3(-3) = 12 and 15+(-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4+4(0)+11-3(0) = 15 and 15+(0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x+3y-3x = 7xy$ c) $4ab-5+ab = 4ab-5$ b) $6m^2-m^2+4m^2 = 9m^2$ d) $3p-3p+7p = 7p$ b) $6m^2-m^2+4m^2 = 9m^2$ d) $3p-3p+7p = 7p$	3)	Simplify each expression:	11- 12- h 2-	3)	d = 0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		a) $4 + 4y + 11 - 3y$ d) $6a + 4b + 4b + 2an$	11c + 2a - b - 2c	a) $y + 15$ b) $7m + 7m + 4m$	a) $8a + 3b + 9c$
(1) $6y + 2 - 2y - 3$ (1) $1 - 3(s - 18)$ (1) $1 - 3(s - 18)$ (2) $6y - 3$ (1) $6y - 3$ (1) $6y - 3$ (3) $6y + 2 - 2y - 3$ (1) $1 - 3(s - 18)$ (4) $30 - 33 + 44 + 4(3) + 11 - 3(3) = 18$ (3) $18 + 48 + 340 \cdot s answer of 16 \cdot y is incorrect.(4) 11 + 3(1) = 16 and 16(1) = 16(1) 4 + 4(1) + 11 - 3(1) = 16 and 16(1) = 16(1) 2 + y  both expressions gave the same answer ach(1) 4 + 4(1) + 11 - 3(1) = 16 and 16(1) = 16(1) 2 + y \text{ both expressions gave the same answer ach(11) Convincing Jabu: 4 + 4(3) + 11 - 3(3) = 18(1) 2 + y \text{ both expressions gave the same answer anly(11) Convincing Jabu: 4 + 4(3) + 11 - 3(-3) = 12 and15 + (-3) = 12; 12 = 12(2) -(1) + (1) - (2) + (1)(2) - (1)(2) = 0(12) Your answer is 16(-3) = -48; 12 \neq -48(13) 15 + (-3) = 12; 12 = 12(13) Your answer is 16(-3) = -48; 12 \neq -48(14) 1 + (1) - (2) + (1)(2) - (1)(2) = 0(14) Your answer is 16(-3) = -12; 12 = 12(2) -(1) + (1) - (2) + (1)(2) - (1)(2) = 0(15) Your answer is 16(-3) = -12; 12 = 12(15) Still get 0 with another set of values(16) Your answer is 16(-0) = 0; 15 \neq 0(16) Still get 0 with another set of values(17) Your answer is 16(-0) = 0; 15 \neq 0(16) Your answer is 16(-0) = 0; 15 \neq 0(2) TRUE or FALSE. If the statement is false, change the expression on the left of the equalsign to make the statement true.(2) 4ab - 5 + ab = 4ab - 5(3) TRUE or FALSE. If the statement true.(3) 3p - 3p + 7p = 7p(3) False 4x + 3y(3) 7x + 3y - 3x = 7xy(3) 3p - 3p + 7p = 7p(4) True$		b) $9pi + ip + 4i - 2pi$ e) $icu + cu + cu$	+2c - cu	b) $7p1 + 7p + 47$ c) $6y^2 = 2$	$f(x) = \frac{1}{2} \int \frac{1}{2} 1$
4)Solution to Q4a a)4)Solution to 44(iii) continued and solution to Q4ba)Q3a: $4 + 4y + 11 - 3y$ i4)Solution to 44(iii) continued and solution to Q4bii) $4 + 4(3) + 11 - 3(3) = 18$ and $16(3) = 48$ , $18 \neq 48$ Jabu's answer of 16y is incorrect.When we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time $10y$ both expressions gave the same answer <i>each</i> time but when $y = 1$ <tr< th=""><th></th><th><math>C_1 = 0y + 2 - 2y - 5 = 11 - 3 + 3 - 5</math></th><th>-1 + 31 - 31</th><th><math>c_{j} = 0 = 3</math></th><th>1) 0</th></tr<>		$C_1 = 0y + 2 - 2y - 5 = 11 - 3 + 3 - 5$	-1 + 31 - 31	$c_{j} = 0 = 3$	1) 0
a) Q3a: $4 + 4y + 11 - 3y$ ii) $4 + 4(3) + 11 - 3(3) = 18 \text{ and } 16(3) = 48,$ $18 \neq 48 \text{ Jabu's answer of 16y is incorrect.}$ ii) $4 + 4(1) + 11 - 3(1) = 16 \text{ and } 16(1) = 16$ Yes Jabu is correct when $y = 1$ iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer $15 + (3) = 18;$ $18 = 18 \text{ Your answer is } 48. 18 \neq -48$ If $x = -3$ : My answer is 4 + 4(-3) + 11 - 3(-3) = 12 and 15 + (-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ iii) Continued When we substituted into $4 + 4y + 11 - 3y$ and 15 + y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer <i>ach</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ when the substituted into $4 + 4y + 11 - 3y$ the substituted into $4 + 4y + 11 - 3y$ the substituted into $4 + 4y + 11 - 3y$ the substituted into $4 + 4y + 11 - 3y$ the substitute	4)	Solution to Q4a	4) Solut	ion to 4a(iii) continued and solutic	on to Q4b
i) $4 + 4(3) + 11 - 3(3) = 18$ and $16(3) = 48$ , $18 \neq 48$ Jabu's answer of 16y is incorrect. ii) $4 + 4(1) + 11 - 3(1) = 16$ and $16(1) = 16$ Yes Jabu is correct when $y = 1$ iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer $15 + (3) = 18$ ; 18 = 18 Your answer is $44 + 4(-3) + 11 - 3(-3) = 12$ and 15 + (-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $4 + 4(0) + 11 - 3(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ When we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $15 + y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ and $16y$ both expressions gave the same answer <i>each</i> time BUT when we substituted into $4 + 4y + 11 - 3y$ an		a) Q3a: $4 + 4y + 11 - 3y$	iii) (	Continued	
$18 \neq 48 \text{ Jabu's answer of 16 y is incorrect.}$ ii) $4 + 4(1) + 11 - 3(1) = 16 \text{ and } 16(1) = 16 \text{ time BUT when we substituted into } 4 + 4y + 11 - 3y \text{ and } 16y \text{ both expressions gave the same answer each time BUT when we substituted into } 4 + 4y + 11 - 3y \text{ and } 16y \text{ both expressions gave the same answer only once that was when } y = 1 \text{ and } 16y \text{ both expressions gave the same answer only once that was when } y = 1$ i) Own choice. e.g. $r = 2; s = 1$ gives $(2) - (1) + (1) - (2) + (1)(2) - (1)(2) = 0$ ii) Still get 0 with another set of values iii) Thabi: e.g. using $r = 2; s = 1$ $(2) - (2) - (1) + (1) + (1)(2) - (1)(2) = 0$ which is correct $2y + 4x(0) + 11 - 3(0) = 15; 15 = 15$ Your answer is $16(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$		i) $4 + 4(3) + 11 - 3(3) = 18 \text{ and } 16(3)$	= 48,	When we substituted into $4 + 4y$	+ 11 – 3 <i>y</i> and
ii) $4 + 4(1) + 11 - 3(1) = 16$ and $16(1) = 16$ Yes Jabu is correct when $y = 1$ time BUT when we substituted into $4 + 4y + 11 - 3y$ and 16y both expressions gave the same answer only once that was when $y = 1$ iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer $15 + (3) = 18$ ; $18 = 18$ Your answer is $4 + 4(-3) + 11 - 3(-3) = 12$ and $15 + (-3) = 12; 12 = 12$ Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is $4 + 4(0) + 11 - 3(0) = 15$ and $15 + (0) = 15; 15 = 15$ Your answer is $16(0) = 0; 15 \neq 0$ b) Q3f: $r - s + s - r + sr - sr$ answer is $zero!$ $(2) - (1) + (1) - (2) + (1)(2) - (1)(2) = 0$ ii) Still get 0 with another set of values iii) Thabi: e.g. using $r = 2; s = 1$ $(2) - (2) - (1) + (1) + (1)(2) - (1)(2) = 0$ which is correct Dumi: e.g. using $r = 2; s = 1$ $(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2$ which is incorrect Dumi added $-s + s$ incorrectly5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ 5)		$18 \neq 48$ Jabu's answer of $16y$ is incorre	ect.	15 + y both expressions gave the s	same answer each
Yes Jabu is correct when $y = 1$ iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer $15 + (3) = 18$ ; $18 = 18$ Your answer is $48 \cdot 18 \neq -48$ If $x = -3$ : My answer is 4 + 4(-3) + 11 - 3(-3) = 12 and 15 + (-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ iiii $160 + 11 - 3(3) = 12$ Your answer is $16(-3) = -48; 12 \neq -48$ 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c) False $5ab - 5$ d) True		ii) $4 + 4(1) + 11 - 3(1) = 16$ and $16(1)$	= 16 t	ime BUT when we substituted into	94 + 4y + 11 - 3y
(iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3) = 18$ and my answer $15 + (3) = 18$ ; $18 = 18$ Your answer is $48. 18 \neq -48$ If $x = -3$ : My answer is 4 + 4(-3) + 11 - 3(-3) = 12 and 15 + (-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ (2) $-(1) + (1) - (2) + (1)(2) - (1)(2) = 0$ which is correct Dumi: e.g. using $r = 2; s = 1$ (2) - (2) - (1) + (1) + (1)(2) - (1)(2) = 0 which is correct Dumi: e.g. using $r = 2; s = 1$ (1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 which is incorrect Dumi added $-s + s$ incorrectly (5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ (c) False $5ab - 5$ d) True		Yes Jabu is correct when $y = 1$	10	and $16y$ both expressions gave the	same answer only
b) Q3f: $r - s + s - r + sr - sr$ answer is zero! i) Own choice. e.g. $r = 2; s = 1$ gives (2) $-(1) + (1) - (2) + (1)(2) - (1)(2) = 0$ ii) Still get 0 with another set of values iii) Thabi: e.g. using $r = 2; s = 1$ (2) $-(2) - (1) + (1) + (1)(2) - (1)(2) = 0$ iii) Still get 0 with another set of values iii) Thabi: e.g. using $r = 2; s = 1$ (2) $-(2) - (1) + (1) + (1)(2) - (1)(2) = 0$ which is correct Dumi: e.g. using $r = 2; s = 1$ (1) (2) $-(1)(2) + (2) - 2(1) - (2) = -2$ which is incorrect Dumi added $-s + s$ incorrectly 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$		(iii) Convincing Jabu: $4 + 4(3) + 11 - 3(3)$	= 18	once that was when $y = 1$	
b) $Q3f: r - s + s - r + sr - sr$ answer is zero! ii) $Q3f: r - s + s - r + sr - sr$ answer is zero! ii) $Q3f: r - s + s - r + sr - sr$ answer is zero! ii) $Q3f: r - s + s - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - sr$ answer is zero! ii) $Q3f: r - s + sr - r + sr - r + sr - sr answer is zero! ii) Q3f: r - s + sr - r + sr - sr answer is zero! ii) Q3f: r - s + sr - r + sr - sr answer is zero! ii) Q3f: r - s + sr - r + sr - sr answer is zero! ii) Q3f: r - s + sr - r + sr - sr answer is zero! iii) Q3f: r - s + sr - r + sr - sr answer is zero! iii) Q3f: r - s + sr - sr - sr - sr - sr - sr - s$		and my answer $15 + (5) = 16;$ 18 - 18 Your answer is 48, 18 $\neq$ -48			
i) Own choice. e.g. $r = 2; s = 1$ gives 4 + 4(-3) + 11 - 3(-3) = 12 and 15 + (-3) = 12; 12 = 12 Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ i) Still get 0 with another set of values (2) - (1) + (1) - (2) + (1)(2) - (1)(2) = 0 which is correct Dumi: e.g. using $r = 2; s = 1$ (2) - (2) - (1) + (1) + (1)(2) - (1)(2) = 0 which is correct Dumi: e.g. using $r = 2; s = 1$ (1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 which is incorrect Dumi added $-s + s$ incorrectly 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c) False $5ab - 5$ d) True		If $r = -3$ . My answer is	b) (	Q3f: $r - s + s - r + sr - sr$ answe	er is zero!
$15 + (-3) = 12; 12 = 12$ Your answer is $16(-3) = -48; 12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; 15 = 15 Your answer is $16(0) = 0; 15 \neq 0$ $(2) - (1) + (1) - (2) + (1)(2) - (1)(2) = 0$ With another set of values Thab: e.g. using $r = 2; s = 1$ (2) - (2) - (1) + (1) + (1)(2) - (1)(2) = 0 which is correct Dumi: e.g. using $r = 2; s = 1$ (1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 which is incorrect Dumi added $-s + s$ incorrectly 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ (2) $-(1) + (1) - (2) + (1)(2) - (1)(2) = 0$ which is correct Dumi: e.g. using $r = 2; s = 1$ (1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 which is incorrect Dumi added $-s + s$ incorrectly (3) False $4x + 3y$ (b) True c) False $5ab - 5$ d) True		4 + 4(-3) + 11 - 3(-3) = 12 and	i	) Own choice. e.g. $r = 2; s = 1$	gives
Your answer is $16(-3) = -48$ ; $12 \neq -48$ If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; $15 = 15Your answer is 16(0) = 0; 15 \neq 05) TRUE or FALSE. If the statement is false, change the expression on the left of the equalsign to make the statement true.a) 7x + 3y - 3x = 7xy c) 4ab - 5 + ab = 4ab - 5b) 6m^2 - m^2 + 4m^2 = 9m^2 d) 3p - 3p + 7p = 7pb) 6m^2 - m^2 + 4m^2 = 9m^2 d) 3p - 3p + 7p = 7ph) Stinglet 0 with abother set of valuesiii) Thabi: e.g. using r = 2; s = 1(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 whichis incorrectDumi added -s + s incorrectlya) False 4x + 3yb) Truec) False 5ab - 5d) True$		15 + (-3) = 12; 12 = 12	12 ;	(2) - (1) + (1) - (2) + (1)(	(2) - (1)(2) = 0
If $x = 0$ : My answer is 4 + 4(0) + 11 - 3(0) = 15 and 15 + (0) = 15; $15 = 15Your answer is 16(0) = 0; 15 \neq 05) TRUE or FALSE. If the statement is false, change the expression on the left of the equalsign to make the statement true.a) 7x + 3y - 3x = 7xy c) 4ab - 5 + ab = 4ab - 5b) 6m^2 - m^2 + 4m^2 = 9m^2 d) 3p - 3p + 7p = 7pb) 6m^2 - m^2 + 4m^2 = 9m^2 d) 3p - 3p + 7p = 7ph) True(2) - (2) - (1) + (1) + (1)(2) - (1)(2) = 0which is correctDumi: e.g. using r = 2; s = 1(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2$ which is incorrect Dumi added $-s + s$ incorrectly b) True c) False $4x + 3y$ b) True c) False $5b - 5$ d) True		Your answer is $16(-3) = -48; 12 \neq$	-48	i) Still get 0 with another set of $x = 2$ , $s = 1$	alues
$4 + 4(0) + 11 - 3(0) = 15 \text{ and}$ $15 + (0) = 15; 15 = 15$ Your answer is $16(0) = 0; 15 \neq 0$ $11(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $11(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $11(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $11(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2 \text{ which}$ is incorrect $10(1)(2) - (1)(2) + (2) - 2(1) + (2) + (2) - 2(1) + (2) + (2) + (2) + (2) + (2)$		If $x = 0$ : My answer is	I	(2) - (2) - (1) + (1) + (1)(2)	(2) - (1)(2) = 0
15 + (0) = 15; 15 = 15 Your answer isDumi: e.g. using $r = 2; s = 1$ $(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2$ which is incorrect Dumi added $-s + s$ incorrectly5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ 5)Clean colspan="2">Dumi: e.g. using $r = 2; s = 1$ $(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2$ which is incorrect Dumi added $-s + s$ incorrectly5)TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal b) for the equal b) True c) False $4x + 3y$ b) True c) False $5ab - 5$ d) True		4 + 4(0) + 11 - 3(0) = 15 and		which is correct	
Your answer is $16(0) = 0; \ 15 \neq 0$ $(1)(2) - (1)(2) + (2) - 2(1) - (2) = -2$ which is incorrect Dumi added $-s + s$ incorrectly5)TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a)5)a) $7x + 3y - 3x = 7xy$ b)c) $4ab - 5 + ab = 4ab - 5$ b)5)b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c)c)False $5ab - 5$ d)True		15 + (0) = 15; 15 = 1	.5	Dumi: e.g. using $r = 2$ ; $s = 1$	
is incorrect Dumi added $-s + s$ incorrectly 5) TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c) False $5b - 5c - $		Your answer is $16(0) = 0; 15 \neq 0$		(1)(2) - (1)(2) + (2) - 2(1)	(-(2) = -2 which
Dumi added $-s + s$ incorrectly5)TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true.5)a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c)False $5b - 5c - $				is incorrect	
5)TRUE or FALSE. If the statement is false, change the expression on the <i>left</i> of the equal sign to make the statement true.5)a) $7x + 3y - 3x = 7xy$ b)c) $4ab - 5 + ab = 4ab - 5$ $3p - 3p + 7p = 7p$ b)b) $6m^2 - m^2 + 4m^2 = 9m^2$ c) $3p - 3p + 7p = 7p$ c)c)False $5b - 5c^2$ d) $3p - 3p + 7p = 7p$ c)d)True				Dumi added $-s + s$ incorrectl	У
sign to make the statement true. a) $7x + 3y - 3x = 7xy$ c) $4ab - 5 + ab = 4ab - 5$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c) False $5ab - 5$ d) True	5)	TRUE or FAUSE of the statement is false, change t	he expression on the	left of the equal 51	
a) $7x + 3y - 3x = 7xy$ b) $6m^2 - m^2 + 4m^2 = 9m^2$ c) $4ab - 5 + ab = 4ab - 5$ d) $3p - 3p + 7p = 7p$ c) False $5ab - 5$ d) True	5)	sign to make the statement true	ic copression on the		se $4x + 3y$
b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p + 7p = 7p$ c) False $5ab - 5$ d) True		a) $7x + 3y - 3x = 7ry$ c) $4ab - 5$	+ ah = 4ah - 5	h) Tri	Je
d) True		b) $6m^2 - m^2 + 4m^2 = 9m^2$ d) $3p - 3p$	+7p = 7p	c) Fal	se $5ab - 5$
		· · · · · · · · · · · · ·		d) Tru	Je



In this worksheet you will focus on: verbal and algebraic expressions which include the minus symbol (-); adding and subtracting 3 or more like terms in algebraic expressions.

Qu	estior	S							
1)	.) In the table below the letter <i>y</i> represents any number. Match the columns.								
	There may be more than one correct answer.								
	Ve	bal expression	Alg exp	ebraic pression					
	e.g fro	A number is multiplied m the product.		-3y - 2					
	1.	A number is subtracted	I from the product of 8 and 5	А	7y - 6				
	2.	A number is subtracted same number	l from the product of 8 and that	В	-7y-6				
	3.	The product of 8 and a	n unknown number is increased by 2	С	-7y + 6				
	4.	Six less than 7 times a r	number	D	7y + 6				
	5.	Six less than negative 7	times a number	Е	8k-k				
	6.	Six more than negative	7 times a number	F	$8 \times 5 - n$				
				G	2 + 8x				
				Н	8 <i>p</i> + 2				
2)	Write	e a verbal expression for	each of the following:						
	a)	3d + 6	b) $-3d - 6$ c)	$\frac{x-4}{2}$					
3)	The t	able contains 6 expressi	ons (some of them have only 1 term).	-					
			$\begin{array}{c ccccc} 3x & 2x^2 & 4 \\ \hline -3x+4 & -x+1 & 7+x \end{array}$						
	Choo	se expressions from the	table to add/subtract so that you get the	e answ	vers below.				
	e	.g. from $3x; -x + 1$ and	14, I can get $2x + 5$						
	a)	$2x^2 + x + 11$	b) $-4x + 1$ c)	7 <i>x</i> -	+ 7				
4)	) Simplify: Write answers in descending powers of the variable. e.g. $-3p + 5p^2 + 7$ is written $5p^2 - 3p + 7$ because a power of 2 is bigger than a power of 1								
	a)	$7a - 7a^2 - 2a^2$	b) $2a - 7a^2 + 2a^2$ c)	-5 <i>c</i>	ab - 7ba + ab + 6ba				
	d)	5ac + 9ca - 2ca - ac	e) $5m - 4m + 3m - 2m + m$ f)	$-t^{2}$	$x^2 - 2t^2 + 2y^2 - 3y^2$				



An	swers					
Qu	estions					Answers
1)	In the	e table below the letter y represents any number	er. M	atch t	he columns	s. 1)
	There may be more than one correct answer.					
	Verbal expression				braic expre	ession 1. F
	e.g.	. A number is multiplied by negative 3 then 2		0.9	24, 2	2. E
	is s	ubtracted from the product.		e.g.	-3y - 2	3. G and H
	1.	A number is subtracted from the product		А	7y - 6	4. A
		of 8 and 5				5. В
	2.	A number is subtracted from the product		В	-7y - 6	6. C
		of 8 and that same number				
	3.	The product of 8 and an unknown		С	-7y + 6	
		number is increased by 2				
	4.	Six less than 7 times a number		D	7 <i>y</i> + 6	
	5.	Six less than negative 7 times a number	[	E	8k-k	
	6.	Six more than negative 7 times a number		F	$8 \times 5 - 1$	n
				G	2 + 8x	
				Н	8 <i>p</i> + 2	
2)	Write	a verbal expression for each of the following:	2)	The	following a	are possible verbal expressions
	a) 3	3d + 6		a)	6 is added	d to the product of a number and 3.
	b) -	-3d - 6	b) 6 is subtracted from the product of a number and negati			acted from the product of a number and negative 3.
	c) -	$\frac{1}{2}$		c)	4 subtract	ted from a number is then divided by two.
3)	The ta	able contains 6 expressions (some of them have	e only	/ 1 tei	·m).	3) The expressions can be combined in different
						orders by they must produce the correct
		$3x$ $2x^2$ 4				expression.
		-3x + 4 $-x + 1$ $7 + x$				a) $(2x^2) + (7 + x) + (4)$
						$= 2x^2 + x + 11$
	Choos	e expressions from the table to add/subtract so	o that	t you	get the	
	answe	ers below. e.g. from $3x$ ; $-x + 1$ and 4, I can ge	t 2 <i>x</i>	+ 5	-	b) $(-x+1) - (3x) = -4x + 1$
	a) 2	$2x^2 + x + 11$				
	, b) -	-4x + 1				c) $(7+x) - (-3x+4) + (4) + (3x)$
	c) 7	7x + 7				= 7x + 7
	•					
4)	Simpl	ify. 4) /	Answ	ers ar	e in descer	nding powers of the variable where applicable
-	a) 7	$7a - 7a^2 - 2a^2$	a)	$-9a^{2}$	+ 7a+	
	b) 2	$2a - 7a^2 + 2a^2$	, c) -	$-5a^2$	+ 2a	
	c) -	-5ab - 7ba + ab + 6ba	, :) -	-5 <i>ab</i>		
	, d) 5	5ac + 9ca - 2ca - ac	, 1) 1	11ac		
	e) 5	5m - 4m + 3m - 2m + m	) 3	3 <i>m</i>		
	f) -	$-t^2 - 2t^2 + 2y^2 - 3y^2$	, : -) -	$-3t^{2}$	$-v^2$	
	,		,		,	
l						



In this worksheet you will focus on: verbal and algebraic expressions which include the minus symbol (-); adding and subtracting 3 or more like terms in algebraic expressions.

1)	In the table below the letter $n$ represents any number. Match the columns.								
	There may be more than one correct answer.								
	Ve	bal expression	Algebraic expression						
	e.g fro	. A number is multiplied by negative 3 then 2 is subtracted m the product.	e.g. $-3n - 2$						
	1.	A number is subtracted from the product of 3 and 4	A $4+5n$						
	2.	A number is subtracted from the product of 5 and that same number	B  -7y-6						
	3.	The product of 5 and a number is decreased by 4	C 4.3 – n						
	4.	Four more than 5 times a number	D 12-n						
	5.	Four more than negative 5 times a number	$E \qquad 4-5n$						
	6.	Four less than negative 5 times a number	F $n-5n$						
			G  -5n-4						
			H $5n-4$						
2)	Wr a) b) c)	ite a verbal expression for each of the following: 2m + 5 -2k - 4 $\frac{z+3}{4}$							
a)	The table contains 6 expressions (some of them have only 1 term) $ \begin{array}{c c c c c c c c c c c c c c c c c c c $								
4)	Sin a b	pplify. ) $5a - 10a^2 + 5a$ c) $2y - 5y^2 + 2y$ e ) $-b^2 - 2b^2 + 2b - 3b$ d) $8m - 7 + 6m - 5m + 4m$ f	e) $-5ab - 7ba + ab + 6ba$ ) $6mn - 9nm - 2mn + nm$						



An	swe	rs				
Qu	estio	ns				Answers
1)	In t	he table below the letter $n$ represents	1)			
	The	ere may be more than one correct answ	wer.			
						1. C and D
	Ver	bal expression		Alg	gebraic expression	2. No match
	e.g.	A number is multiplied by negative 3	then 2 is subtracted	e.e	-3n-2	5n - n
	fror	n the product.		0.5		3. Н
	1.	A number is subtracted from the pro	oduct of 3 and 4	A	4 + 5n	4. A
	Ζ.	same number	oduct of 5 and that	В	-7y - 6	5. E 6. G
	3.	The product of 5 and a number is de	creased by 4	С	4.3 - n	
	4.	Four more than 5 times a number		D	12 - n	
	5.	Four more than negative 5 times a n	umber	Е	4 - 5n	
	6.	Four less than negative 5 times a nu	mber	F	n-5n	
				G	-5n - 4	
				Н	5n - 4	
21	14/		fellouing, 2) Dessil			
2)	vvri a)	2m L 5	rollowing: 2) Possin	ole ver	bal expressions	
	a) b)	2m + 5	a) :		to the product of 2	and a number.
	, U	$-2\kappa - 4$ z+3	D) 4	4 is su	otracted from negativ	e 2 and a number.
	C)	4	C) /	A num	ber is added to 3 and	then the sum is divided by 4.
					<u>,</u>	
3)	The	e table contains 6 expressions (some o	t them have only 1 term)	3	)	5) 0 1 0
		$2a$ $2a^2$	5	a	(2a) + (a + 3) + (3a)	ab = 3a + 8
		$-3a + 5$ $4 - a^2$	a + 3	D	$(2a^2) - (4 - a^2)$	$+(5) = 3a^{2} + 1$
				С	$(2a^{2}) + (-3a + 2a^{2})$	(a + 3) + (2a) + (5)
	Cho	ose expressions from the table to add	/subtract so that you get		$= 2a^{-} + 13$	
	the	answers below.				
		e.g. from $2a$ ; $a + 3$ , I can get $3a + 3$	3			
	a)	3a+8				
	b)	$3a^2 + 1$				
	c)	$2a^2 + 13$				
4)	Sim	plify.	4) Answers are in des	cendir	ng powers of the varia	ble where applicable
	a)	$5a - 10a^2 + 5a$	a) $-10a^2 + 10a$	or	$10a - 10a^2$	
	b)	$-b^2 - 2b^2 + 2b - 3b$	b) $-3b^2 - b$ o	or — Ł	$b - 3b^2$	
	c)	$2y - 5y^2 + 2y$	c) $-5y^2 + 4y$ o	r 41,	$y - 5y^2 +$	
	d)	8m - 7 + 6m - 5m + 4m	d) $13m - 7$	2	-	
	e)	-5ab - 7ba + ab + 6ba	e) —5 <i>ab</i>			
	f)	6mn - 9nm - 2mn + nm	f) -4mn			



In this worksheet you will focus on substituting values into familiar formulae, and into different algebraic expressions.

Qu	Questions								
1)	The formula for the area of a rectangle is: Area = length x breadth.								
	The area is shaded and we will abbreviate this as $A = L \times B$								
	a) If $L = 4$ cm and $B = 3$ cm, calculate the area in cm <sup>2</sup> . b) If $L = 12$ cm and $B = 8$ cm, calculate the area in cm <sup>2</sup> . c) If $L = 3,5$ cm and $B = 2$ cm, calculate the area in cm <sup>2</sup> .								
	d) If $L = 7$ cm and $A = 14$ cm <sup>2</sup> , calculate the breadth in cm.								
	e) If $B = 4$ cm and $A = 24$ cm <sup>2</sup> , calculate the length in cm.								
	f) If $L = x$ cm and $B = 5$ cm, give an expression for the area in terms of x. g) If $L = 2a$ cm and $R = (a + 4)$ cm give an expression for area in terms of a								
	g) If $L = 2a$ cm and $B = (a + 4)$ cm, give an expression for area in terms of $a$ .								
2)	The formula for the perimeter of a rectangle is: <b>Perimeter = <math>2 \times \text{length} + 2 \times \text{breadth}</math></b>								
	We will abbreviate this as: $P = 2L + 2B$								
	a) If $L = 4$ cm and $B = 3$ cm, calculate the perimeter in cm.								
	b) If $L = 12$ cm and $B = 8$ cm, calculate the perimeter in cm.	В							
	c) If $L = 3.5$ cm and $B = 2$ cm, calculate the area in cm <sup>-</sup> .								
	e) If $P = 66$ cm and $R = 8$ cm <sup>2</sup> calculate the length in cm								
	f) If $L = x$ cm and $B = 5$ cm, give an expression for the perimeter in terms of x.								
	g) If $L = 4a$ cm and $B = (a + 1)$ cm, give an expression for the perimeter in terms of $a$ .								
2)									
-,	a) If $a = 5$ and $b = -2$ , calculate the value of: b) Give two pairs of values for $m$ and $r$	ı so							
	i) $a+b$ that:								
	ii) $ab$ i) $m + n$ gives an answer of 5								
	iii) $-ab$ ii) $mn$ gives an answer of 5								
2)	$\frac{1}{1}$								
5)	Given the expression: $y = x + 5$ . a) Determine the value of x if $x = 8$								
	b) What value must we substitute for x so that $y = 8$ ? Try to do this "in your head".								
	c) Give 3 values that we can substitute for $x$ so that $y$ will be greater than 8.								
	d) What value must we substitute for $x$ to make $y = 0$ ?								
4)	Consider the following rule: $L = 2M + 3$								
,	Match the <i>M</i> -value to the statement about the <i>L</i> -value								
	e.g. If $M = 5$ , then $L = 2(5) + 3 = 13$ , and we can say L is a prime number								
	<i>M</i> -value Statement about the <i>L</i> -value								
	a) 4 A. L must be greater than $-8$ but less than 0								
	b) $-5$ B. L must be less than 0 but greater than $-4$								
	c) -3 C. L must be a negative multiple of 5								
	a) —9 D. L must be a prime number								



Answers				
Que	estions	Answers		
1)	The formula for the area of a rectangle is: Area = length x	breadth. 1)		
	The area is shaded and we will abbreviate this as $A = L \times L$	B a) $A = 4 \times 3 = 12 \text{ cm}^2$		
		b) $A = 12 \times 8 = 96 \text{ cm}^2$		
	a) If $L = 4$ cm and $B = 3$ cm, calculate the area in cm <sup>2</sup> .	c) $A = 3,5 \times 2 = 7 \text{ cm}^2$		
	b) If $L = 12$ cm and $B = 8$ cm, calculate the area in cm <sup>2</sup> .	d) $14 = 7 \times B  \therefore B = 2 \text{ cm}$		
	c) If $L = 3,5$ cm and $B = 2$ cm, calculate the area in cm <sup>2</sup>	e) $24 = L \times 4$ $\therefore L = 6 \text{ cm}$		
	d) If $L = 7$ cm and $A = 14$ cm <sup>2</sup> , calculate the breadth in	cm. f) $A = x \times 5 = 5x \text{ cm}^2$		
	e) If $B = 4$ cm and $A = 24$ cm <sup>2</sup> , calculate the length in c	m. g) $A = 2a(a+4)$		
	f) If $L = x$ cm and $B = 5$ cm, give an expression for the	area in terms of x. $= 2a^2 + 8a \text{ cm}^2$		
	g) If $L = 2a$ cm and $B = (a + 4)$ cm, give an expression of $a$ .	produce expanded version)		
2)	The formula for the perimeter of a rectangle is:	2)		
	Perimeter = 2 x length + 2 x breadth	a) $P = 2(4) + 2(3) = 14$ cm		
	We will abbreviate this as: $P = 2L + 2B$	b) $P = 2(12) + 2(8) = 40 \text{ cm}$		
	a) If $L = 4$ cm and $B = 3$ cm, calculate the perimeter in	cm. c) $P = 2(3,5) + 2(2) = 11$ cm		
	b) If $L = 12$ cm and $B = 8$ cm, calculate the perimeter in	n cm. d) $20 = 2(7) + 2B  \therefore B = 3 \text{ cm}$		
	c) If $L = 3,5$ cm and $B = 2$ cm, calculate the area in cm <sup>2</sup>	e) $66 = 2L + 2(8)  \therefore L = 25 \text{ cm}$		
	d) If $L = 7$ cm and $P = 20$ cm <sup>2</sup> , calculate the breadth in	cm. f) $P = 2(x) + 2(5) = 2x + 10$ cm		
	e) If $P = 66$ cm and $B = 8$ cm <sup>-</sup> , calculate the length in c	m. g) $P = 2(4a) + 2(a + 1)$		
	f) If $L = x$ cm and $B = 5$ cm, give an expression for the	perimeter in terms $= 8a + 2a + 2 = 10a + 2$ cm (may not yet he able to produce		
	of <i>x</i> . a) If $I = Aa$ cm and $P = (a + 1)$ cm give an expression	(illay not yet be able to produce expanded version)		
	g) If $L = 4u$ cm and $B = (u + 1)$ cm, give an expression			
3)	perimeter in terns of <i>u</i> .	3)		
5,	e) If $a = 5$ and $b = -2$ determine the value of:	a)		
	(x) a + b	i) 3		
	vi) ab	ii) —10		
	vii) -ab	iii) 10		
	viii) 5ab	iv) -50		
	,	b) There are many possibilities		
	f) Give two pairs of values for <i>m</i> and <i>n</i> so that:	i) e.g. $m = 0$ and $n = 5$ ; $m = -1$ and $n = 6$ ;		
	iii) $m + n$ gives an answer of 5	$m=1rac{1}{2}$ and $n=3rac{1}{2}$		
	iv) mn gives an answer of 5	ii) e.g. $m = 1$ and $n = 5$ ; $m = -1$ and $n = -5$ ;		
		$m = 5$ and $n = 1$ ; $m = \frac{1}{2}$ and $n = 10$		
4)	Given the expression: $y = x + 3$ .	4)		
	c) Determine the value of $y$ if $x = 8$ .	a) $y = 11$		
	d) What value must we substitute for $x$ so that $y = 8$ ? T	ry to do this "in your head". b) $x = 5$		
	g) Give 3 values that we can substitute for x so that y wi	ill be greater than 8. c) Any value where $x > 5$		
	h) What value must we substitute for $x$ to make $y = 0$ ?	d) $x = -3$		
5)	Consider the following rule: $L = 2M + 3$	5)		
	Match the $\emph{M}$ -value to the statement about the $\emph{L}$ -value			
	e.g. If $M = 5$ , then $L = 2(5) + 3 = 13$ , and we can say L is a prime number			
	<i>M</i> -value Statement about the <i>L</i> -value	$\qquad \qquad $		
	e) 4 A. L must be greater than -8 but le	ess than 0 a) 4 $L = 2(4) + 3 = 11$ D		
	f) -5 B. L must be less than 0 but greater	r than $-4$ b) $-5$ $L = 2(-5) + 3 = -7$ A		
	g) $-3$ C. L must be a negative multiple of	5 c) $-3$ $L = 2(-3) + 3 = -3$ B		
	h) $-9$ D. L must be a prime number	d) -9 $L = 2(-9) + 3 = -15$ C		



In this worksheet you will focus on: a variable having a specific value or a variety of values.

Questions			
1)	The box contains 3 examples of rules for calculating the value of y. A. $y = x - 2$ B. $y = 2 - x$ C. $y = 2x - 4$ a) For each example, determine by inspection what value of x will make $y = 10$ .		
	e.g. If $y = x + 2$ , then $y = 6$ when $x = 4$ .		
	b) For each example, determine the value of y if $x = 10$ .		
	c) Make up your own rule for $y = \_$ and find an x-value that will make the y-value larger than 20.		
	e.g. Say I choose $y = 3 + x$ . If $x = 19$ , then $y = 3 + 19 = 22$ which is bigger than 20		
2)	Give 3 possible values for a and b to make the statement true:		
	e.g. If $a + b = 4$ , then $a = 3, b = 1$ ; OR $a = 2, b = 2$ ; OR $a = 6, b = -2$ , OR $a = \frac{1}{2}, b = 3\frac{1}{2}$ , etc.		
	a) $a + b = 10$		
	b) $a - b = 10$		
	c) $b - a = 10$		
3)			
	a) If $c = -2$ and $a = 3$ , determine the value of $ca$ . b) If $c = 2$ and $d = -2$ determine the value of $cd$ .		
	b) If $c = 2$ and $u = -3$ , determine the value of $cu$ .		
	d) If $c = -2$ and $d = -3$ determine the value of $cd$ .		
	e) Give two pairs of values for $c$ and $d$ so that the expression $c + d$ gives the same answer as your answer in Q3d.		
4)	Here are two rules:		
	<b>1:</b> $C = D + 4$		
	<b>2</b> : $C = double D$		
	<ul> <li>a) If D = 3, which of the rules will produce a larger value of C?</li> <li>b) If D = -1, which of the rules with produce a smaller value of C?</li> <li>c) If D = 4, will either of the rules produce a C-value equal to 8?</li> <li>d) If D = -3, will either rule produce a C-value that is bigger than -8 but less than 0?</li> </ul>		



Answers				
Questions		Answers		
1)	<ul> <li>The box contains 3 examples of rules for calculating the value of y.</li> <li>A. y = x - 2</li> <li>B. y = 2 - x</li> <li>C. y = 2x - 4</li> <li>a) For each example, determine by inspection what value of x will make y = 10.</li> <li>e.g. If y = x + 2, then y = 6 when x = 4.</li> <li>b) For each example, determine the value of y if x = 10.</li> <li>c) Make up your own rule for y =and find an x-value that will make the y-value larger than 20.</li> <li>e.g. Say I choose y = 3 + x. If x = 19, then y = 3 + 19 = 22 which is bigger than 20</li> </ul>	1) a) A. $x = 12$ B. $x = -8$ C. $x = 7$ b) A. $y = 8$ B. $y = -8$ C. $y = 16$ c) Multiple solutions e.g. $y = \frac{x}{2}$ ; if $x = 100$ then $y = 50$ which is bigger than 20		
2)	Give 3 possible values for <i>a</i> and <i>b</i> to make the statement true: e.g. If $a + b = 4$ , then $a = 3, b = 1$ ; OR $a = 2, b = 2$ ; OR $a = 6, b = -2$ , OR $a = \frac{1}{2}, b = 3\frac{1}{2}$ , etc. a) $a + b = 10$ b) $a - b = 10$ c) $b - a = 10$	2) Multiple solutions, e.g.: a) $a = 2$ and $b = 8$ ; $a = \frac{1}{2}$ and $b = 9\frac{1}{2}$ ; a = -3 and $b = 13b) a = 15 and b = 5; a = 11\frac{1}{2} and b = 1\frac{1}{2};a = -3$ and $b = -13c) a = 6 and b = 16; a = 2\frac{1}{2} and b = 12\frac{1}{2};a = -6$ and $b = 4$		
3)	<ul> <li>a) If c = -2 and d = 3, determine the value of cd.</li> <li>b) If c = 2 and d = -3, determine the value of cd.</li> <li>c) You should get the same answer for Q3a and Q3b. Why does this happen?</li> <li>d) If c = -2 and d = -3, determine the value of cd.</li> <li>e) Give two pairs of values for c and d so that the expression c + d gives the same answer as your answer in Q3d.</li> </ul>	<ul> <li>3) -6</li> <li>b) -6</li> <li>c) Because in Q3a we multiply a negative by a positive and in Q3b we multiply a positive by a negative and both result in a negative number. Since the numerals are both 2 and 3 we get -6 in both cases.</li> <li>d) 6</li> <li>e) Multiple solutions, e.g.: c = -3 and d = 9; c = 1 and d = 5; c = <sup>1</sup>/<sub>4</sub> and d = 5<sup>3</sup>/<sub>4</sub></li> </ul>		
4)	Here are two rules: 1: $C = D + 4$ 2: $C = double D$ a) If $D = 3$ , which of the rules will produce a larger value of b) If $D = -1$ , which of the rules with produce a smaller value c) If $D = 4$ , will either of the rules produce a C-value equa d) If $D = -3$ , will either rule produce a C-value that is bigg -8 but less than 0?	4) a) $C = (3) + 4 = 7$ C = double D = 2(3) = 6 Rule 1 b) $C = (-1) + 4 = 5$ C = double D = 2(-1) = -2 Rule 2 C) $C = (4) + 4 = 8$ C = double D = 2(4) = 8 Yes, both rules d) $C = (-3) + 4 = 1$ C = double D = 2(-3) = -6 Yes, Rule 2		



In this worksheet you will focus on: a variable having a specific value or a variety of values.

Que	Questions			
1)	The box contains 4 examples of rules for calculating the value of y. A. $y = 2x + 10$ B. $2x - 10 = y$ C. $y = 12 - x$ D. $y = x - 12$			
	<ul> <li>a) For each example, determine what value of x will make y = 10.</li> <li>e.g. If y = x + 2, then y = 6 when x = 4</li> <li>b) Which example will give a y-value less than 4 when x = 6?</li> </ul>			
2)	9) Give 3 possible values for each letter to make the statement true: e.g. If $a + b = 4$ , then $a = 3, b = 1$ ; OR $a = 2, b = 2$ ; OR $a = 6, b = -2$ , OR $a = \frac{1}{2}, b = 3\frac{1}{2}$ , etc. a) $b - a = 1$ b) $a - 2b = 0$ c) $a + b$ is even and less than 20			
3)	Here are two rules: <b>1:</b> T1 = D + 3 <b>2:</b> T 2= double D			
	a) Give a value for D that will make T1 =20. b) Give a value for D that will make T2 =20. c) Give a value for D that will make T1 > T2. d) Give a value for D that will make T1 = T2. e) If $D = -3$ , which rule will produce the larger answer? f) If $D = -\frac{1}{2}$ , will either rule produce a value that is bigger than $-1$ but less than 6?			
4)	<ul> <li>a) If m = 6 and n = 2, determine the value of m - n.</li> <li>b) If m = 6 and n = -2, determine the value of m + n.</li> <li>c) You should get the same answer for Q4a and Q4b. Why does this happen?</li> <li>d) You are told that A = mn - n + m</li> <li>i) If m = -2 and n = -3, determine the value of A.</li> <li>ii) Give two pairs of values for m and n so that the value of A is less than 0.</li> </ul>			



Answers					
Qu	estions	Answers			
1)	The box contains 4 examples of rules for calculating the value of y. E. $y = 2x + 10$ F. $2x - 10 = y$ G. $y = 12 - x$ H. $y = x - 12$ a) For each example, determine what value of x will make $y = 10$ . e.g. If $y = x + 2$ , then $y = 6$ when $x = 4$ b) Which example will give a y-value less than 4 when $x = 6$ ?	1) a) A. $x = 0$ B. $x = 10$ C. $x = 2$ D. $x = 22$ b) Example D			
2)	Give 3 possible values for each letter to make the statement true: e.g. If $a + b = 4$ , then $a = 3$ , $b = 1$ ; OR $a = 2$ , $b = 2$ ; OR $a = 6$ , $b = -2$ , OR $a = \frac{1}{2}$ , $b = 3\frac{1}{2}$ , etc. a) $b - a = 1$ b) $a - 2b = 0$ c) $a + b$ is even and less than 20	2) Multiple solutions, for example: a) $a = 2$ and $b = 3$ ; $a = \frac{1}{2}$ and $b = 1\frac{1}{2}$ ; a = -3 and $b = -2b) a = 10 and b = 5; a = 1 and b = \frac{1}{2};a = -6$ and $b = 3c) a = 10 and b = 2; a = \frac{1}{2} and b = 5\frac{1}{2};a = -3$ and $b = -51$			
3)	Here are two rules: 1: T1 = D + 3 2: T 2= double D a) Give a value for D that will make T1 = 20. b) Give a value for D that will make T2 = 20. c) Give a value for D that will make T1 > T2. d) Give a value for D that will make T1 = T2. e) If $D = -3$ , which rule will produce the larger answer? f) If $D = -\frac{1}{2}$ , will either rule produce a value that is bigger than $-1$ but less than 6?	<ul> <li>3)</li> <li>a) D= 7</li> <li>b) D= 0</li> <li>c) Multiple solutions, for example: D= -1</li> <li>d) D= 3</li> <li>e) Rule 1</li> <li>f) Yes, rule 1</li> </ul>			
4)	<ul> <li>a) If m = 6 and n = 2, determine the value of m - n.</li> <li>b) If m = 6 and n = -2, determine the value of m + n.</li> <li>c) You should get the same answer for Q4a and Q4b. Why does this happen?</li> <li>d) You are told that A = mn - n + m</li> <li>i) If m = -2 and n = -3, determine the value of A.</li> <li>ii) Give two pairs of values for m and n so that the value of A is less than 0.</li> </ul>	4) a) 4 b) 4 c) Because subtracting a positive is the same as adding a negative d) i) $A=7$ ii) Multiple solutions e.g. m = 5 and $n = -10$ ; $m = \frac{1}{2}$ and $n = 10$			


In this worksheet you will focus on: a variable as part of a product, using the distributive law when monomials are positive and binomials have positive terms.

Questions	
1)	
a) Expand:	
i) $3(p) =$ ii) $3(p^2) =$ iii) $3(2p) =$ iv) $3(2 + p)$	=
b) In each example what operation is between the 3 and the brackets?	
c) Why do you get 2 terms in your answer to Q1a(iv)?	
2) Look at examples A to D in the box below:	
A. $p(p+2)$ a) Write down the monomial for each example.	
B. $3p(p+2)$ b) Write down the binomial for each example.	
C. $3p(p^2 + 2)$ c) Which example will NOT have a term with $p^2$ after the expression	n has
D. $3p^2(p+2)$ been expanded? Try to do this by inspection.	
d) Expand A to D.	
e) Look at your answers to C and D. What is the same and what is	
different?	
3) Look at examples A to D in the box below:	
A. $a(a^2 + 2)$ a) What is the same about each example?	
B. $a(a^2 + 2a)$ b) What is the different about each example?	
C. $a(a^2 + 2b)$ c) Which examples will have a term with $a^2$ after the expression has	as been
D. $a(a^2 + 2ab)$ expanded? Try to do this by inspection.	
d) Will any example have a term with <i>ab</i> after the expression has b	een
expanded? Try to do this by inspection.	
e) Expand A to D.	
4)	
a) Expand and write the powers in your answers from smallest to largest	
i) $3m(2+m)$	
ii) $5r^2(2+r)$	
b) The following expression has 2 variables, a and b: $ab(a + 3b)$	
i) Expand the expression and write your answer so that the powers of a go from smal	lest to
largest.	
ii) Now rewrite your answers so that the powers of $b$ go from largest to smallest.	



Questions	Answers
<ul> <li>1)</li> <li>a) Expand: <ul> <li>i) 3(p) =</li> <li>ii) 3(p<sup>2</sup>) =</li> <li>iii) 3(2p) =</li> <li>iv) 3(2 + p) =</li> </ul> </li> <li>b) In each example what operation is between the 3 and the brackets?</li> <li>c) Why do you get 2 terms in your answer to Q1a(iv)?</li> </ul>	1) a) i) $3p$ ii) $3p^2$ iii) $6p$ iv) $6+3p$ b) Multiplication c) Because 2 and p are unlike terms
<ul> <li>2) Look at examples A to D in the box below:</li> <li>A. p (p + 2)</li> <li>B. 3p (p + 2)</li> <li>C. 3p (p<sup>2</sup> + 2)</li> <li>D. 3p<sup>2</sup> (p + 2)</li> <li>a) Write down the monomial for each example.</li> <li>b) Write down the binomial for each example.</li> <li>c) Which example will NOT have a term with p<sup>2</sup> after the expression has been expanded? Try to do this by inspection.</li> <li>d) Expand A to D.</li> <li>e) Look at your answers to C and D. What is the same and what is different?</li> <li>3) Look at examples A to D in the box below:</li> </ul>	2) A B C D a) $p 3p 3p 3p^2$ $p+2 p+2 p^2+2 p+2$ c) C d) A. $p^2 + 2p$ B. $3p^2 + 6p$ C. $3p^3 + 6p$ D. $3p^3 + 6p^2$ e) Same: First term is $3p^3$ Different: Second terms are $6p$ and $6p^2$ 3) a) Monomial is always $q$ : the first term in the
<ul> <li>A. a (a<sup>2</sup> + 2)</li> <li>B. a (a<sup>2</sup> + 2a)</li> <li>C. a (a<sup>2</sup> + 2b)</li> <li>D. a (a<sup>2</sup> + 2ab)</li> <li>a) What is the same about each example?</li> <li>b) What is the different about each example?</li> <li>c) Which examples will have a term with a<sup>2</sup> after the expression has been expanded? Try to do this by inspection.</li> <li>d) Will any example have a term with ab after the expression has been expanded? Try to do this by inspection.</li> <li>e) Expand A to D.</li> </ul>	<ul> <li>a) Monomial is always <i>a</i>; the first term in the bracket is always <i>a</i><sup>2</sup>; all brackets involve addition and there is a 2 in the second term in each bracket.</li> <li>b) The second term in the bracket – constant, 1 letter, 2 letters</li> <li>c) B, C</li> <li>d) Yes, C</li> <li>e) <ul> <li>A. a<sup>3</sup> + 2a</li> <li>B. a<sup>3</sup> + 2a<sup>2</sup></li> <li>C. a<sup>3</sup> + 2ab</li> <li>D. a<sup>3</sup> + 2a<sup>2</sup>b</li> </ul> </li> </ul>
<ul> <li>4)</li> <li>a) Expand and write the powers in your answers from smallest to largest <ul> <li>i) 3m(2 + m)</li> <li>ii) 5r<sup>2</sup>(2 + r)</li> </ul> </li> <li>b) The following expression has 2 variables, a and b: ab(a + 3b)</li> <li>i) Expand the expression and write your answer so that the powers of a go from smallest to largest.</li> <li>ii) Now rewrite your answers so that the powers of b go from largest to smallest.</li> </ul>	4) a) i) $6m + 3m^2$ ii) $10r^2 + 5r^3$ b) i) $3ab^2 + a^2b$ ii) $a^2b + 3ab^2$



In this worksheet you will focus on: a variable as part of a product, using the distributive law when monomials are positive and binomials have positive terms.

Qu	estio	ns		
1)				
	a)	Expand:		
		i) $7(p) =$	ii)	$7(p^2) =$ iii) $7(3p) =$ iv) $7(3+p) =$
	b)	In each example v	what	operation is between the 7 and the brackets?
	c)	Why do you get t	wo t	erms in your answer to Q1a(iv)?
2)		kat ovamplas. A t		n the bey below:
2)	LUUI	k at examples A t	ושט	IT THE BOX DEIGW.
	Α.	x(x+3)	a)	Write down the monomial for each example.
	В.	4x(x+3)	b)	Write down the binomial for each example.
	C.	$4x(x^2+3)$	c)	Which example will NOT have a term with $x^2$ after the expression has
	D.	$4x^{2}(x+3)$		been expanded?
			d)	Expand A to D.
			e)	Look at your answers to C and D. What is the same and what is
				different?
3)	Lool	k at examples A to	) D ii	n the box below:
			1_\	
	A.	$a(a^2 + 5)$	a)	what is the different electric example?
	Б. С	$a(a^2 + 5a)$	(D)	what is the different about each example?
		u(u + 5b)	C)	Which examples will have a term with $a^2$ after the expression has been
	υ.	u (u + 3ub)	]	expanded? Try to do this by inspection.
			d)	Will any example have a term with $ab$ after the expression has been
				expanded? Try to do this by inspection.
			e)	Expand A to D.
4)				
	a)	Expand and write	the	powers in your answers from smallest to largest
		i) $6m(m+2)$		
		ii) $3r^2(2+r)$		
	b)	The following exp	ress	ion has 2 variables, a and b: $ab(a + 8b)$
		i) Expand the ex	kpre	ssion and write your answer so that the powers of $a$ go from smallest to
		largest.		
		ii) Now rewrite	your	answers so that the powers of <i>b</i> go from smallest to largest.



Questions	Answers
<ul> <li>1)</li> <li>a) Expand: <ul> <li>ii) 7(p) =</li> <li>iii) 7(p<sup>2</sup>) =</li> <li>iv) 7(3p) =</li> <li>v) 7(3 + p) =</li> </ul> </li> <li>b) In each example what operation is between the 7 and the brackets?</li> <li>c) Why do you get two terms in your answer to Q1a(iv)?</li> </ul>	1) a) i) $7p$ ii) $7p^2$ iii) $21p$ iv) $21 + 7p$ b) Multiplication in all 4 cases c) Because 3 and $p$ are unlike terms
<ul> <li>2) Look at examples A to D in the box below:</li> <li>A. x (x + 3)</li> <li>B. 4x (x + 3)</li> <li>C. 4x (x<sup>2</sup> + 3)</li> <li>D. 4x<sup>2</sup> (x + 3)</li> <li>a) Write down the monomial for each example.</li> <li>b) Write down the binomial for each example.</li> <li>c) Which example will NOT have a term with x<sup>2</sup> after the expression has been expanded?</li> <li>d) Expand A to D.</li> <li>e) Look at your answers to C and D. What is the same and what is different?</li> </ul>	2) A B C D a) $x 4x 4x 4x 4x^2$ b) $x+3 x+3 x^2+3 x+3$ c) C d) A. $x^2+3x$ B. $4x^2+12x$ C. $4x^3+12x$ D. $4x^3+12x^2$ e) Same: First term is $4x^3$ Different: Second term is $12x$ and $12x^2$
<ul> <li>3) Look at examples A to D in the box below:</li> <li>A. a (a<sup>2</sup> + 5)</li> <li>B. a (a<sup>2</sup> + 5a)</li> <li>C. a (a<sup>2</sup> + 5b)</li> <li>D. a (a<sup>2</sup> + 5ab)</li> <li>a) What is the same about each example?</li> <li>b) What is the different about each example?</li> <li>c) Which examples will have a term with a<sup>2</sup> after the expression has been expanded? Try to do this by inspection.</li> <li>d) Will any example have a term with ab after the expression has been expanded? Try to do this by inspection.</li> <li>e) Expand A to D.</li> </ul>	<ul> <li>3)</li> <li>a) Monomial is always <i>a</i>; the first term in the bracket is always <i>a</i><sup>2</sup>; operation in bracket is addition; second term in bracket contains 5.</li> <li>b) The second term in the bracket, number of variables in the binomial</li> <li>c) B and D</li> <li>d) Yes, C</li> <li>e)</li> <li>A. a<sup>3</sup> + 5a</li> <li>B. a<sup>3</sup> + 5a<sup>2</sup></li> <li>C. a<sup>3</sup> + 5ab</li> <li>D. a<sup>3</sup> + 5a<sup>2</sup>b</li> </ul>
<ul> <li>4)</li> <li>a) Expand and write the powers in your answers from smallest to largest <ol> <li><i>6m(m + 2)</i></li> <li><i>3r<sup>2</sup>(2 + r)</i></li> </ol> </li> <li>b) The following expression has 2 variables, <i>a</i> and <i>b</i>: <i>ab(a + 8b)</i></li> <li>i) Expand the expression and write your answer so that the powers of <i>a</i> go from smallest to largest.</li> <li>ii) Now rewrite your answers so that the powers of <i>b</i> go from smallest to largest.</li> </ul>	4) a) i) $12m + 6m^2$ ii) $6r^2 + 3r^3$ b) i) $8ab^2 + a^2b$ ii) $a^2b + 8ab^2$



This worksheet focuses on using the distributive law working left to right as well as right to left, binomials include positive and negatives.

Qu	estions		
1)	Multiply out:		
	a) $5(m+2) =$		
	b) $2(m-2) =$		
	c) $5m(m-2) =$		
2)	Insert the missing values ( $\Box$ ) (	o make the following	; statements true:
	a) $2(x - \Box) = 2x - 10$		
	b) $2x(\Box - 5) = 2x^2 - 10x$		
	c) $2x^2(\Box - 5) = 2x^3 - \Box$		
3)	Say whether each statement i	s TRUE or FALSE. If th	e statement is false, change the <i>right</i> side of the
	is equal sign to make the state	ement true.	
	a) $3(p+2) = 3p+6$		
	b) $2(m+1) = 2m+1$ c) $F(a+2) = Fa+10$		
	c) $-5(a+2) = -5a + 10$ d) $6(2a+7) = 12a+12$		
	d) $6(2x + 7) = 12x + 13$		
4)	Fix the part on the right of the	is equal to sign to sh	ow the correct way to use the distributive law
	a) $9(m+2) = 9(2m)$		
	b) $49 - 14d = 7(7 - 2)$		
5)	Column A contains examples of	of monomials multipli	ed by binomials. Column B contains expanded
- /	versions.		,
	a) Match the columns.		
	b) Some examples don't hav	e a partner. You will r	need to produce the matching partner.
		•	
	Column A	Column B	
	1. $4(x-2)$	A $2x^2 - 8x$	
	2. $2(x-4)$	B $4x - 8$	
	3. $x(2-4x)$	C $4x - 2$	
	4. $2x(x-4)$	D $8x - 2x^2$	
	5. $2x(4-x)$	E $2x-8$	



Qu	Questions				Ans	wers	6		
1)	Multi	ply out:					1)	,	5
	a) :	5(m+2) =						a)	5m + 10
	b) 1	2(m-2) =						b)	2m - 4
	C) :	5m(m-2) =						C)	$5m^2 - 10m$
2)	Inser	t the missing values ( $\Box$	) to make	e the f	ollowing statemer	nts true:	2)		
	a) 1	$2(x-\Box)=2x-10$						a)	5
	b) 1	$2x(\Box-5)=2x^2-10$	0 <i>x</i>					b)	x
	c) 1	$2x^2(\Box-5) = 2x^3 - 1$						c)	$x; 10x^2$
3)	Say w	hether each statemen	t is TRUE	or FAI	LSE. If the stateme	ent is false, change the	3)		
	right	side of the is equal sign	n to make	the s	tatement true.			a)	True
	a) :	3(p+2) = 3p+6						b)	False, $2m + 2$
	b) 1	2(m+1) = 2m+1						c)	False, $-5a - 10$
	c) ·	-5(a+2) = -5a+1	0					d)	False, $12x + 42$
	d) (	6(2x+7) = 12x+13	8						
4)	Fix th	e part on the right of t	he is equa	al to si	ign to show the co	prrect way to use the	4)		
	distributive law							a)	9m + 18
	a) (	$\Theta(m+2) = \Theta(2m)$						b)	7(7-2d)
	b) $49 - 14d = 7(7 - 2)$								
5)	5) Column A contains examples of monomials multiplied by binomials. Column B								
	conta	ins expanded versions						a)	
	a) I	Match the columns.							1. B
	b) :	Some examples don't h	nave a par	rtner.	You will need to p	produce the matching			2. E
	I	partner.							3. No match
									4. A
	Col	umn A		Colu	umn B				5. D
	1.	4(x-2)		A	$2x^2 - 8x$			b)	Dartpor for 2:
	2.	2(x-4)		В	4x-8				$r(2-4r) = 2r - 4r^2$ or
	3.	x(2-4x)		C	4x - 2				$x(2 - 4x) = -4x^2 + 2x$
	4.	2x(x-4)		D	$8x-2x^2$				Partner for C:
	5.	2x(4-x)		E	2x - 8				4x - 2 = 2(2x - 1)



This worksheet focuses on using the distributive law working left to right as well as right to left, binomials include positives and negatives.

Qu	estions					
1)	Multiply out:					
	a) $5(p-3) =$					
	b) $2(-p+3) =$					
	c) $5p(p-3) =$					
2)	Insert the missing values (□) to	ake the following statements true:				
	a) $3(a - \Box) = 3a - 12$					
	b) $3a(\Box - 5) = 3a^2 - 15a$					
	c) $3a(\Box - \Box) = 10a^2 - 18a$					
3)	Say whether each statement is	UE or FALSE. If the statement is false, change the <i>right</i> side of the				
	equal sign to make the stateme	true.				
	a) $5(a + 7) = 5a + 12$					
	b) $2(m-1) = 2m-1$ c) $7(1-2h) = 7-2h$					
	c) $7(1-3b) = 7-3b$ d) $4(y-2x) = -12x + 4y$					
	d) $4(y - 3x) = -12x + 4y$					
4)	Fix the part on the right of the equal sign to show the correct use of the distributive law:					
	a) $6b + 10e = 3(2b + 3e)$					
	b) $12x - 4 = 4(3x - 0)$					
5)	Column A contains expressions	olumn B contains monomials multiplied by binomials				
5,	a) Match the columns.	olarini b contains monormais mattiplica by binormais.				
	b) Some examples don't have a partner. You will need to produce the matching partner.					
	Column A	Column B				
	1. $3p^2 - 6p$	A $3(p-1)$				
	2. $2p - 10$	B $2p(3-p)$				
	3. $3p - 3$	C $3p(2-p)$				
	4. $6p - 2p^2$	D $3p(p-2)$				
	5. $3p + 9$	E $3(p+3)$				



Ar	nswers		
Qu	estions		Answers
1)	Multiply out:		1)
	a) $5(p-3) =$		a) $5p - 15$
	b) $2(-p+3) =$		b) $-2p + 6$
	c) $5p(p-3) =$		c) $5p^2 - 15p$
2)	Insert the missing values ( $\Box$ ) t	o make the following statements true:	2)
	a) $3(a-\Box)=3a-12$		a) 4
	b) $3a(\Box - 5) = 3a^2 - 15a$	1	b) $a^{10}$ $a^{10}$ $a^{10}$ $a^{10}$
	c) $3a(\Box - \Box) = 10a^2 - 1$	8a	$\frac{1}{3}a, 0$
3)	Say whether each statement is	TRUE or FALSE. If the statement is false,	3)
	change the <i>right</i> side of the eq	ual sign to make the statement true.	a) False, 5 <i>a</i> + 35
	a) $5(a+7) = 5a + 12$		b) False, $2m-2$
	b) $2(m-1) = 2m-1$		c) False, 7 — 21 <i>b</i>
	c) $7(1-3b) = 7-3b$		d) True
	d) $4(y-3x) = -12x + 4y$		
4)	Fix the part on the right of the	equal sign to show the correct use of the	4)
	distributive law:		a) $2(3b + 5e)$
	a) $6b + 10e = 3(2b + 3e)$		b) $4(3x - 1)$
	b) $12x - 4 = 4(3x - 0)$		
5)	Column A contains expressions	<ol> <li>Column B contains monomials multiplied by</li> </ol>	5)
	binomials.		a)
	a) Match the columns.		1. D
	b) Some examples don't nav	e a partner. You will need to produce the	2. No Match
	matching partner.		3. A
	Column A	Column P	4. B
			5. E
	1. $3p^2 - 6p$	A $3(p-1)$	b)
	2. $2p - 10$	B $2p(3-p)$	Partner for 2: $2n - 10 = 2(n - 5)$
	3. $3p-3$	C $3p(2-p)$	Partner for C: $3p(2-p) = 6p - 3p^2$
	4. $6p - 2p^2$	$\begin{array}{c c} D & 3p(p-2) \\ \hline \end{array}$	
	5. $3p + 9$	E $3(p+3)$	



In this worksheet you will focus on: using the distributive law when monomials are positive and binomials contain negative numbers.

Qu	estions				
1)	<ul> <li>a) Expand: 3(p - 2)</li> <li>b) Expand: 3(2 - p)</li> <li>c) Write down 3 things that are the same in Q1a and Q1b.</li> <li>d) Write down 2 things that are different in Q1a and Q1b.</li> <li>e) If p = 5, will you get the same answer for Q1a and Q1b?</li> </ul>	<ul> <li>Conventions for writing answers involving expressions:</li> <li>1) Use alphabetical order for terms <ul> <li>e.g. The expression 5 + 3b + a should be written as:</li> <li>a + 3b + 5</li> <li>Write the variables in alphabetical order</li> <li>Write constants last</li> </ul> </li> <li>2) If there is more than one variable: <ul> <li>e.g. 9c + 5ac - 2a - 3 is written as 5ac - 2a + 9c - 3</li> <li>Write the term with more than one variable first</li> <li>e.g. 2b × 4ab × b is written as 8ab<sup>3</sup></li> <li>Write coefficient first</li> <li>Write answers in descending powers of the variable (from largest to smallest) OR in ascending powers of <i>e</i> and in ascending powers of <i>d</i>.</li> </ul> </li> </ul>			
2)	Look at examples A and B in the box below	/:			
	A. $m(2-m)$ B.a)Substitute b)B. $m(-m+2)$ b)Choose an get the sac)Multiply of d)Are the since	m = 1 in A and B. Do you get the same answer? nother value for $m$ and substitute in A and B. Do you me answer? out A and B. mplified expressions the same? Explain.			
3)	<ul> <li>3) In this question we are going to compare 5(4 - x) and 5(x - 4).</li> <li>a) Multiply out: <ul> <li>i) 5(4 - x)</li> <li>ii) 5(x - 4)</li> </ul> </li> <li>b) What is the same about the expanded expressions for Q3a(i) and Q3a(ii) and what is different?</li> <li>c) If x = 2, will you get the same answer for the two expressions?</li> </ul>				
4)	Look at examples A to C in the box below:				
	A. $3t(t-2)$ a)SubstituteB. $3t(2-t)$ b)Which exampleC. $(2-t)3t$ c)Expand A,d)Are all the	t = 5 in A, B and C. amples give the same answer? Why does this happen? B and C. Write your answers in ascending powers of $t$ . e expanded expressions the same? Explain.			
5)	Expand. Write your answers in ascending p	powers of $d$ .			
	a) $de(e^2 - 2d)$ b) $de(-2d + e^{-2d})$	$(e^2)$ c) $de(-2d - e^2)$ d) $de(-e^2 - 2d)$			



Questions		Answers			
1)			1)		
	a)	Expand: $3(p-2)$	a) 3( <i>p</i> –	2) = 3	p-6
	b)	Expand: $3(2-p)$	b) 3(2 -	(p) = 6	- 3p
	c)	Write down 3 things that are the	c) Same:	Monon	nial is multiplied by a binomial; the monomial is 3;
		same in Q1a and Q1b.		the exp	ponent of $p$ in the answers is 1
	d)	Write down 2 things that are	d) Differ	ent: The	binomial in Q1a is variable $p$ subtract constant 2
		different in Q1a and Q1b.	(i.e. <i>p</i>	— 2); in	Q1b the binomial is constant 2 subtract variable $p$
	e)	If $p = 5$ , will you get the same	(i.e. 2	— p); th	e answers of Q1a and Q1b are different
		answer for Q1a and Q1b?	(i.e. fc	or Q1a is	3p-6, and for Q1b is $6-3p$ )
			e) No. If	p = 5 ir	Q1a, the answer is 9. If $p = 5$ in Q1b, the answer is $-9$ .
2)	Loo	k at examples A and B in the box below	/:	2)	
	<u> </u>			а	A: If $m = 1$ , then $1(2 - 1) = 1$ , and
	A.	m(2-m)		h	B: If $m = 1$ , then $1(-1+2) = 1$ . Same answer.
	В.	m(-m+2)		U	A: If $m = 2$ , then $2(2 - 2) = 0$ and
	a)	Substitute $m = 1$ in A and B. Do you	get the same		B: If $m = 2$ , then $2(-2+2) = 0$ .
	- /	answer?			Same answer.
	b)	Choose another value for $m$ and subs	titute in A and	C	
		B. Do you get the same answer?			A. $m(2-m) = 2m - m^2$
	c)	Multiply out A and B.		Ь	B. $m(-m+2) = -m^2 + 2m$ Ves The monomials are the same. The binomials are
	u)	Explain	e same:	ŭ	the same, i.e. $2 - m = -m + 2$
					· · · · · · · · · · · · · · · · · · ·
3)	In t	his question we are going to compare 5	5(4-x) and	3)	
	5( <i>x</i>	- 4).		а	
	a)	Multiply out:			i) $5(4-x) = 20 - 5x$
		i) $5(4-x)$			ii) $5(x-4) = 5x - 20$
		ii) $5(x-4)$		b	) Same: They are the product of a monomial and a
	b)	What is the same about the expanded	d expressions		binomial. The monomial is 5 in both cases.
		for Q3a(i) and Q3a(ii) and what is diff	erent?		Different: The binomial in Q3a(i) is $4 - x$ and the
	c)	If $x = 2$ , will you get the same answe	r for the two		binomial in Q3a( $x - 4x$
- 1		expressions?		C	No. If $x = 2$ , answer to (i) is 10; answer to (ii) is $-10$ .
4)	Loo	k at examples A to C in the box below:		4)	$A = 2(\Gamma)(\Gamma = 2) = 1\Gamma(2) = 4\Gamma$
		24(4 2)		a	A: 3(5)(5-2) = 15(3) = 45
	A.	3t(t-2) 3t(2-t)			B: 3(5)(2-5) = 15(-3) = -45
	Б.	3t(2-t)			C: (2-5)3(5) = (-3)15 = -45
	С.	(2 1)31		b	) Examples B and C. The monomials are both 15. The
	a)	Substitute $t = 5$ in A. B and C.			binomials are both $-3$ . Multiplication is commutative:
	b)	Which examples give the same answe	er? Why does		15(-3) = (-3)15
	/	this happen?	,	C)	A: $3t(t-2) = 3t^2 - 6t = -6t + 3t^2$
	d)	Expand A B and C Write your answe	rs in ascending		B: $3t(2-t) = 6t - 3t^2$
	α,	powers of t.			C: $(2-t)3t = 6t - 3t^2$
	c)	Are all the expanded expressions the	same? Explain.	d	) No. Only B and C are the same: multiplication is
	-,				commutative and the monomials and binomials are
					the same. In A the terms in the binomial are swopped
					around and subtraction is not commutative i.e.
					$(t-2) \neq (2-t).$
5)	Exp	and. Write your answers in ascending $\mu$	powers of $d$ .	5)	
	a)	$de(e^2 - 2d)$		a .	$de(e^{2} - 2d) = de^{3} - 2d^{2}e$
	b)	$ae(-2a + e^2)$		b	$ae(-2d + e^{2}) = de^{3} - 2d^{2}e$
	C)	$ae(-2a - e^2)$		C.	$ae(-2a - e^{2}) = -ae^{3} - 2a^{2}e^{3}$
	d)	$ae(-e^{2}-2a)$		d	$ae(-e^2-2a)=-ae^3-2a^2e$



In this worksheet you will focus on: using the distributive law when monomials are positive and binomials contain negative numbers.

Qu	stions	
1)		
,	a) Expand: $2(p-3)$	
	b) Expand: $2(3-p)$	
	c) Write down 3 things that are the same in Q1a and Q1b.	
	d) Write down 2 things that are different in Q1a and Q1b.	
	e) If $p = 5$ , will you get the same answer for Q1a and Q1b?	
2)	In this question we are going to compare $4(x-5)$ and $4(5-x)$	
	a) Expand:	
	i) $4(x-5)$	
	ii) $4(5-x)$	
	b) What is the same about the expanded expressions for Q2a(i) and Q2a(ii) and what is different?	
	c) If $x = 2$ , will you get the same answer for the two expressions?	
3)	Look at examples A to C in the box below:	
	A. $3y(2-y)$	
	B. $3y(y-2)$	
	C. $(2 - y)(3y)$	
	a) Substitute $y = 3$ in A, B and C.	
	b) Which examples give the same answer? Why does this happen?	
	c) Expand A, B and C. Write your answers in descending powers of y.	
	d) Are all the expanded expressions the same? Explain.	
4)	Expand. Write your answers in descending powers of b.	
	a) $ab(b^2 - 2a)$	
	b) $ab(-2a+b^2)$	
	c) $ab(-2a-b^2)$	
	d) $(-b^2 - 2a)(ab)$	



Questions		Answers	Answers		
1)		1)			
-	a) Expand: $2(p-3)$	a) $2(p-3) = 2p$	- 6		
	b) Expand: 2(3 – p)	b) $2(3-p) = 6-$	2 <i>p</i>		
	c) Write down 3 things that are the same in Q1a and (	c) Same:			
	d) Write down 2 things that are different in Q1a and C	The monor	nial is multiplied by a binomial		
	e) If $p = 5$ , will you get the same answer for Q1a and	? • The monor	nial is 2 in Q1a and Q1b		
		The expone	ent of $p$ in the bracket and in the		
		answers of	Q1a and Q1b is 1		
		d) Different:			
		The binom	ial in Q1a is variable $p$ subtract		
		constant 3	(i.e. $p-3$ ), whilst the binomial in		
		Q1b is cons	stant 3 subtract variable $p$ (i.e.		
		3 – <i>p</i> )			
		The answe	rs of Q1a and Q1b are different		
		(i.e. for Q1	a is $2p-6$ , and for Q1b is		
		6 - 2p)			
		e) No. When $p = 5$	5 Q1a, the answer is 4.		
		When $p = 5$ in	Q1b, the answer is $-4$ .		
2)	In this question we are going to compare $4(x - 5)$ and	2)			
	4(5-x):	a)			
	a) Expand:	i) $4(x-5) =$	= 4x - 20		
	i) $4(x-5)$	ii) $4(5-x) =$	= 20 - 4x		
	ii) $4(5-x)$	b) They are both th	ne product of a monomial and a		
	b) What is the same about the expanded expressions	binomial.			
	Q2a(I) and Q2a(II) and what is different?	The binomial in	(i) is $x - 5$ and the binomial in (ii)		
	c) If $x = 2$ , will you get the same answer for the two	$1s \ 5 - x \ so \ the \ s$	ligns are different. $(2) = 20 = -12$ and		
	expressions?	c) NO. If $x = 2, 4($	(2) - 20 = -12 and $(2) = 12$		
2)	Look at examples A to C in the hey helevy	20	-4(2) = 12		
3)	Look at examples A to C in the box below: $A = \frac{3y(2-y)}{y(2-y)}$	a) If $y = 3$ in $A$ the	an 3(3)(2-3) - 9(-1)9		
	B $3y(y-2)$	$a_{1} = 1 \text{ if } y = 3 \text{ in } R, \text{ the}$	2 = 3(3)(2 = 3) = 9(1) = 9		
	$C_{1} = (2 - y)(3y)$	If $y = 3$ in C, the	$(2 - 3)^{2}(3) = -1(9) = -9$		
		$\begin{array}{l} \text{If } y = 5 \text{ If } C, \text{ the } \\ \text{b)}  \text{Examples } A \text{ and} \end{array}$	C The monomials are the same		
	a) Substitute $y = 3$ in A, B and C.	and the binomic	c. The monormals are the same		
	b) Which examples give the same answer? Why does	c) $\wedge 3y(2-y) =$	$6y - 3y^23y^2 + 6y$		
	happen?	C) A. $3y(2-y) =$ B. $3y(y-2) =$	$3y^2 - 6y^2$		
	c) Expand A, B and C. Write your answers in descendir	B. $3y(y-2) =$	3y = 0y, $6y = 2y^2 = -2y^2 + 6y$		
	powers of y.	C. (2 - y) Sy = d	0y - 3y = -3y + 0y		
	d) Are all the expanded expressions the same? Explair	the same becau	con the expanded expressions are		
		the same becau	ials and binomials are the same. In		
		B the terms in t	hais and binomials are the same. In		
		B the terms in t	is not commutative		
		and subtraction			
4)	Evened Write your encycles is descending any of t	i.e. $(z - y) \neq (y)$	y = 2j.		
4)	Expanse. write your answers in descending powers of <i>b</i> . $ab(b^2 - 2a)$	$\begin{pmatrix} 4 \\ 2 \end{pmatrix} = ah(h^2 - 2a) =$	$ah^3 - a^2h$		
	a) $uv(v - 2u)$ b) $ab(-2a + b^2)$	a) $uv(v^2 - 2a) =$ b) $ab(-2a \pm b^2)$	uv - uv $-ah^3 - 2a^2h$		
	c) $ab(-2a - b^2)$	c) $ab(-2a - b^2)$	= ab = 2a b = $-ah^3 - 2a^2h$		
	d) $(-h^2 - 2a)(ah)$	d) $(-h^2 - 2a)(ah)$	$(-ab)^{2} - ab^{3} - 2a^{2}b$		
			,		



In this worksheet you will focus on: using the distributive law when monomials are positive or negative and binomials contain negative and positive numbers.

Questions			
<ul> <li>1) Look at examples A and B in the box below: <ul> <li>A. 3(p + 2)</li> <li>B3(p + 2)</li> </ul> </li> <li>a) Write down the monomials in A and B.</li> <li>b) Write down the binomials in A and B.</li> <li>c) When you multiply out each expression, what will be the sign of the constant term?</li> <li>d) Multiply out A and B.</li> </ul>			
<ul> <li>2) Look at example A and B in the box below: <ul> <li>A. k(5-k)</li> <li>Bk(5-k)</li> </ul> </li> <li>a) Substitute k = 3 in A and B. Do you get the same answer?</li> <li>b) Choose a negative value for k and substitute in A and B. Do you get the same answer?</li> <li>c) Multiply out A and B.</li> <li>d) Are the multiplied out expressions the same? Explain.</li> </ul>			
<ul> <li>3) Look at examples A to C in the box below:</li> <li>A3b(b+6)</li> <li>B3b(6+b)</li> <li>C. (6+b)(-3b)</li> <li>a) Substitute b = 4 in A, B and C.</li> <li>b) Which examples give the same answer? Why does this happen?</li> <li>c) Expand A, B and C. Write your answers in descending powers of b.</li> <li>d) Are the expanded expressions the same? Explain.</li> </ul>			
4) Simplify. Write your answers in descending powers of $e$ . a) $-de(e^2 - 2d)$ b) $-de(2d - e^2)$ c) $-de(-2d + e^2)$ d) $-de(-2d - e^2)$ e) $(e^2 - 2d)(-de)$ f) $(-e^2 + 2d)(-de)$			



Answers				
Questions	Answers			
<ol> <li>Look at examples A and B in the box below:         <ul> <li>A. 3(p + 2)</li> <li>B3(p + 2)</li> <li>B. write down the monomials in A and B.</li> <li>b) Write down the binomials in A and B.</li> <li>c) When you multiply out each expression, what will be the sign of the constant term?</li> <li>d) Multiply out A and B.</li> </ul> </li> </ol>	1) a) Monomials b) Binomials A $3 p+2$ B $-3 p+2$ c) The constant will be positive in A and negative in B d) A: $3(p+2) = 3p+6$ B: $-3(p+2) = -3p-6$			
<ul> <li>2) Look at example A and B in the box below: <ul> <li>A. k(5-k)</li> <li>Bk(5-k)</li> </ul> </li> <li>a) Substitute k = 3 in A and B. Do you get the same answer?</li> <li>b) Choose a negative value for k and substitute in A and B. Do you get the same answer?</li> <li>c) Multiply out A and B.</li> <li>d) Are the multiplied out expressions the same? Explain.</li> </ul>	2) a) If $k = 3$ , then $3(5 - 3) = 6$ , and -3(5 - 3) = -6. Not the same answer. b) Own choice. If $k = -2$ , then $(-2)(5 - (-2)) = -14$ , and -(-2)(5 - (-2)) = 14. Not the same answer. c) A. $k(5 - k) = 5k - k^2$ B. $-k(5 - k) = -5k + k^2$ d) No, the monomials are different, one is positive, and one is negative.			
<ul> <li>3) Look at examples A to C in the box below:</li> <li>A3b(b + 6) B3b(6 + b) C. (6 + b)(-3b)</li> <li>a) Substitute b = 4 in A, B and C.</li> <li>b) Which examples give the same answer? Why does this happen?</li> <li>c) Expand A, B and C. Write your answers in descending powers of b.</li> <li>d) Are the expanded expressions the same? Explain.</li> </ul>	3) a) If $b = 4$ , A gives $-3(4)(4+6) = -120$ B gives $-3(4)(6+4) = -120$ C gives $(6+(4))(-3(4)) = -120$ b) All the examples give the same answer. The monomial is the same and the binomials produce the same answer due to the commutative property: $(b+6) = (6+b)$ c) A: $-3b(b+6) = -3b^2 - 18b$ B: $-3b(6+b) = -3b^2 - 18b$ C: $(6+b)(-3b) = -3b^2 - 18b$ d) Yes. See explanation in Q3b.			
4) Simplify. Write your answers in descending powers of e. a) $-de(e^2 - 2d)$ b) $-de(2d - e^2)$ c) $-de(-2d + e^2)$ d) $-de(-2d - e^2)$ e) $(e^2 - 2d)(-de)$ f) $(-e^2 + 2d)(-de)$	4) a) $-de^{3} + 2d^{2}e$ b) $de^{3} - 2d^{2}e$ c) $-de^{3} + 2d^{2}e$ d) $de^{3} + 2d^{2}e$ e) $-de^{3} + 2d^{2}e$ f) $de^{3} - 2d^{2}e$			



In this worksheet you will focus on: using the distributive law when monomials are positive or negative and binomials contain negative and positive numbers.

Que	Questions			
1)	<ul> <li>Look at examples A and B in the box below:</li> <li>A. 7(v + 2)</li> <li>B7(v + 2)</li> <li>a) Write down the monomials in A and B.</li> <li>b) Write down the binomials in A and B.</li> <li>c) When you multiply out each expression, what will be the sign of the constant term?</li> <li>d) Multiply out A and B.</li> </ul>			
2)	<ul> <li>Look at example A and B in the box below:</li> <li>A. a(6 - a)</li> <li>Ba(6 - a)</li> <li>a) Substitute a = 5 in A and B. Do you get the same answers?</li> <li>b) Choose a negative value for a and substitute in A and B. Do you get the same answers?</li> <li>c) Multiply out A and B.</li> <li>d) Are the expanded expressions the same? Explain.</li> </ul>			
3)	Look at examples A to C in the box below: $ \begin{array}{ccc} A. & -2b(b+9) \\ B. & -2b(9+b) \\ C. & (9+b)(-2b) \end{array} $ a) Substitute $b = 2$ in A, B and C. b) Which examples give the same answer? Why does this happen? c) Expand A, B and C. Write your answers in descending powers of b. d) Are the expanded expressions the same? Explain.			
4)	Multiply out. Write your answers in descending powers of $a$ . a) $ad(a^2 - 2b)$ b) $-ad(2d - a^2)$ c) $(-ad)(-2d + a^2)$ d) $-da(-2d - a^2)$ e) $(a^2 - 2d)(-ad)$ f) $(-a^2 + 2d)(-da)$			



An	swers				
Que	estions	Answers			
1)	Look at examples A and B in the box below:	1)			
	A. $7(v+2)$			a) Monomials	b) Binomials
	B. $-7(v+2)$		А	7	v+2
			в	-7	12 + 2
	a) Write down the monomials in A and B.		-	,	
	b) Write down the binomials in A and B.		c)	The constant will h	he nositive in A and
	c) When you multiply out each expression, what will be the		Cj	negative in B	
	sign of the constant term?		d)	$7(11 \pm 2) - 711 \pm 2$	11
	d) Multiply out A and B		u)	7(v+2) = 7v + -7(v+2) = -71	14 - 14
				-7(v+2) = -7v	/ - 14
2)	Look at example A and B in the box below:	2)			
	A. $a(6-a)$		a)	If $a = 5$ , then 5(6	(-5) = 5, and then
	B. $-a(6-a)$			-5(6-5) = -5.	Not the same answer.
			b)	Own choice.	
	a) Substitute $a = 5$ in A and B. Do you get the same answers?			If $a = -2$ , then (-	-2)(6-(-2)) = -16,
	b) Choose a negative value for <i>a</i> and substitute in A and B.			and $-(-2)(6-($	(-2)) = 16.
	Do you get the same answers?			Not the same answ	wer.
	c) Multiply out A and B.		c)		
	d) Are the multiplied out expressions the same? Explain.			A. $a(6-a) = 6$	$ba - a^2$
				B. $-a(6-a) =$	$a^{2} - 6a + a^{2}$
			d)	No, the monomial	s are different, one is
				positive, and one i	s negative.
3)	Look at examples A to C in the box below:	3)			
	A. $-2b(b+9)$		a)	If $b = 2$ , A gives –	-2(2)((2)+9) = -44
	B. $-2b(9+b)$			B gives –	-2(2)(9+(2)) = -44
	C. $(9+b)(-2b)$			C gives (	9 + (2)(-2(2)) = -44
			b)	All the examples g	ive the same answer. The
	a) Substitute $b = 2$ in A, B and C.			monomial is the sa	ame and the binomials
	b) Which examples give the same answer? Why does this			produce the same	answer due to the
	nappen?			commutative prop	perty: $(b + 9) = (9 + b)$
	c) Expand A, B and C. Write your answers in descending powers		c)	A: -2b(b+9) =	$-2b^2 - 18b$
	$\frac{\partial D}{\partial t}$			B: -2b(9+b) =	$-2b^2 - 18b$
	d) Are the expanded expressions the same? Explain.			C: (9+b)(-2b) =	$= -2b^2 - 18b$
			d)	Yes. See explanation	on in Q3b.
4)	Multiply out. Write your answers in descending powers of $a$	4)			
.,	a) $ad(a^2 - 2b)$	.,	a)	$a^3d - 2ad^2$	
	b) $-ad(2d-a^2)$		b)	$a^3d - 2ad^2$	
	c) $(-ad)(-2d + a^2)$		c)	$-a^{3}d + 2ad^{2}$	
	d) $-da(-2d-a^2)$		d)	$a^{3}d + 2ad^{2}$	
	e) $(a^2 - 2d)(-ad)$		, e)	$-a^{3}d + 2ad^{2}$	
	f) $(-a^2 + 2d)(-da)$		f)	$a^3d - 2ad^2$	



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In this worksheet you will focus on: using the distributive law when there are 2 or more terms in the brackets, monomials are positive or negative and terms in the brackets contain positive and/or negative and numbers.

Qu	estions
1)	Look at examples A, B and C in the box below: A. $2(m + n)$ B. $2(m + 3n)$ C. $2(m - 3n)$
	<ul><li>a) How many terms are in each bracket?</li><li>b) Predict how many terms there will be in the final answer for each example.</li><li>c) Expand A to C. Is your answer in Q1b correct?</li></ul>
2)	Look at examples A, B and C in the box below: A. $2(m+3n+4p)$ B. $2(m-3n+4p)$ C. $2(m+3n-4p)$
	<ul><li>b) Predict how many terms there will be in the final answer for each example.</li><li>c) Expand A to D. Is your answer in Q2b correct?</li></ul>
3)	Expand:a) $-2(f + g + h)$ f) $(f + g + h)(-e)$ b) $(f + g + h)(-2)$ g) $-e(f - g + h)$ c) $e(f + g + h)$ h) $(f - g - h)(-e)$ d) $(f + g + h)e$ i) $-4e(f + g + h)$ e) $-e(f + g + h)$ j) $(f + g + h)(-4e)$
4)	Multiply out: a) $t(t^2 + t + 3)$ b) $(t^2 + t + 3)t$ c) $-t(t^2 + t + 3)$ d) $(t^2 + t + 3)(-t)$
5)	Multiply out. Write your answers in descending powers of <i>s</i> for Q5a to Q5c, and in descending powers of <i>p</i> for Q5d to Q5f. a) $(s-5)3st$ b) $(s-5)(-3st)$ c) $(s^2 + 2t + 3)(-3st)$ d) $-pr(p^2 + 2p)$ e) $-pr(p^2 - 2p)$ f) $-pr(-p^2 - 2p + 5)$



Answers				
Questions	Answers			
1) Look at examples A, B and C in the box below:	1)			
A. $2(m+n)$	a) 2			
B. $2(m+3n)$	b) 2			
C = 2(m - 3n)	c) $\wedge 2m + 2n$			
C. 2( <i>m</i> 3 <i>n</i> )	$\frac{1}{100} \frac{1}{100} \frac{1}$			
a) How many terms are in each bracket?	$\begin{array}{c} \mathbf{D} \cdot \mathbf{D} \mathbf{n} \\ \mathbf{C} \cdot \mathbf{D} \mathbf{m} \\ \mathbf{C} \cdot$			
a) How many terms are in each bracket:	C. 2m - 6n			
b) Predict now many terms there will be in the fina	al answer for			
each example.	Yes it is correct			
c) Expand A to C. Is your answer in Q1b correct?				
2) Look at examples A, B and C in the box below:	2)			
A. $2(m+3n+4p)$	a) 3			
B. $2(m - 3n + 4p)$	b) 3			
C. $2(m+3n-4p)$	c) A: $2m + 6n + 8p$			
	B: $2m - 6n + 8p$			
a) How many terms are in each bracket?	C: $2m + 6n - 8p$			
b) Predict how many terms there will be in the final	al answer for			
each example	Yes it is correct			
c) Expand A to D is your answer in O2b correct?				
c) Expand A to D. is your answer in Q2D correct:				
3) Expand:	3)			
2) -2(f + a + b)	(2) -2f - 2a - 2h			
a) $-2(j + j + i)$ b) $(f + a + b)(-2)$	b) $-2f - 2a - 2h$			
b) $(f + g + h)(-2)$	$\frac{y}{y} = \frac{zy}{zy} = \frac{zy}{zh}$			
c) $e(f + g + h)$	c) $e_j + e_j + e_h$			
d) $(f+g+h)e$				
e) $-e(f+g+h)$	$e_j - e_j - e_g - e_h$			
f) $(f+g+h)(-e)$	(1) -ej - eg - eh			
g) $-e(f-g+h)$	g) $-ef + eg - eh$			
h) $(f - g - h)(-e)$	n) $-ef + eg + en$			
i) $-4e(f+g+h)$	1) -4ef - 4eg - 4en			
j) $(f + g + h)(-4e)$	J) -4 <i>ef</i> - 4 <i>eg</i> - 4 <i>en</i>			
4) Multiply out:	4)			
a) $t(t^2 + t + 3)$	a) $t^3 + t^2 + 3t$			
b) $(t^2 + t + 3)t$	b) $t^3 + t^2 + 3t$			
c) $-t(t^2 + t + 3)$	c) $-t^3 - t^2 - 3t$			
d) $(t^2 + t + 3)(-t)$	d) $-t^3 - t^2 - 3t$			
5) Multiply out. Write your answers in descending pow	ers of <i>s</i> for 5)			
Q5a to Q5c, and in descending powers of p for Q5d t	o Q5f.			
a) $(s-5)3st$	a) $3s^2t - 15st$			
b) $(s-5)(-3st)$	b) $-3s^2t + 15st$			
c) $(s^2 + 2t + 3)(-3st)$	c) $-3s^3t - 6st^2 - 9st$			
d) $-pr(p^2 + 2p)$	d) $-p^3r - 2p^2r$			
e) $-pr(p^2 - 2p)$	e) $-p^3r + 2p^2r$			
f) $-pr(-p^2 - 2p + 5)$	f) $p^3r + 2p^2r - 5pr$			



In this worksheet you will focus on: using the distributive law when there are 2 or more terms in the brackets, monomials are positive or negative and terms in the brackets contain positive and/or negative and numbers.

Que	estions
1)	Look at examples A, B, C and D in the box below: A. $3(d+2e+4f)$ B. $3(d-2e+4f)$ C. $3(d+2e-4f)$ D. $3(d-2e-4f)$
	<ul><li>a) How many terms are in each bracket?</li><li>b) Predict how many terms there will be in the final answer for each example.</li><li>c) Expand A to D. Is your answer in Q1b correct?</li></ul>
2)	Multiply out: a) $w(x + y + z)$ b) $(x + y + z)w$ c) $x(x + y + z)$ d) $-x(x + y + z)$ e) $-x(x - y + z)$ f) $-4x(x - y - z)$
3)	Multiply out: a) $3a(a^2 + a + 5)$ b) $2a(a^2 - a + 5)$ c) $-a(a^2 - a + 5)$ d) $(a^2 - a + 5)(-a)$
4)	Multiply out. Write your answers in descending powers of x for Q4a to Q4c, and in descending powers of c for Q4d to Q4f. a) $(x - 7)3xy$ b) $(x - 7)(-3xy)$ c) $(x^2 - 7x + 3)(-3xy)$ d) $-cd(c^2 - 2c)$ e) $-cd(-c^2 - 2c)$ f) $-cd(-c^2 - 2c + 7)$



An	Answers				
Questions		Ans	Answers		
1)	<ul> <li>Look at examples A, B, C and D in the box below:</li> <li>A. 3(d + 2e + 4f)</li> <li>B. 3(d - 2e + 4f)</li> <li>C. 3(d + 2e - 4f)</li> <li>D. 3(d - 2e - 4f)</li> <li>a) How many terms are in each bracket?</li> <li>b) Predict how many terms there will be in the final answer for each example.</li> <li>c) Expand A to D. Is your answer in Q1b correct?</li> </ul>	1)	a) b) c)	3 3 A. $3d + 6e + 12f$ B. $3d - 6e + 12f$ C. $3d + 6e - 12f$ D. $3d - 6e - 12f$ Yes it is correct	
2)	Multiply out: a) $w(x + y + z)$ b) $(x + y + z)w$ c) $x(x + y + z)$ d) $-x(x + y + z)$ e) $-x(x - y + z)$ f) $-4x(x - y - z)$	2)	a) b) c) d) e) f)	wx + wy + wz xw + yw + zw $x^{2} + xy + xz$ $-x^{2} - xy - xz$ $-x^{2} + xy - xz$ $-4x^{2} + 4xy + 4xz$	
3)	Multiply out: a) $3a(a^2 + a + 5)$ b) $2a(a^2 - a + 5)$ c) $-a(a^2 - a + 5)$ d) $(a^2 - a + 5)(-a)$	3)	a) b) c) d)	$3a^{3} + 3a^{2} + 15a$ $2a^{3} - 2a^{2} + 10a$ $-a^{3} + a^{2} - 5a$ $-a^{3} + a^{2} - 5a$	
4)	Multiply out. Write your answers in descending powers of x for Q4a to Q4c, and in descending powers of c for Q4d to Q4f. a) $(x - 7)3xy$ b) $(x - 7)(-3xy)$ c) $(x^2 - 7x + 3)(-3xy)$ d) $-cd(c^2 - 2c)$ e) $-cd(-c^2 - 2c)$ f) $-cd(-c^2 - 2c + 7)$	4)	a) b) c) d) e) f)	$3x^{2}y - 21xy -3x^{2y} + 21xy -3x^{3}y + 21x^{2}y - 9xy -c^{3}d + 2c^{2}d c^{3}d + 2c^{2}d c^{3}d + 2c^{2}d - 7cd$	



This worksheet focuses on simplifying algebraic expressions, substituting into algebraic expressions and working with verbal and algebraic expressions.

Qu	Questions				
1)	Simplify:				
	a)	a + a + a			
	b)	$8b \times 3b$			
	c)	$7a \times 4b$			
	d)	(p)(q)-r			
	e)	-3s(-4t)			
-	-				
2)	Ca	culate the value of:			
	a)	3ab if $a = 3$ and $b = 4$			
	b)	x + 10 if $x = -5$			
	c)	3(2w+5) if $w = 2$			
2)					
5)	2)	Write $h = 0$ as a verbal expression			
	a) h)	Write $n = 9$ as a verbal expression Write (thirteen more than a number' as an algebraic expression			
	D)				
4)	Ca	culate the value of:			
	a)	3ab if $a = 3$ and $b = 4$			
	b)	x + 10 if $x = -5$			
	c)	3(2w+5) if $w = 2$			
5)	Sin	nplity:			
	a)	r - 7r + r			
	b)	7b + 5b - 3a			
	C)	5x + 6 + 2x + 5			
	d)	-15y - 6y			
	e)	5a + 2e + 8 + 7a - e + 8			
6)	Say	v whether each statement is TRUE or FALSE:			
	a)	8xy and $8yx$ are like terms			
	b)	3(x+2y) = 3x+2y			
	c)	32 + 16d = 8(4 + 2d)			
	d)	10x - 36y + 2x + y = 12x + 36y			



Que	estio	ns	Ans	wers	<b>i</b>
1)	Sim	plify:	1)		
	a)	a + a + a		a)	3a
	b)	$8b \times 3b$		b)	$24b^2$
	c)	$7a \times 4b$		c)	28 <i>ab</i>
	d)	(p)(q) - r		d)	pq-r
	e)	-3s(-4t)		e)	12 <i>st</i>
2)	Calo	culate the value of:	2)		
	a)	3ab if $a = 3$ and $b = 4$		a)	3(3)(4) = 36
	b)	x + 10 if $x = -5$		b)	(-5) + 10 = 5
	c)	3(2w+5) if $w = 2$		c)	3(4+5) = 27
3)			3)	Pos	sible answers:
	a)	Write $h-9$ as a verbal expression		a)	Nine less than $h$ or $h$ subtract 9
	b)	Write 'thirteen more than a number' as an algebraic expression		b)	x + 13  or  13 + x
4)	Sim	plify:	4)		
	a)	r - 7r + r		a)	-5r
	b)	7b + 5b - 3a		b)	-3a + 12b
	c)	5x + 6 + 2x + 5		c)	7x + 11
	d)	-15y - 6y		d)	-21 <i>y</i>
	e)	5d + 2e + 8 + 7d - e + 8		e)	12d + e + 16
E)	6.014	whether each statement is TRUE or EALCE.	E)		
5)	Say	Serve and Serve are like torms	5)	2	True
	a) L	oxy and $oyx$ are like terms 2(x + 2x) = 2x + 2x		a) h)	True
	(a	3(x + 2y) = 3x + 2y 22 + 16d - 9(4 + 2d)		(a	Faise
	c)	52 + 10u = 0(4 + 2u) $10x - 26u + 2x + u = 12x + 26u$		C)	irue Falar
	u)	10x - 30y + 2x + y = 12x + 30y		a)	False



This worksheet focuses on simplifying algebraic expressions, substituting into algebraic expressions and working with verbal and algebraic expressions.

Qu	Questions				
1)	Sim	nplify:			
	a)	b + 2b			
	b)	$\frac{8x}{4}$			
	c)	-7a(4h)			
	d)	(n)(q) - (n)(r)			
	e)	3m - 6m			
	,				
2)	Cal	culate the value of:			
	a)	3a + b if $a = 3$ and $b = 4$			
	b)	(x-5) + 5 if $x = -5$			
	c)	3(6w + 4w) if $w = 2$			
3)					
	a)	Write $4p + 3$ as a verbal expression			
	b)	Write 'five less than a number' as an algebraic expression			
	<u> </u>				
4)	Sim				
	a)	a - 3a + a			
	b)	6m + 3m - 2			
	C)	8x - 3 + 4x + 3			
	a)	-4j-4j			
	e)	4xyz + xz + 2x - xyz - x - y			
	ŋ	a - 3a			
5)	Say	v whether each statement is TRUE or FALSE:			
,	, а)	6a - 3a - a - 12 = 3a - 12			
	, b)	12(x + 2y + 2x) = 12(3x + 2y)			
	, c)	6(d-e) = 6d - 6e			
	, d)	4(2x - 3y) = -24xy			
	-				



Qu	Questions			Answers			
1)	Sim	ıplify:	1)				
	a)	b + 2b		a)	3 <i>b</i>		
	b)	$\frac{8x}{4}$		b)	2 <i>x</i>		
	c)	-7a(4b)		c)	-28ab		
	d)	(p)(q) - (p)(r)		d)	pq - pr		
	e)	3m-6m		e)	-3m		
2)	Cal	culate the value of:	2)				
	a)	3a + b if $a = 3$ and $b = 4$		a)	13		
	b)	(x-5) + 5 if $x = -5$		b)	-5		
	c)	3(6w + 4w) if $w = 2$		c)	60		
3)			3)	Pos	sible answers		
	a)	Write $4p + 3$ as a verbal expression		a)	Three more than 4 multiplied by a number		
	b)	Write 'five less than a number' as an algebraic expression		b)	x-5		
4)	Sim	ıplify:	4)				
	a)	a - 3a + a		a)	- a		
	b)	6m + 3m - 2		b)	9m - 2		
	c)	8x - 3 + 4x + 3		c)	12 <i>x</i>		
	d)	-4j-4j		d)	-8j		
	e)	4xyz + xz + 2x - xyz - x - y		e)	3xyz + xz + x - y		
5)	Say	whether each statement is TRUE or FALSE:	5)				
	a)	6a - 3a - a - 12 = 3a - 12		a)	False		
	b)	12(x + 2y + 2x) = 12(3x + 2y)		b)	True		
	c)	6(d-e) = 6d - 6e		c)	True		
	d)	4(2x - 3y) = -24xy		d)	False		



In this worksheet you will focus on: adding, subtracting or multiplying algebraic expressions which have 2 terms in brackets.

Questions						
1)						
a) Which of these terms produce the $25p; 2 \times 5p; 2(5p); 2p(5)$	same answer when they are simplified?					
b) Apply the distributive law: $3a(a + a)$	b) Apply the distributive law: $3a(a + 7)$					
c) Spot the 2 errors and correct them						
5 + m(2 + m)						
= 5m(2+m)						
-15m						
- 15m						
2) This question focuses on the 6 expressi	ons in the box.					
A. $5k(k + 2)$						
B. $(k + 2)5k$						
C. $5 + k(k + 2)$						
D. $(k + 2)5 + k$						
E. $(k + 2) + 5k$						
F. $5(k + 2)k$						
a) Look at the expressions carefully ar	nd answer these questions:					
i) In which expressions is <i>k</i> multip	olied into the bracket?					
ii) In which expressions is 5 multip	plied into the bracket?					
b) Simplify each expression.						
c) Which expressions have the same a	inswer? Why does this happen?					
3) Each expression below uses $2x$ ; $x$ and	3. We have grouped them into 3 clusters.					
A. $2x(x + 3)$ a	What is different between A, B and C?					
B. $2x + (x + 3)$ b	) What is different between D and E?					
C. $2x - (x + 3)$ c)	What is different between F and G?					
D. $(2x - x) + 3$ d	What is the same and what is different between E and G?					
E. $(2x - x)3$ e	Simplify A to G.					
F. $(2x - 3) + x$ f)	Try to do E in different way.					
G. $(2x-3)x$ g	In which expressions are the brackets not needed?					
4) Three expressions are given below:						
A. $2x(x-y)$ B. $x+2x(x-y)$						
B. $x + 2x(x - y)$ C $(x - y)^2x + x$						
$\begin{bmatrix} c. & (\lambda - y) \Delta \lambda + \lambda \end{bmatrix}$						
a) Expand each expression						
b) For B, a classmate's answer is: $3x^2$	-3xy. What did she do wrong?					



Questions	Answers
1)	1)
<ul> <li>a) Which of these terms produce the same answer when they are simplified?</li> <li>25p; 2 × 5p; 2(5p); 2p(5)</li> <li>b) Apply the distributive law: 3a(a + 7)</li> <li>c) Spot the 2 errors and correct them:</li> <li>5 + m(2 + m)</li> <li>= 5m(2 + m)</li> <li>= 10m + 5m</li> <li>= 15m</li> </ul>	<ul> <li>a) These terms 2 × 5p; 2(5p); 2p(5) all produce 10.</li> <li>b) 3a<sup>2</sup> + 21a</li> <li>c) Line 2: 5 + m is written as 5 and in line 3 the product of 5m and m is given as 5m instead of 5m<sup>2</sup>. This is what the answer should be: 5 + m(2 + m) = 5 + 2m + m<sup>2</sup></li> </ul>
2) This question focuses on the 6 expressions in the box.	2)
A. $5k(k + 2)$ B. $(k + 2)5k$ C. $5 + k(k + 2)$ D. $(k + 2)5 + k$ E. $(k + 2) + 5k$ F. $5(k + 2)k$ a) Look at the expressions carefully and answer these questions: i) In which expressions is k multiplied into the bracket? ii) In which expressions is 5 multiplied into the bracket? b) Simplify each expression.	a) i) A, B, C and F ii) A, B, D and F b) A. $5k^2 + 10k$ B. $5k^2 + 10k$ C. $5 + k^2 + 2k = k^2 + 2k + 5$ D. $6k + 10$ E. $6k + 2$ F. $5k^2 + 10k$ c) A, B and F: In A, monomial $5k$ is multiplied into binomial k + 2 from the left; in B, $5k$ is multiplied into $k + 2$ from the right; in C 5 of the monomial $5k$ is multiplied into
c) Which expressions have the same answer? Why does this happen?	k + 2 from the right and then the product is multiplied by the variable k of 5k
3) Each expression below uses $2x$ ; $x$ and $3$ . We have grouped them into $3$ clusters. A. $2x(x + 3)$ B. $2x + (x + 3)$ C. $2x - (x + 3)$ D. $(2x - x) + 3$ E. $(2x - x) + 3$ E. $(2x - 3) + x$ G. $(2x - 3) + x$ G. $(2x - 3) x$ a) What is different between A, B and C? b) What is different between D and E? c) What is different between F and G? d) What is the same and what is different between E and G? e) Simplify A to G. f) Try to do E in different way. g) In which expressions are the brackets <u>not</u> needed?	3) a) In A, monomial $2x$ is multiplied into binomial $x + 3$ from the left. In B, binomial $x + 3$ is added to monomial $2x$ In C, binomial $x + 3$ is subtracted from monomial $2$ b) In D, 3 is added to $2x - x$ , in E, $2x - x$ is multiplied by 3 from the right c) In F, $x$ is added to $2x - 3$ , In G, $2x - 3$ is multiplied by $x$ from the right d) Same: E and G have the a binomial multiplied by monomial; $2x$ is the first term in the binomial; there is subtraction in both brackets Different: Binomial in E consists of like terms, but binomial in G consists of unlike terms. e) A. $2x^2 + 6x$ B. $3x + 3$ C. $x - 3$ D. $x + 3$ E. $3x$ F. $3x - 3$ G. $2x^2 - 3x$ f) $6x - 3x = 3x$ or $(x)3 = 3x$ g) B, D and F
5) Three expressions are given below: A. $2x(x - y)$	4) a)
<ul> <li>B. x + 2x(x - y)</li> <li>C. (x - y)2x + x</li> <li>a) Expand each expression.</li> <li>b) For B, a classmate's answer is: 3x<sup>2</sup> - 3xy. What did she do wrong?</li> </ul>	A. $2x^2 - 2xy$ B. $x + 2x^2 - 2xy = 2x^2 - 2xy + x$ C. $2x^2 - 2xy + x$ b) She added x and 2x first then applied the distributive law. She should have distributed 2x first.



In this worksheet you will focus on: adding, subtracting or multiplying in algebraic expressions which have 2 terms in brackets.

Questions
<ul> <li>1)</li> <li>a) Which of the following terms produce the same answer when simplified? 3 × 5x; 3(5x); 5x(3); 3 + 5x</li> <li>b) Apply the distributive law: 2a(a + 7)</li> <li>c) Spot the 2 errors and work out the correct solution: 3 + 2m(m + 2) = 5m(m + 2) = 5m<sup>2</sup> + 10</li> </ul>
<ul> <li>2) This question focuses on the 6 expressions in the box.</li> <li>A. 5k(k - 2)</li> <li>B. (k - 2)5k</li> <li>C. 5 + k(k - 2)</li> <li>D. (k - 2)5 + k</li> <li>E. (k - 2) + 5k</li> <li>F. 5(k - 2)k</li> <li>a) Look at the expressions carefully and answer these questions: <ul> <li>i) In which expressions is k multiplied into the bracket?</li> <li>ii) In which expressions is 5 multiplied into the bracket?</li> <li>b) Simplify each expression.</li> <li>c) Which expressions have the same answer? Why does this happen?</li> </ul> </li> </ul>
<ul> <li>3) Each expression below uses 2a; a and 3. We have grouped them into 3 clusters.</li> <li>A. 2a(a + 3)</li> <li>B. 2a + (a + 3)</li> <li>C. 2a - (a + 3)</li> <li>D. (2a - a) + 3</li> <li>E. (2a - a)3</li> <li>F. (2a - 3) + a</li> <li>G. (2a - 3)a</li> <li>A. What is different between A, B and C?</li> <li>B. What is different between D and E?</li> <li>C. What is different between F and G?</li> <li>C. What is the same and what is different between E and G?</li> <li>E. (2a - 3) + a</li> <li>G. (2a - 3) a</li> <li>A. What is the same and what is different between E and G?</li> <li>A. What is the same and what is different between E and G?</li> <li>A. What is the same and what is different between E and G?</li> <li>A. What is the same and what is different between E and G?</li> <li>A. What is the same and what is different between E and G?</li> <li>A. What is the same and what is different between E and G?</li> <li>A. What is the same and what is different between E and G?</li> <li>A. Simplify A to G.</li> <li>B. Try to do E in different way.</li> <li>C. What is the same and the following expressions:</li> </ul>
a) $2x(x-y)$ b) $x + 2x(x-y)$ c) $(x-y)2x + x$ d) $2x(x-y) + y$



Questions			Ans	wers	
1)			1)		
	a)	Which of the following terms produce the same		a)	The following terms: $3 \times 5x$ ; $3(5x)$ ; $5x(3)$ give $15x$ .
		answer when simplified?		b)	$2a^2 + 14a$
		$3 \times 5x; 3(5x); 5x(3); 3 + 5x$		c)	Line 2: $3 + 2m$ is written as $5m$ , and in
	b)	Apply the distributive law: $2a(a + 7)$			Line 4: the product of $5m$ and 2 is given as $10$ instead of
	c)	Spot the 2 errors and work out the correct			10 <i>m</i> .
		solution:			This is what the answer should be:
		3 + 2m(m + 2)			$3 + 2m(m+2) = 3 + 2m^2 + 4m$
		= 5m(m+2) $= 5m^2 + 10$			$= 2m^2 + 4m + 3$
		- 5m + 10			
2)	This	question focuses on the 6 expressions in the box.	2)		
	A	5k(k-2)		a)	
	B	(k-2)5k			i) A, B, C and F
	C	5 + k(k - 2)			ii) A, B, D and F
	D	(k-2)5+k		b)	
	E.	(k-2)+5k			A. $5k^2 - 10k$
	F.	5(k-2)k			B. $5k^2 - 10k$
					C. $5 + k^2 - 2k$
	a)	Look at the expressions carefully and answer these			D. $6k - 10$
		questions:			E. $6k - 2$
		i) In which expressions is k multiplied into the			F. $5k^2 - 10k$
		bracket?		c)	A, B and F. In A, monomial 5k is multiplied into binomial
		ii) In which expressions is 5 multiplied into the			k - 2 from the left, in B, monomial 5k and binomial
		bracket?			k-2 are just switched around. In C, constant 5 of the
	b)	Simplify each expression.			monomial $5k$ is first multiplied into binomial $k-2$ , and
	c)	Which expressions have the same answer? Why			then the product is is multiplied by the variable $k$ of $5k$ .
		does this happen?			
3)	Eac	h expression below uses $2a$ ; $a$ and $3$ . We have	3)		
	gro	uped them into 3 clusters.		a)	In A, monomial $2a$ is multiplied into binomial $a + 3$
		A. $2a(a + 3)$			In B, binomial $a + 3$ is added to monomial $2a$
		B. $2a + (a + 3)$			In C, binomial $a + 3$ is subtracted from monomial 2
		C. $2a - (a + 3)$		b)	In D, 3 is added to $2a - a$ , in E, $2a - 3$ is multiplied by 3
		D. $(2a - a) + 3$			from the right
		E. $(2a - a)^3$		c)	In F, a is added to $2a - 3$ , in G, $2a - a$ multiplied by a
		F. $(2a-3) + a$		d)	Same: E and G have binomials multiplied by monomials;
		(2a-3)a	1		2 <i>a</i> is the first term in the binomial; there is subtraction
	a)	what is different between A, B and C?	1		in both brackets
	(a	what is different between D and E?	1		Different: The binomial in E consists of like terms, and
	C)	what is different between F and G?	1		they can be added to a single term before multiplying by
	a)	what is the same and what is different between E			3.; the binomial in G has unlike terms.
	<b>~</b> \			e)	
	e) f	Simpiny A to G.			A. $2a^2 + 6a$ B. $3a + 3$ C. $a - 3$ D. $a + 3$
	ו) ~`	In which expressions are the breakets not needed.		f)	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
	g)	in which expressions are the brackets <u>not</u> needed?		י) ה)	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
			1	б <i>)</i>	0, 0 anu i
۷)	Evo	and the following expressions:	4)		
7)	rvh ⊐y	2d(d-e)	+)	a)	$2d^2 - 2de$
	b)	d + 2d(d - e)	1	с) b)	$d^{2} + 2d^{2} - 2de = 2d^{2} - 2de + d$
	c)	(d-e)2d+e	1	c)	$2d^2 - 2de + d$
	d)	2d(d-e)+e	1	, d)	$2d^2 - 2de + d$



In this worksheet you will focus on: adding, subtracting or multiplying algebraic expressions which have 2 terms in brackets, and include negatives

# Questions

1)	1) There are 4 different expressions in Column A. Find an equivalent expression for each in Column B.				
	There may be more than one match.				
	Column A	Column B			
	a) ( <i>a</i> + 2)3	A. $a(a+2)+3$			
	b) $(a+2)-3$	B. 3( <i>a</i> + 2)			
	c) $(a+2)a+3$	C. $2(3+a)$			
	d) $(3+a)2$	D. 3 <i>a</i> + 6			
		E. <i>a</i> + 2 - 3			
2)	Look at each pair of exampl	es and do the following	2		
	<ul> <li>Say what is the same at</li> </ul>	out each expression in	the pair		
	Simplify each expression	n			
	• Are the answers in the p	pair the same or differe	nt?		
	<ul> <li>Say why the answers ar</li> </ul>	e the same or different			
	2(m+1)		2(m+1)+2		
	a) $3(m \pm 1)$ b) $3(-m \pm 1)$		$e_{j} = -3(m + 1) + 3$ f) $-3(m + 1) = 3$		
	0 - 3(-m + 1)		1) -3(m + 1) - 3		
	c) $3(m + 1)$		g) $(m+n) - 2m + n$		
	d) $3(-m + 1)$		h) $(m+n)(-2m) + n$		
3)	Multiply out and simplify:				
	a) $2p(p + r)$	c) $(p+r)2p$	+ $r$ e) $(p+2)p-2p$		
	b) $p + 2p(p+r)$	d) $p - 2p(p - 2p)$	+ r)		
4)	Find the value of each expre	ession if $i = 1$ and $k = 1$	2.		
.,	a) $(i + k)2i$				
	b) $2j(j+k)$				
	c) $(j+k)(-2j)$				
	d) $(j + k) - 2j$				
	e) $(j + k) - kj$				
	$\mathbf{f} = (\mathbf{i} + \mathbf{k}) + \mathbf{i} + \mathbf{k}$				
	T) $(J + K) + J + K$				
	$g_{j} (j + \kappa) - j + \kappa$				
	Do any clusters (or groups)	give the same answers?	? If so, why does this happen?		
	, e		,,		
1					



Answers							
Questions			Answers				
1)	There are 4 different expressions in Column A. Find an	1)					
	equivalent expression for each in Column B. There may						
	be more than one match.						
	Column A Column B						
	d) $(a+2)3$ A. $a(a+2)+3$		a)	B and D			
	e) $(a+2)-3$ B. $3(a+2)$		b)	E			
	f) $(a+2)a+3$ C. $2(3+a)$		c)	A			
	e) $(3+a)2$ D. $3a+6$		d)	C			
	E. <i>a</i> +2-3						
2)	Question and answers are grouned together for Q2						
2)	Question and answers are grouped together for Q2.						
	Look at each pair of examples and do the following:			-2(-1) + 2			
	Say what is the same about each expression in the pa	ır		g) $-3(m+1)+3$			
	Simplify each expression			n) $-3(m+1) - 3$			
	• Are the answers in the pair the same or different?			the monomials and binomials are the same			
	<ul> <li>Say why the answers are the same or different</li> </ul>			• $-3m$ and $-3m - 6$			
				The answers are different			
	a) $3(m+1)$			• In Q2e, 3 is added to $-3(m + 1)$ but in Q2f, 3			
	b) $3(-m+1)$			is subtracted from $-3(m + 1)$ .			
	<ul> <li>the monomials are the same</li> </ul>						
	• $3m + 3$ and $-3m - 3$			i) $(m+n) - 2m + n$			
	The answers are different			j) $(m+n)(-2m) + n$			
	• The sign of <i>m</i> in Q2a is positive but in Q2b <i>m</i> is			• the binomials are the same and the last term of			
	negative.			each is $+n$ .			
	c) $(m + 1)(-3)$			• $-m + 2n$ and $-2m^2 - 2mn + n$			
	d) $(m + 1) - 3$			The answers are different			
	<ul> <li>the binomials are the same</li> </ul>			• In Q2g, $(m + n)$ is has $-2m$ added to it but			
	• $-3m - 3$ and $m - 2$			in Q2h, $(m + n)$ is multiplied by $(-2m)$ .			
	The answers are different						
	• In Q2c, $(m + 1)$ is multiplied by $-3$ but in Q2d 3	l is					
	subtracted from $(m + 1)$ .						
3)	Multiply out and simplify:	3)					
-,	a) $2n(n+r)$	-,	a)	$2n^2 + 2nr$			
	b) $p + 2p(p + r)$		∽, h)	$n + 2n^2 + 2nr = 2n^2 + 2nr + n$			
	c) $(n+r)2n+r$		2) C)	$2n^2 + 2nr + n$			
	d) $p - 2p(p+r)$		d)	$n = 2n^2 = 2nr = -2n^2 = 2nr + n$			
	e) $(p+2)p - 2p$		e)	$p^{2} + 2p - 2p = p^{2}$			
4)	Find the value of each expression if $i = 1$ and $k = 2$	4)					
	a) $(i + k)2i$		۶Ì	((1) + (2))2(1) = 6			
	b) $2i(i+k)$		6) 6)	((1) + (2))2(1) = 0			
			D)	2(1)((1) + (2)) = 0 same answers. The same binomial is multiplied by the same monomial just from different			
	c) $(j+k)(-2j)$			sides.			
	d) $(j+k) - 2j$		c)	((1) + (2))(-2(1)) = -6			
	e) $(j+k)-kj$		Ч) 2)	((1) + (2)) - 2(1) - 1			
	f) $(i+k) + i + k$		u)	(1) + (2) $(2)(1) = 1$ forme ensurement of $0.4$ and $(1) + (2)$			
	g) $(i+k) - i + k$		e)	((1) + (2)) - (2)(1) = 1 Same answers for Q4d and			
				Q4e because $k = 2$ .			
	Do any clusters (or groups) give the same answers? If so,		f)	((1) + (2)) + (1) + (2) = 6			
	why does this happen?	1	g)	((1) + (2)) - (1) + (2) = 4			



#### Worksheet 4.6

In this worksheet you will focus on: adding, subtracting or multiplying algebraic expressions which have 2 terms in brackets, and include negatives

# Questions

1) Look at each pair of expre	.) Look at each pair of expressions and do the following:				
• Say what is the same	Say what is the same about each expression in the pair				
Simplify each express	Simplify each expression				
• Are the answers in th	e pair the same or different?				
• Say why the answers	are the same or different				
a) $2(x + 3)$	e) $-2(x + 3) - 2$ i) $(-d + e) - 2d(-d)$				
b) $-2(x + 3)$	f) $-2(x + 3) + 2$ j) $(-d + e)(-2d) - d$				
c) $(x + 3)(-2)$	g) $(b+c) - 2b + b$				
d) $(x + 3) - 2$	h) $(b+c)(-2b) + b$				
2) There are 4 different expr	ressions in Column A. Find an equivalent expression for each in Column B.				
There may be more than	one match or no match.				
Column A	Column B				
a) $(d+1)2$	A. $d + 1 - 2$				
b) $(d+1)^2$	B. $2d + 2$				
c) $(d+1)-2$	C. $(d+1)(d+1)$				
d) $(d+1)d+1$	D = 2(d+1)				
(u   1)u   1	D.  - 2(a + 1)				
<i>ay</i> ( <i>u</i> + 1) <i>u</i> + 1	$\begin{array}{c c} D. & -2(d+1) \\ \hline E. & 2(d+1) \end{array}$				
(u + 1)u + 1	$\begin{array}{c c} D. & -2(d+1) \\ \hline E. & 2(d+1) \end{array}$				
3) Simplify:	$\begin{array}{c c} D. & -2(d+1) \\ \hline E. & 2(d+1) \end{array}$				
3) Simplify: a) $m + 2m(m + y)$ b) $(m + y)^{2m} + yy$	$\begin{array}{c c} D. & -2(d+1) \\ \hline E. & 2(d+1) \end{array}$				
3) Simplify: a) $m + 2m(m + y)$ b) $(m + y)2m + m$ c) $m - 2m(m + y)$	$\begin{array}{c c} D. & -2(d+1) \\ \hline E. & 2(d+1) \end{array}$				
3) Simplify: a) $m + 2m(m + y)$ b) $(m + y)2m + m$ c) $m - 2m(m + y)$ d) $(m + 2)m - 5m$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				
3) Simplify: a) $m + 2m(m + y)$ b) $(m + y)2m + m$ c) $m - 2m(m + y)$ d) $(m + 2)m - 5m$ e) $(m + 2)(-m) = 5$					
3) Simplify: a) $m + 2m(m + y)$ b) $(m + y)2m + m$ c) $m - 2m(m + y)$ d) $(m + 2)m - 5m$ e) $(m + 2)(-m) - 5$					



b) (m+y)2m+m

c) m - 2m(m + y)d) (m + 2)m - 5me) (m + 2)(-m) - 5

An	swers	
1)	Question and answers are grouped together for Q1	
a) b) c) d)	<ul> <li>Look at each pair of expressions and do the following:</li> <li>Say what is the same about each expression in the pair</li> <li>Simplify each expression</li> <li>Are the answers in the pair the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>Say why the answers are the same or different?</li> <li>The brackets have the same terms</li> <li>2x + 6 and -2x - 6</li> <li>The answers are different</li> <li>The signs of the monomials are different . In Q1a we multiply a positive 2 into the bracket but in Q1b we multiply a negative 2 into the bracket.</li> <li>(x + 3)(-2)</li> <li>(x + 3) - 2</li> <li>The binomial (x + 3) is the same in both.</li> <li>-2x - 6 and x + 1</li> <li>The answers are different</li> <li>In Q1c, -2 is multiplied by (x + 3). In Q1d, 2 is subtracted from (x + 3)</li> </ul>	e) $-2(x + 3) - 2$ f) $-2(x + 3) + 2$ • $-2$ is multiplied by $(x + 3)$ in both. • $-2x - 6 - 2 = -2x - 8$ and $-2x - 6 + 2 = -2x - 4$ • Answers are different • In Q1e, 2 is subtracted from $-2(x + 3)$ while in Q1f, 2 is added to $-2(x + 3)$ . g) $(b + c) - 2b + b$ h) $(b + c)(-2b) + b$ • The binomial $(b + c)$ is the same and b is added to the answer in both. • c and $-2b^2 - 2bc + b$ • Answers not the same • In Q1g, 2b is subtracted from $(b + c)$ but in Q1h, $(b + c)$ is multiplied by $-2b$ . i) $(-d + e) - 2d(-d)$ j) $(-d + e)(-2d) - d$ • $(-d + e)$ is the same. • $-d + e + 2d^2$ and $2d^2 - 2de - d$ • Answers not the same • In Q1i, 2d is multiplied by $-d$ and subtracted from (-d + e) but in Q1j, $-2d$ is multiplied by (-d + e) and d is subtracted from the answer.
Que	estion	Answers
2)	There are 4 different expressions in Column A. Find an equivalent expression for each in Column B. There may be more than one match or no match. Column A       Column B         a) $(d + 1)^2$ b) $(d + 1)^2$ c) $(d + 1)^2$ d) $(d + 1)d + 1$ E. $2(d + 1)$ E. $2(d + 1)$ E. $2(d + 1)$	2) a) B and E b) C c) A d) No match $d^2 + d + 1$
	a) $m + 2m(m + y)$	a) $m + 2m^2 + 2my = 2m^2 + 2my + m$

b)  $2m^2 + 2my + m$ 

c)  $m - 2m^2 - 2my$ d)  $m^2 + 2m - 5m = m^2 - 3m$ 

e)  $-m^2 - 2m - 5m = -m^2 - 7m$ 



In this worksheet you will focus on: adding, subtracting and multiplying algebraic expressions which have 2 or more terms in brackets and 3 or more terms in the expressions.

Qu	estions						
1)	.) There are 6 examples of algebraic expressions in the box below.						
	A. $3 - t(t + 3)$	D. $(t + 1) + t + 1$					
	B. $(t + 3)3 - t$	E. $(t+2) - 2t$					
	C. $1 + t + (t + 1)$	F. $(t+2)(-2t)$					
	Look at the examples carefully and a	answer these questions:					
	a) In which examples must you mu	Itiply <i>t</i> into the bracket?					
	b) Simplify each example.						
	c) You should have got the same a	nswer for C and D. Why does this happen?					
	d) Make one change to D so that the	ne answer is 2.					
2)							
2)	LOOK at the 3 examples of algebraic	expressions in the box below. Read all the questions (a-d) before					
	you begin.	7					
	A. $4(2p + 3p)$						
	B. $4p(p + 2p + 2)$						
	C. $4p(3+2p+1)$						
	a) Re-write A. B and C by adding th	e like terms in the brackets.					
	b) Now simplify your new expressions for A B and C						
	c) Now go back to the original expl	ressions for A. B and C in the box. Simplify by applying the					
	distributive law.						
	d) Check that you get the same and	swers in O2b and O2c.					
3)	Look at the 8 examples of algebraic	expressions in the box.					
		17					
	A. $2a + (3 + a)$	E. $a + a + (3 + a)$					
	B. $2 + a + (3 + a)$	F. $2 + 2(3 + a)$					
	C. $2 + a(3 + a)$	G. $3 + 2 + (3 + a)$					
	D. $a + a(3 + a)$						
	a) In which examples can you simp	lify terms outside the bracket before you deal with the bracket?					
	b) In which examples are the brack	xets unnecessary?					
	c) In which examples must you app	bly the distributive law?					
	d) Simplify each example. Try to go	p from the question straight to the answer.					
	,,,						
4)	Simplify:						
	a) $m - 2 + m - 2$	d) $3r + 2 - (4 - r)$					
	b) $x + y - 2(x + y)$	e) $(2x + y) - 2x + y$					
	c) $3r + (4 - r)2$	f) $-2(x + y) - (x + y)$					



	Answers				
Que	estions		Answe	rs	
1)	There are 6 examples of algebraic expressions in the box belo	w.	1)		
	A. $3 - t(t+3)$		a)	A and F	
	B. $(t + 3)3 - t$		b)		
	C + t + t + t + 1		-	A. $3 - t^2 - 3t$	
	$D_{t}(t+1)+t+1$			B = 2t + 9	
	$E_{1}(t+2) = 2t$			$C_{2} + 2$	
	L. $(l+2) - 2l$			$\begin{array}{ccc} c. & 2t+2 \\ \hline c. & 2t+2 \end{array}$	
	F. $(l+2)(-2l)$			D. $2t + 2$	
				E. $-t+2$	
	Look at the examples carefully and answer these questions:			F. $-2t^2 - 4t$	
	a) In which examples must you multiply $t$ into the bracket?		c)	Because of the commutative law:	
	<ul> <li>b) Simplify each example.</li> <li>c) Manual Annual Annua Annual Annual Annu</li></ul>	la sa thèo haona a 2		a + b = b + a	
	c) You should have got the same answer for C and D. Why d	does this happen?	d)	(t+1)-t+1	
	d) Make one change to D so that the answer is 2.				
2)	Look at the 3 examples of algebraic expressions in the box be	low. Read all the	2)		
,	questions (a-d) before you begin.		, a)		
			,	A. $4(5n)$	
	A. $4(2p + 3p)$			B $4n(3n+2)$	
	B. $4p(p + 2p + 2)$			$\int 4n(2n \pm 4)$	
	C. $4p(3+2p+1)$		b)	c. = p(2p + 1)	
			5,	$\Delta) = 20n$	
	a) Re-write A, B and C by adding the like terms in the brack	ets.		B) $12n^2 + 8n$	
	b) Now simplify your new expressions for A, B and C.			C) $8n^2 + 16n$	
	c) Now go back to the original expressions for A, B and C in	the box. Simplify	c)	C, 0p 110p	
	by applying the distributive law.		0)	A 20n	
	d) Check that you get the same answers in Q2b and Q2c.			<b>B</b> $12n^2 \pm 8n$	
				<b>b.</b> $12p + 6p$	
			d)	C. $12p + 6p$	
			u)	res, they are the same.	
3)	Look at the 8 examples of algebraic expressions in the box.		3)		
			a)	F and H	
	A. $2a + (3 + a)$		b)	B,C, F and H	
	B. $2 + a + (3 + a)$		c)	A, D,E and G	
	C. $2 + a(3 + a)$		d)		
	D. $a + a(3 + a)$			A. $6a + 2a^2$	
	E. $a + a + (3 + a)$			B. $3a + 3$	
	F. $2 + 2(3 + a)$			C. $5 + 2a$	
	G. $3 + 2 + (3 + a)$			D. $2 + 3a + a^2$	
				E. $4a + a^2$	
	a) in which examples can you simplify terms <u>outside</u> the bra	acket before you		F. $3a + 3$	
	deal with the bracket?			G. $8 + 2a$	
	b) In which examples are the brackets unnecessary?			H. $8 + a$	
	c) In which examples must you apply the distributive law?				
	d) Simplify each example. Try to go from the question straig	ght to the answer.			
4)	Simplify:		4)		
	a) $m - 2 + m - 2$		a)	2m - 4	
	b) $x + y - 2(x + y)$		b)	-x-y	
	c) $3r + (4 - r)2$		c)	r + 8	
	d) $3r + 2 - (4 - r)$		d)	4r - 2	
	e) $(2x + y) - 2x + y$		e)	2 <i>y</i>	
	f) $-2(x + y) - (x + y)$		f)	-3x - 3y	



In this worksheet you will focus on: adding, subtracting and multiplying algebraic expressions which have 2 or more terms in brackets and 3 or more terms in the expressions.

Qu	Questions					
1)	1) There are 6 examples of algebraic expressions in the box below					
	A. $5 - a(a + 5)$ D. $(a + 3) + a + 3$ B. $(a + 5)5 - a$ E. $(a + 4) - 4a$ C. $3 + a + (a + 3)$ F. $(a + 4)(-4a)$					
	<ul> <li>Look at the examples carefully and answer these questions:</li> <li>a) In which examples must you multiply <i>a</i> into the bracket?</li> <li>b) Simplify each example.</li> <li>c) You should have got the same answer for C and D. Why does this happen?</li> <li>d) Make one change to D so that the answer is 2a.</li> </ul>					
2)	<ul> <li>Look at the 3 examples of algebraic expressions in the box below. Read all the questions (a-d) before you begin.</li> <li>A. 5(p + 3p)</li> <li>B. 5p(p + 3p + 2)</li> <li>C. 5p(3 + p + 1)</li> <li>a) Re-write A, B and C by adding the like terms in the brackets.</li> <li>b) Now simplify your new expressions for A, B and C.</li> <li>c) Now go back to the original expressions for A, B and C in the box. Simplify by applying the distributive law.</li> <li>d) Check that you get the same answers in Q2b and Q2c.</li> </ul>					
3)	Look at the 8 examples of algebraic expressions in the box. A. $2x(4 + x)$ E. $x - x(4 + x)$ B. $2x + (4 + x)$ F. $x - x + (4 + x)$ C. $2 + x + (1 - x)$ G. $1 + (3 + x)2$ D. $2 + x(1 - x)$ H. $1 + 2 - 3(1 + x)$ a) In which examples can you simplify terms <u>outside</u> the bracket before you deal with the bracket? b) In which examples must you apply the distributive law? c) In which examples are the brackets unnecessary? d) Simplify each example.					
4)	Simplify:a) $2b + 3(4 - b) + b$ d) $(x + y) - 2x + x$ a) $2b + 3 - (4 - b) + 5b$ e) $-2x(x + y) - 2x - x$ c) $2b - 3 + b(4 - b) + 5$ f) $(x + y + 3) - 2x - 3$					



Answers				
Questions			Answers	
1)	There are 6 examples of algebraic expressions in the bo A. $5 - a(a + 5)$	ox below.	1) a)	A and F
	B. $(a + 5)^{5} - a$ C. $3 + a + (a + 3)$ D. $(a + 3) + a + 3$ E. $(a + 4) - 4a$ F. $(a + 4)(-4a)$		b)	A. $5 - a^2 - 5a$ B. $4a + 25$ C. $6 + 2a$ D. $2a + 6$
	Look at the examples carefully and answer these questions:			E. $-3a + 4$
	<ul> <li>a) In which examples must you multiply <i>a</i> into the bracket?</li> <li>b) Simplify each example.</li> <li>c) You should have got the same answer for C and D. Why does this happen?</li> </ul>			F. $-4a^2 - 16a$
			c)	Addition is commutative
			d)	$(a+4) + \mathbf{a} - 4 = 2a$
	d) Make one change to D so that the answer is $2a$ .			
2)	Look at the 3 examples of algebraic expressions in the box below. Read all the questions (a-d) before you begin. A. $5(p + 3p)$		2) a)	A. 5(4 <i>p</i> )
	B. $5p(p + 3p + 2)$ C. $5p(3 + p + 1)$		b)	B. $5p(4p+2)$ C. $5p(4+p)$
	<ul> <li>a) Re-write A, B and C by adding the like terms in the brackets.</li> <li>b) Now simplify your new expressions for A, B and C.</li> <li>c) Now go back to the original expressions for A, B and C in the box. Simplify by applying the distributive law.</li> <li>d) Check that you get the same answers in Q2b and Q2c.</li> </ul>		c)	A. $20p$ B. $20p^2 + 10p$ C. $20p + 5p^2$
			d)	A. $20p$ B. $20p^2 + 10p$ C. $20p + 5p^2$ Yes, they are the same
3)	3) Look at the 8 examples of algebraic expressions in the box.		3)	
			a)	C,F and H
	A. $2x(4+x)$ a) In which example	oles can you simplify	b)	A, D,E,G and H
	B. $2x + (4 + x)$ terms <u>outside</u> the bracket beforeC. $2 + x + (1 - x)$ you deal with the bracket?D. $2 + x(1 - x)$ b) In which examples must you applyF. $x = x(4 + x)$ the distribution law?		c)	B,C and F
			d	A 0 1. 2?
				A. $8x + 2x^2$ B. $3x \pm 4$
	E. $x - x + (4 + x)$ the distributive law?			$\begin{array}{c} \mathbf{B},  \mathbf{S}, \mathbf{T} \neq \mathbf{I} \\ \mathbf{C}  \mathbf{S} \end{array}$
	G. $1 + (3 + x)^2$ unnecessary?I. $1 + 2 - 3(1 + x)$ d) Simplify each example.			D. $2 + x - x^2$
				E. $-3x - x^2$
				F. $4 + x$
				G. $7 + 2x$
				Н. −3 <i>х</i>
4)	Simplify: a) $2b + 3(4 - b) + b$ b) $2b + 3 - (4 - b) + 5b$ c) $2b - 3 + b(4 - b) + 5$ d) $(x + y) - 2x + x$ e) $-2x(x + y) - 2x - x$ f) $(x + y + 3) - 2x - 3$		4) a) b) c) d) e) f)	$12$ $8b - 1$ $-b^{2} + 6b + 2$ $y$ $-2x^{2} - 2xy - 3x$ $-x + y$
1			1	


In this worksheet you will focus on: adding, subtracting and multiplying algebraic expressions which have 2 or more terms in brackets and 3 or more terms in the expressions.

Questions						
·						
1)	) There are 6 examples of algebraic expressions in the box below.					
	A. $(p + 3) - 5 - p$ D. $(p + 3)5 - p$					
	B. $5 - p - (p + 3)$ E. $(p + 3) - 5p$					
	C. $5p(p+3)$ F. $(p+3)(-5p)$					
	Look at the examples carefully and answers these questions:					
	a) In which examples must you multiply p into the bracket? b) In which examples must you multiply 5 (or $-5$ ) into the bracket?					
	$c_{j}$ Simplify each example					
2)	Look at the 5 examples of algebraic expressions in the box below.					
-,	A. $2m(6 + 2m + 1)$ D. $2(6 + 2m + am)$					
	B. $2m(m + 6m + k)$ E. $2m(6 + 2m + k)$					
	C. $2(k + m + 1)$					
	a) In which examples can you simplify terms inside the bracket before you apply the distributive					
	law?					
	b) Simplify by applying the distributive law.					
3)	Look at the 8 examples of algebraic expressions in the box.					
	A. $2t(4+t)$ E. $t-t(4+t)$					
	B. $2t + (4+t)$ F. $t + t + (3-t)$					
	C. $2+t-(4+t)$ G. $2+2(3+t)$					
	D. $2 + t(4 + t)$ H. $10 + 3 - (3 - t)$					
	a) In which examples can you simplify terms outside the bracket before you deal with the bracket?					
	a) In which examples can you simplify terms <u>outside</u> the bracket before you deal with the bracket?					
	c) In which examples are the brackets unnecessary?					
	d) Simplify each example. Try to go from the question straight to the answer					
	ay simplify each example. By to go nom the question straight to the answer.					
4)	Simplify:					
	a) $4n + 3(5 - n) + n$					
	b) $4n + 3 - (5 - n) + n$					
	c) $4n - 3 + n(5 - n) + 5$					
	d) $(c + d) - 4c + c$					
	e) $(c + d + 3) - 4c - 3c(c + d + 3) - 3$					
	f) $-4c(c + d) - 4c - (c + d)(-4c) - c - 2$					



Answers						
Questions			Answers			
1)	There are 6 examples of algebraic expressions in the box below. A. $(p + 3) - 5 - p$ B. $5 - p - (p + 3)$ C. $5p(p + 3)$ D. $(p + 3)5 - p$ E. $(p + 3) - 5p$ F. $(p + 3)(-5p)$ Look at the examples carefully and answers these questions: a) In which examples must you multiply $p$ into the bracket? b) In which examples must you multiply 5 (or $-5$ ) into the bracket? c) Simplify each example.	1) a) b) c)	C and F C, D and F A. $-2$ B. $2 - 2p$ C. $5p^2 + 15p$ D. $4p + 15$ E. $-4p + 3$ F. $-5p^2 - 15p$			
2)	Look at the 5 examples of algebraic expressions in the box below. A. $2m(6 + 2m + 1)$ B. $2m(m + 6m + k)$ C. $2(k + m + 1)$ D. $2(6 + 2m - 6m)$ E. $2m(6 + 2m + k)$ a) In which examples can you simplify terms <u>inside</u> the bracket before you apply the distributive law? b) Simplify by applying the distributive law.	2) a) b)	A, B and D A. $14m + 4m^2$ B. $14m^2 + 2mk$ C. $2k + 2m + 2$ D. $12 - 8m$ E. $12m + 4m^2 + 2mk$ $= 4m^2 + 2mk + 12m$			
3)	Look at the 8 examples of algebraic expressions in the box. A. $2t(4+t)$ B. $2t + (4+t)$ C. $2+t - (4+t)$ D. $2+t(4+t)$ E. $t - t(4+t)$ F. $t + t + (3-t)$ G. $2+2(3+t)$ H. $10 + 3 - (3-t)$ a) In which examples can you simplify terms <u>outside</u> the bracket before you deal with the bracket? b) In which examples must you apply the distributive law? c) In which examples are the brackets unnecessary? d) Simplify each example. Try to go from the question straight to the answer.	3) a) b) c) d)	F and H A, D, E and G B and F A) $8t + 2t^2$ B) $3t + 4$ C) $-2$ D) $2 + 4t + t^2$ E) $-3t - t^2$ F) $t + 3$ G) $8 + 2t$ H) $10 + t$			
4)	Simplify: a) $4n + 3(5 - n) + n$ b) $4n + 3 - (5 - n) + n$ c) $4n - 3 + n(5 - n) + 5$ d) $(c + d) - 4c + c$ e) $(c + d + 3) - 4c - 3c(c + d + 3) - 3$ f) $-4c(c + d) - 4c - (c + d)(-4c) - c - 2$	4) a) b) c) d) e) f)	15 + 2n 4n - 2 $-n^{2} + 9n + 8$ -2c + d $-12c + d - 3c^{2} - 3cd$ $= -3c^{2} - 3cd - 12c + d$ -5c - 2			



In this worksheet you will focus on: adding, subtracting and multiplying algebraic expressions which have 2 or more terms in brackets and 3 or more terms in the expressions.

Questions 1) There are 6 examples of algebraic expressions in the box below. A. 4 - j - (j + 2)D. (j + 2)4 - jB. (j + 2) - 4 - jE. (j + 2) - 4jC. 4 - j(j + 2)F. (j + 2)(-4j)Look at the examples carefully and answers these questions: a) In which examples must you multiply *j* into the bracket? b) In which examples must you multiply 4 (or -4) into the bracket? c) Simplify each example. 2) Look at the 5 examples of algebraic expressions in the box below. A. 2g(g + 2g + h) D. 2(h + 3g + 3)B. 2g(4 + 2g + 3) E. 2g(4 + 3g + h)C. 2(4 + 2g + 3g)a) In which examples can you simplify terms inside the bracket before you apply the distributive law? b) Simplify by applying the distributive law. 3) Look at the 8 examples of algebraic expressions in the box: A. 3t(4+t) + 5E. -t - t(4 + t)B. 3t + (4+t) - 5F. t+t+(2-t)+5C. 3+t-(4+t)G. -3+3(2+t)+tD. -3 + t(4 + t) - t H. 10 + 2 - (2 - t)a) In which examples can you simplify terms outside the bracket before you deal with the bracket? b) In which examples must you apply the distributive law? c) In which examples are the brackets unnecessary? d) Simplify each example. Try to go from the question straight to the answer. 4) Simplify: a) 2u + 3(4 - u) + ub) 2u + 3 - (4 - u) + 5uc) 2u - 3 + u(4 - u) + 5d) (a + b) - 2a + ae) (a + b + 3) - 2a - 3a(a + b + 3) - 3f) -2a(a + b) - 2a - (a + b)(-2a) - a - 2



Answers						
Questions		Answe	Answers			
1)	There are 6 examples of algebraic expressions in the box below:	1)				
	A. $4 - j - (j + 2)$	a)	) C and F			
	B. $(j + 2) - 4 - j$	b	) D and F			
	C. $4 - j(j + 2)$	c)				
	D. $(j + 2)4 - j$		A. $-2i + 2$			
	E. $(j + 2) - 4j$		B2			
	F. $(j + 2)(-4j)$		$i^2 - 2i = -i^2 - 2i + 4$			
			$D_{3i+8}$			
	Look at the examples carefully and answers these questions:		$D_{i} = -2i \pm 2$			
	d) In which examples must you multiply <i>j</i> into the bracket?		$-1;^2 \circ;$			
	e) In which examples must you multiply 4 (or $-4$ ) into the bracket?		F. $-4j = 0j$			
	f) Simplify each example.					
2)	Look at the 5 examples of algebraic expressions in the box below:	2)				
	A. $2g(g + 2g + h)$	a	) A, B and C			
	B. $2g(4+2g+3)$	b	)			
	C. $2(4 + 2g + 3g)$		A. $6a^2 + 2ah$			
	D. $2(h + 3g + 3)$		B. $14g + 4g^2$			
	E. $2g(4 + 3g + h)$		C. $8 + 10q$			
			D. $2h + 6a + 6$			
			= 6a + 2h + 6			
	a) In which examples can you simplify terms <u>inside</u> the bracket before		E. $8a + 6a^2 + 2ah$			
	you apply the distributive law?		$= 6a^2 + 2ah + 8a$			
	b) Simplify by applying the distributive law.		5 5 5			
3)	Look at the 8 examples of algebraic expressions in the box:	3)				
-,	$\begin{bmatrix} A & 3t(4+t) + 5 \end{bmatrix}$	-, a)	) Eand H			
	B $3t + (4 + t) - 5$	b	) A D F and G			
	C = 3 + t - (4 + t)	c)	B and F			
	D. $-3 + t(4 + t) - t$	d'				
	F = -t - t(4 + t)	u,	$1 = 12t + 3t^2 + 5 = 3t^2 + 12t + 5$			
	F. $t+t+(2-t)+5$		R $4t - 1$			
	$G_{1} = -3 + 3(2 + t) + t$		-1			
	H. $10 + 2 - (2 - t)$		$-3 + 3t + t^2$			
			E $-5t - t^2$			
	a) In which examples can you simplify terms outside the bracket		E + 7			
	before you deal with the bracket?		$G_{1} = 3 + 4t$			
	b) In which examples must you apply the distributive law?		H. $10 + t$			
	c) In which examples are the brackets unnecessary?					
	d) Simplify each example. Try to go from the question straight to the					
	answer					
4)	Simplify:	4)				
	a) $2u + 3(4 - u) + u$	a)	12			
	b) $2u + 3 - (4 - u) + 5u$	b)	8u - 1			
	c) $2u - 3 + u(4 - u) + 5$	c)	$-u^2 + 6u + 2$			
	d) $(a + b) - 2a + a$	(b	b			
	e) $(a + b + 3) - 2a - 3a(a + b + 3) - 3$	e)	$-3a^2 - 3ab - 10a + b$			
	f) $-2a(a + b) - 2a - (a + b)(-2a) - a - 2$	£)	-3a-2			
		.,				