

# Worksheet 9: Algebra Part 1

Give yourself plenty of space to answer these questions, don't scrunch the answers up in the margin of the handout!

## Gateway skills: revision

- 1) Work out  $5 - 7 + 6 - 8 + 2 - 4 + 5$
- 2) Work out  $14 - 17 + 12 + 3 - 19 + 10 - 20$
- 3) Work out  $12 \times -4$
- 4) Write down the value of  $-5 \times -6$
- 5) Calculate the answer to  $5 \times -6 - -7 \times 3$
- 6) Work out  $5^8 \times 5^4$  and give your answer as a power of 5
- 7) What is  $3^4 \times 3$  as a power of 3?
- 8) Calculate  $\frac{2^7 \times 2^3}{2^6}$  and give your answer as a power of 2
- 9) Work out  $8 \times 6 - -3 \times 2^2$
- 10) Calculate  $5(3 - 7) + 2(21 - 3 \times 2)$

## Simplifying combinations of terms

- 1) Simplify  $a + a + a + a - a$
- 2) Simplify  $a \times b$
- 3) Simplify  $b \times b \times b \times b$
- 4) Multiply  $6r \times 9s \times 3a$
- 5) Multiply  $-5x \times 4y$
- 6) Multiply  $-7p \times 5p$
- 7) Simplify  $4k + 5k - 7k$
- 8) Simplify  $b^2 + b^2 + b^2 - b^2$

## Substitute into formulas

- 1) The taxi company charges as follows  
“£2.40 goes on the meter when you get in, then its £1.80 per mile travelled”
  - a) Calculate the cost of a journey of 7 miles
  - b) Algernon paid £25.80 for a ride. How far did he go?
  - c) Draw a function machine showing how the cost is calculated
  
- 2)  $A = 3P + 4Q$ 
  - a) Calculate the value of A when  $P = 5$  and  $Q = 8$
  - b) Calculate the value of A when  $P = 9$  and  $Q = -5$
  - c) Calculate the value of P if  $A = 20$  and  $Q = 2$
  
- 3)  $B = 6R - 7S$ 
  - a) Calculate the value of B when  $R = 3$  and  $S = 4$
  - b) Calculate the value of B when  $R = 5$  and  $S = -6$
  - c) Calculate the value of S if  $B = 39$  and  $R = 10$
  
- 4) The formula  $A = \frac{(a+b)}{2} \times h$  crops up in a few weeks.
  - a) Calculate the value of A when  $a = 5$ ,  $b = 7$  and  $h = 4$
  - b)  $A = 35$ ,  $a = 6$  and  $b = 8$ . Find the value of  $h$ .
  
- 5)  $y = 3x - 2$ 
  - a) Calculate the value of y when x is 4
  - b) Calculate the value of y when x is 2
  - c) Calculate the value of y when x is 0
  - d) Calculate the value of y when x is -2
  
- 6)  $y = x^2 + 9$ 
  - a) Calculate the value of y when  $x = 2$
  - b) Calculate the value of y when  $x = 0$
  - c) Calculate the value of y when  $x = -2$
  
- 7)  $A = \pi R^2$   
Calculate A when  $\pi = 3.1$  and  $R = 7$

## Collecting like terms

Simplify all the following expressions where possible.

If you find an expression that is already in its simplest form then copy it out and put a star next to it

1)  $3k + 6k - 8k$

2)  $4a + 3b$

3)  $a + a + a + a + b + b + b$

4)  $9x - 12x + 5x$

5)  $2y - 5y + y + y$

6)  $10x - 8x + x - 3x$

7)  $5a + 7 + a - 3$

8)  $8x + 14 - 5x + 6$

9)  $-5y + 8 - 3y + 7$

10)  $9p + 6 - 4p + 8 - 3p - 12$

11)  $4x + 3y + 2x + 5y$

12)  $6x + 5y$

13)  $8x + 2y - 5x + 2y$

14)  $4a - b + 3a - 5b$

15)  $12p + 4p - 5q + q$

16)  $4x^2 + 3x - 2x^2 + x$

17)  $x^2 - 5x - 3x^2 + 5x$

18)  $7p^2 + p - p^2 - 2p + 5$

19)  $3y^2 + 4x^2 + 2y - 4x - 2y^2 - 3x^2$

20)  $3x + 2xy - 4y + 3xy - 2x$

## Multiplying out brackets

- 1) Multiply out  $3(4x + 2)$
- 2) Multiply out  $5(2x + 7)$
- 3) Multiply out  $-2(4p + 7)$
- 4) Multiply out  $7(4p - 3)$
- 5) Multiply out  $-2(3q - 5)$
- 6) Multiply out and simplify  $2(3x + 1) + 3(4x + 5)$
- 7) Multiply out and simplify  $3(2x - 5) + 2(x + 1)$
- 8) Multiply out and simplify  $3(5a + 2) - 3(3a + 4)$
- 9) Multiply out and simplify  $2(2y - 3) - 3(2y - 7)$
- 10) Multiply out and simplify  $2x(x + 3) - (x - 3)$

## Factorise

Factorise the expressions below as far as you can.

Watch out for the ones with powers in the expression

- 1)  $14x + 7$
- 2)  $27x - 12$
- 3)  $4x - 6$
- 4)  $3x^2 + 6x$
- 5)  $x^2 + x$  Hint: common factor is a letter!
- 6)  $21x^2 - 28x$
- 7)  $x^3 + x$
- 8)  $6x^2 - 2xy$
- 9)  $3x^2y^2 - 9xy$  Hint: write  $x^2$  as  $xx$  and  $y^2$  as  $yy$ .