

Writing and using word formulae



Example 1

David works in a factory. He is paid by the hour and is given an extra bonus at the end of the week. His pay can be calculated using this word formula:

$$\text{pay} = \text{rate of pay} \times \text{hours worked} + \text{bonus}$$

Work out his pay when he works for 40 hours at a rate of pay of £7 an hour and earns a bonus of £20.

$$\text{pay} = £7 \times 40 + £20 = £280 + £20 = £300$$

He earns £300.

Example 2

Rashmi buys 24 pens at 65 pence each. Write down a word formula then use it to work out the total cost of the pens.

Here is a suitable word formula: $\text{cost} = \text{number of pens} \times \text{cost of one pen}$
 $= 24 \times 65\text{p} = 1560\text{p} = £15.60$

Exercises

1. To work out his pay Keith uses the word formula:

$$\text{pay} = \text{rate of pay} \times \text{hours worked} + \text{bonus}$$

(a) Work out his pay when he works for 30 hours at a rate of pay of £6 an hour and earns a bonus of £30.

(b) Work out his pay when he works for 35 hours at a rate of pay of £5.50 an hour and earns a bonus of £15.

2. To work out the distance around her bicycle wheel Davina uses the formula:

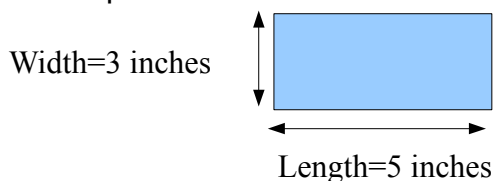
$$\text{distance} = 3 \times \text{diameter}$$

(a) Work out the distance around the wheel if the diameter is 60 cm.

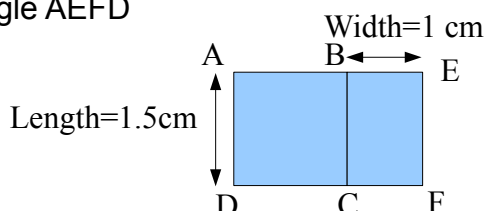
(b) Work out the distance around the wheel if the diameter is 50 cm.

For each of the following questions, first write down a word formula, then use it to help you find the answers.

1. Daniel works for 30 hours at a rate of pay of £9 an hour. How much should he get paid?
2. Susan buys 12 pens at £1.20 each. Work out the total cost of the pens.
3. Karen sells 50 cakes at 40p each. How much money does she collect?
4. Mark adds together his age and the age of his sister Pauline. He gets a total of 28. If Mark is 16 how old is Pauline?
5. James loses some £1 coins from his money bag. He had £12 to start with and now only has £7. How many coins has he lost?
6. At Anne's birthday party there were 48 cans of drink. Everybody at the party had 4 cans. How many people were at the party?
7. Evan and his 9 friends were playing football and smashed a window. The cost of repairing the window was £126. The 10 friends decided to split the cost equally between them. How much did they each have to pay?
8. Work out the perimeter and the area of this rectangle :



9. Work out the perimeter and the area of square ABCD rectangle BECF and rectangle AEFD



Writing and using algebraic formulae

It is usual in algebra to write a word formula using letters.

Example: Write the word formula used in Example 2 as an algebraic formula.

$$\text{Cost} = \text{number of pens} \times \text{cost of one pen}$$

Use the letters C for cost, N for number of pens, and P for cost of one pen.

The algebraic formula is: $C=N \times P$ or $C=NP$

An algebraic formula uses letters to represent a relationship between quantities.

Substituting number values for the letters

Example : Let $a=3$, $b=2$ and $c=5$

Work out the value of (a) $a+b$ (b) ab (c) $3c-2a$

(a) $a+b=3+2=5$

(b) $ab=3 \times 2=6$

(c) $3c-2a=3 \times 5-2 \times 3=15-6=9$

Exercises

- Write an algebraic formula for questions 1-9. Remember to explain what each letter stands for.
- To convert from Celsius to Fahrenheit use this formula : $F=C \times 1.8+32$
 - Convert 37°C to Fahrenheit
 - Convert 0°C to Fahrenheit

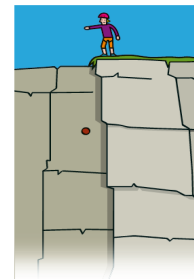


- The formula for working out how far a ball has fallen when dropped off a cliff is: $s=5t^2$

Find the value of s when t is:

(a) 1 (b) 2 (c) 5 (d) 10 (e) 3.5

Remember BIDMAS.
Work out Indices before
Multiplication.



- Copy this table of values.

x	- 3	- 2	- 1	0	1	2	3
$y=3x^2+4$							

- In this exercise $a=3$, $b=-2$ and $c=5$. Work out the value of these expressions.

1 $a+b+c$

2 $a-b-c$

3 $ab+ac$

4 $a(b+c)$

5 a^2+ab

6 $a(a+b)$

7 a^2+c^2

8 b^2

9 ac^2

10 ab^2

11 $(a+bc)^2$

12 $a^2(b-c)$

- Work out the previous expressions when $a=-4$, $b=+0.5$ and $c=-3$

- The formulae $v=u+at$ and $d=ut+at^2 \div 2$ are used in science to work out velocities and distances: (u =initial velocity, a =acceleration, d =distance and t =time)

- Work out the value of v and d when $u=5$, $a=2$ and $t=10$
- Work out the value of v and d when $u=0$, $a=5$ and $t=12$

