

Substitution

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Find $4x - 3$ when $x = -2$

Step 1 · Write out the expression with x replaced

$$4(-2) - 3$$

Step 2 · Multiply: $4 \times (-2) = -8$

$$-8 - 3$$

Step 3 · Subtract

$$-11$$

Answer: -11

Check: $x = -2$: $4(-2) - 3 = -8 - 3 = -11$ ✓

2. Now try one with the steps

Find $2a^2 - 3b$ when $a=3$, $b=4$

Step 1 · Apply indices first: $a^2 = 3^2 = 9$

Step 2 · Multiply each term

Step 3 · Subtract

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. If $x = 4$, find $3x + 7$ [1]

2. If $a = 2$, $b = 3$, find $2a + 3b$ [1]

3. If $x = -2$, find $x^2 + 3x - 1$ [2]

4. Using $A = \frac{1}{2}(a+b)h$, find A when $a=3$, $b=7$, $h=4$ [2]

5. If $p = 2$, $q = -3$, find $p^2 - q^2$ [2]

6. Using $v = u + at$, find v when $u=5$, $a=3$, $t=4$ [2]

7. If $y = 5$, find $4y - 9$ [1]

8. If $m = 6$, find $m/3 + 2$ [1]

9. If $x = 3$, find $2x^2$ [1]

10. If $a = -4$, find $5 - a$ [1]

11. Bike hire costs $C = 12 + 4h$ pounds, where h is the number of hours. Find the cost of hiring a bike for 5 hours. [2]

12. If $p = 3$ and $q = -2$, find $pq + q^2$ [2]

13. Using $P = 2(l + w)$, find P when $l = 8.5$ and $w = 3$ [2]

14. Using $F = 1.8C + 32$, change 25°C into degrees Fahrenheit. [2]

15. If $x = -3$, find $x^3 - 2x$ [2]

16. Using $s = ut + \frac{1}{2}at^2$, find s when $u = 2$, $t = 4$ and $a = 3$ [3]

17. If $a = \frac{1}{2}$ and $b = 4$, find a^2b [2]

4. Before you hand it in

$x = 3$, so $x^2 = 3 \times 2 = 6$ (multiplying by 2 instead of squaring)

x^2 means $x \times x$. If $x = 3$, then $x^2 = 3 \times 3 = 9$. Always write x^2 as $(x)(x)$ before substituting.

When $x = -3$, $-x^2 = 9$ (positive — forgetting the negative sign)

$-x^2$ with $x = -3$: $-(-3)^2 = -(9) = -9$. The minus sign in front of x^2 applies AFTER squaring.

$2a + 3b$ with $a=4$, $b=5 \rightarrow 2 \times 4 + 3 \times 5 = 8 + 15 = 23...$ but writing $23ab$

Once you've substituted numbers, there are no letters left. $2(4) + 3(5) = 8 + 15 = 23$. That's it — a plain number.