

ALGEBRA: FUNCTIONS**Best Guess Mastery Worksheet (Target Grade 7/8)****I Do**

The functions f and g are defined such that:

$$f(x) = \frac{3x - 5}{2}$$

$$g(x) = 2x^2 + 1$$

(a) Find $f^{-1}(x)$.

$$f^{-1}(x) = \dots\dots\dots$$

(b) Work out the value of $gf(3)$.

$$gf(3) = \dots\dots\dots$$

We Do

The functions h and k are defined such that:

$$h(x) = \frac{4x + 1}{3}$$

$$k(x) = x^2 - 5$$

(a) Find $h^{-1}(x)$.

$$h^{-1}(x) = \dots\dots\dots$$

(b) Work out the value of $kh(2)$.

$$kh(2) = \dots\dots\dots$$

ALGEBRA: FUNCTIONS**Best Guess Mastery Worksheet (Target Grade 7/8)**

You Do 1

The functions p and q are defined such that:

$$p(x) = 5(x - 2)$$

$$q(x) = 3x^2$$

(a) Find $p^{-1}(x)$.

$$p^{-1}(x) = \dots\dots\dots$$

(b) Work out the value of $qp(4)$.

$$qp(4) = \dots\dots\dots$$

You Do 2

The functions m and n are defined such that:

$$m(x) = \frac{2x}{5} + 3$$

$$n(x) = (x + 1)^2$$

(a) Find $m^{-1}(x)$.

$$m^{-1}(x) = \dots\dots\dots$$

(b) Work out the value of $nm(10)$.

$$nm(10) = \dots\dots\dots$$

ALGEBRA: COMPOSITE FUNCTIONS (ALGEBRAIC)**Best Guess Mastery Worksheet (Target Grade 8/9)****Challenge 1**

Using the functions $f(x) = \frac{3x-5}{2}$ and $g(x) = 2x^2 + 1$

Find the composite function $fg(x)$.

Give your answer in its simplest form.

$$fg(x) = \dots\dots\dots$$

Challenge 2

Using the functions $f(x) = \frac{3x-5}{2}$ and $g(x) = 2x^2 + 1$

Solve the equation $f(x) = g(2)$.

$$x = \dots\dots\dots$$

Answers & Worked Solutions

I Do:

(a) Let $y = (3x - 5)/2 \rightarrow 2y = 3x - 5 \rightarrow 2y + 5 = 3x \rightarrow x = (2y + 5)/3$. Swap x and y : $f^{-1}(x) = (2x + 5)/3$

(b) First find $f(3)$: $f(3) = (3(3) - 5)/2 = 4/2 = 2$.

Then plug into g : $g(2) = 2(2)^2 + 1 = 2(4) + 1 = 9$.

We Do:

(a) Let $y = (4x + 1)/3 \rightarrow 3y = 4x + 1 \rightarrow 3y - 1 = 4x \rightarrow x = (3y - 1)/4$. Swap: $h^{-1}(x) = (3x - 1)/4$

(b) First find $h(2)$: $h(2) = (4(2) + 1)/3 = 9/3 = 3$.

Then plug into k : $k(3) = (3)^2 - 5 = 9 - 5 = 4$.

You Do 1:

(a) Let $y = 5(x - 2) \rightarrow y/5 = x - 2 \rightarrow x = (y/5) + 2$. Swap: $p^{-1}(x) = (x/5) + 2$

(b) First find $p(4)$: $p(4) = 5(4 - 2) = 5(2) = 10$.

Then plug into q : $q(10) = 3(10)^2 = 3(100) = 300$.

You Do 2:

(a) Let $y = (2x/5) + 3 \rightarrow y - 3 = 2x/5 \rightarrow 5(y - 3) = 2x \rightarrow x = 5(y - 3)/2$. Swap: $m^{-1}(x) = 5(x - 3)/2$

(b) First find $m(10)$: $m(10) = (2(10)/5) + 3 = 4 + 3 = 7$.

Then plug into n : $n(7) = (7 + 1)^2 = 8^2 = 64$.

Challenge 1:

1. Substitute $g(x)$ into $f(x)$: $f(g(x)) = [3(2x^2 + 1) - 5] / 2$

2. Expand the bracket: $(6x^2 + 3 - 5) / 2$

3. Simplify numerator: $(6x^2 - 2) / 2$

4. Divide both terms by 2: $3x^2 - 1$

Challenge 2:

1. Find the numerical value of $g(2)$: $g(2) = 2(2)^2 + 1 = 2(4) + 1 = 9$.

2. Set $f(x)$ equal to 9: $(3x - 5) / 2 = 9$

3. Multiply by 2: $3x - 5 = 18$

4. Add 5: $3x = 23$

5. Divide by 3: $x = 23/3$ (or 7.66...)