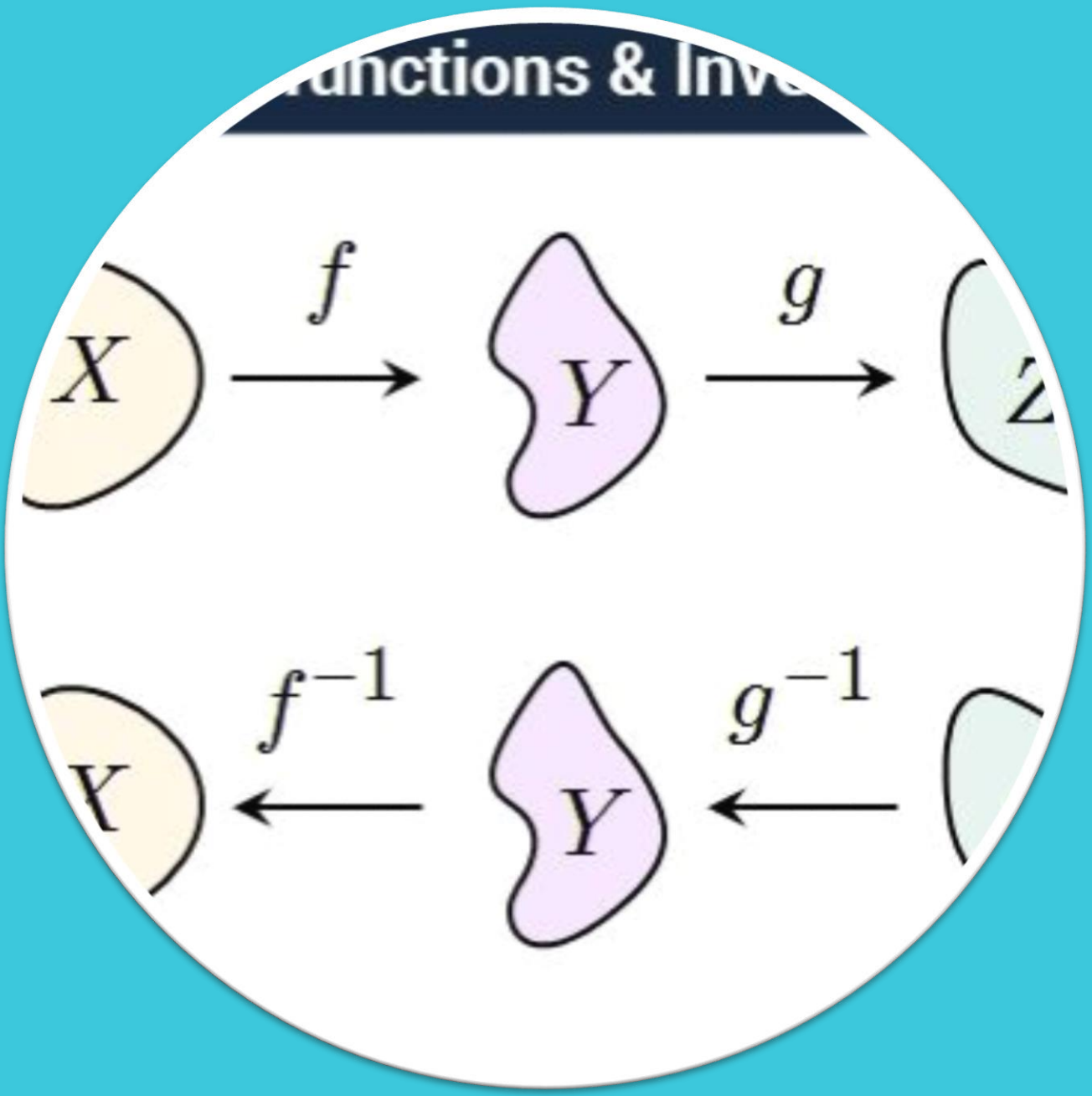

Functions

Key Stage 4 Revision Programme

Pupil Name	
Handbook Designed by	Dr. E. Sample

Timetable and Assignment Submission

Timetable – Tutorials

Tutorial	Date	Time	Location
1 (Baseline assessment)	**03/12/2019**	**3:15pm**	**I.T Room**
2	**10/12/2019**	**3:15pm**	**M1**
3	**17/12/2019**	**3:15pm**	**M1**
4	**07/01/2019**	**3:15pm**	**M1**
5	**14/01/2019**	**3:15pm**	**M1**
6 (Final assessment)	**21/01/2019**	**3:15pm**	**M1**
7 (Feedback)	**28/01/2019**	**3:15pm**	**I.T Room**

Timetable – Homework Assignments

Tutorial 1		
Tutorial 2		
Tutorial 3		
Tutorial 4		
Tutorial 5		

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Tutorial 5	**P25**
Tutorial 6	**P29**
Tutorial 7	**P30**

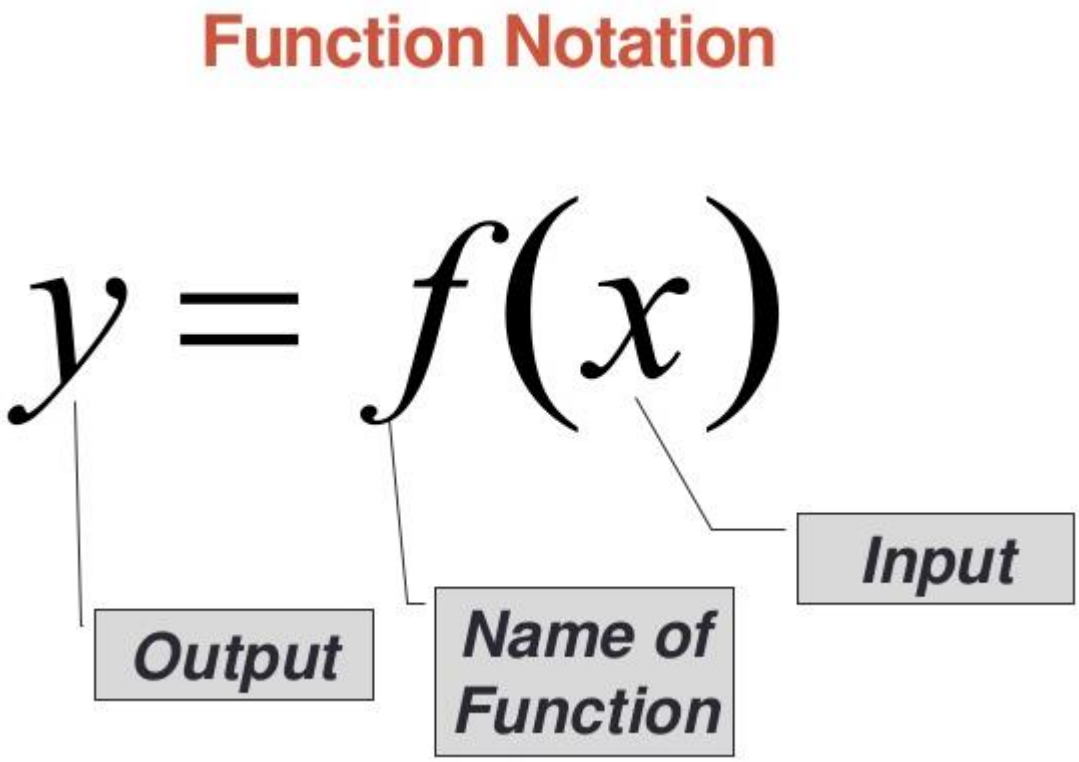
Course Rationale

There is scientific evidence that practice is key to mastery of any subject. By practice here I do not mean just repeatedly doing the same set/type of maths questions but applying and practicing skills rich, varying and engaging questions on the topic. Learning through varied practice makes learning and retention deeper. This particular subject knowledge enhancement programme focuses on supporting varied in-depth practice on the topic Functions in mathematics. This topic has recently been dropped from the A-level content into the GCSE content and examiners report show many pupils find it challenging. Discussions during tutorial will include real life applications of Functions that are often not obvious to pupils. It is hoped that experience gained, and independent learning developed by pupils will be transferred to other topics/subjects and enhance their overall achievement and attitude to learning.

Subject Vocabulary

Word	Definition	In a sentence
Input		
Output		
Composite		
Inverse		
Function		

Tutorial 1 – Baseline assessment and pre - SEF



What is the Purpose of Tutorial 1?

- Pre-SEF
- Baseline assessment

In this tutorial pupils will be introduced to the course structure and expectations. Keywords will be discussed, and pupils can then complete the subject vocabulary section of their workbooks.

Pupils will then complete a Pre-course survey and do a short 30 minutes baseline assessment.

Tutorial 2 – Evaluating Functions

Function	Evaluate f(4)
$f(x) = 5x$	$f(4) = 5(4) = 20$
$f(t) = t + 2$	$f(4) = 4 + 2 = 6$
$f(a) = a^2 + 3a + 1$	$f(4) = 4^2 + 3(4) + 1$ $= 16 + 12 + 1$ $= 29$

What is the Purpose of Tutorial 2?

- Function notations
- To evaluate simple functions

Function Notations

Mathematics equations are written as shown below:

$y = 6x + 5$ $\qquad$ $y = x^2 - 2$

Sometimes a different notation is used which is called **function notation**.

We often use the letters f and g and we write the above equations as

$f(x) = 6x + 5$ $\qquad$ $g(x) = x^2 - 2$

Evaluate functions

EXAMPLE 1

Using the equation $y = 3x + 4$, find the value of y if

(a) $x = 4$ (b) $x = -6$

(a) $y = 3(4) + 4 = 12 + 4 = 16$ ← Substitute for $x = 4$ in the equation

(b) $y = 3(-6) + 4 = -18 + 4 = -14$ ← Substitute for $x = -6$ in the equation

EXAMPLE 2

f is a function such that $f(x) = 3x + 4$

Find the values of

(a) $f(4)$ (b) $f(-6)$

(a) $f(4) = 3(4) + 4 = 12 + 4 = 16$ ← Substitute for $x = 4$ in the equation

(b) $f(-6) = 3(-6) + 4 = -18 + 4 = -14$ ← Substitute for $x = -6$ in the equation

EXAMPLE 3

g is a function such that $g(x) = 2x^2 - 5$

Find the values of (a) $g(3)$ (b) $g(-4)$

(a) $g(3) = 2(3)^2 - 5 = 18 - 5 = 13$ ← Substitute for $x = 3$ in the equation

(b) $g(-4) = 2(-4)^2 - 5 = 32 - 5 = 27$ ← Substitute for $x = -4$ in the equation

EXAMPLE 4

The functions f and g are defined for all real values of x and are such that

$f(x) = x^2 - 4$ and $g(x) = 4x + 1$

Find (a) $f(-3)$ (b) $g(0.3)$

(c) Find the two values of x for which $f(x) = g(x)$.

(a) $f(-3) = (-3)^2 - 4 = 9 - 4 = 5$ ← Substitute for $x = -3$ in the equation f(x)

(b) $g(0.3) = 4(0.3) + 1 = 1.2 + 1 = 2.2$ ← Substitute for $x = 0.3$ in the equation g(x)

(c) $x^2 - 4 = 4x + 1$ ← Put $f(x) = g(x)$

$x^2 - 4 - 4x - 1 = 0$ ← Rearrange the equation as a quadratic = 0

$x^2 - 4x - 5 = 0$ ← Simplify

$(x - 5)(x + 1) = 0$ ← Solve the quadratic by factorising

$x - 5 = 0$ or $x + 1 = 0$

$x = 5$ or $x = -1$

Practice 2: Show clearly the process of going from the questions to your answers

1. The function f is such that $f(x) = 5x + 2$

   Find (a) $f(3)$ (b) $f(-2)$ (c) $f(0.3)$

2. The function f is such that $f(x) = x^2 - 4$

   Find (a) $f(4)$ (b) $f(-6)$ (c) $f(-0.2)$

3. The function g is such that $g(x) = x^3 - 3x^2 - 2x + 1$

   Find (a) $g(0)$ (b) $g(-0.4)$ (c) $g(1.5)$

4. The function f is such that $f(x) = \sqrt{2x+5}$

   Find (a) $f(0)$ (b) $f(-1)$ (c) $f(1.5)$

5. $f(x) = 3x^2 - 2x - 8$

   Express $f(x + 2)$ in the form $ax^2 + bx$

6. The functions f and g are such that

   $f(x) = 3x - 5$ and $g(x) = 4x + 1$

   (a) Find (i) $f(-1)$ (ii) $g(2)$

   (b) Find the value of x for which $f(x) = g(x)$.

7. The functions f and g are such that

   $f(x) = 2x^2 - 1$ and $g(x) = 5x + 2$

   (a) Find $f(-3)$ and $g(-5)$

   (b) Find the two values of x for which $f(x) = g(x)$.

Assessment 2

Discuss in pairs any errors you made and how you dealt with it

Circle the correct answer (You must show the process for your answers)

1) g(x) = 4x – 1. Find $g\left(\frac{x+1}{4}\right)$

A) 3x B) x + 3 C) x D) $\frac{4x+1}{4} - 1$

2) f(x) = 9x – 2, g(x) = x^2. Solve f(x) = g(x + 2)

A) x = 3 or x = -2 B) x = -6 or x = 1 C) x = 3 or x = 2

D) x = 6 or x = -1

3) f(x) = x^2 – 4, g(x) = 4x – 1. Solve f(x) = g(x) + 2

A) x = 5 or x = -1 B) x = -5 or x = -1 C) x = -5 or x = 1

D) x = 4 or x = -1

4) Given f(x) = $2x^2$ + 4x – 3. Find f(2*a* + 3)

A) $8a^2 + 16a + 33$ B) $6a^2 + 20a + 27$ C) $4a^2 + 32a + 27$

D) $8a^2 + 32a + 27$

5) Given f(x) = x^2 - x – 4. Find f(x) = 8

A) x = 6 or x = 8 B) x = 4 or x = -3 C) x = -4 or x = -3

D) x = -6 or x = -8

Tutorial 3 – Composite functions

Composite functions

Composite functions are just two functions carried out in sequence.

Say $f(x) = 2x + 3$ and $g(x) = x^2 - 1$

Then $fg(x)$ means do $g(x)$ first, then do $f(x)$.

So to work out $fg(2)$, work out $g(2)$, then put what you get into $f(x)$.

$g(2) = 2^2 - 1$
$g(2) = 4 - 1 = 3$

Now do $f(3)$:

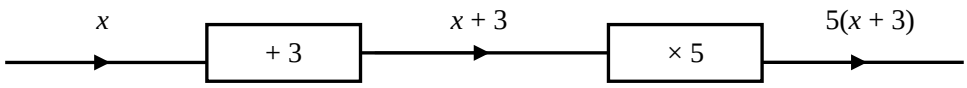
$f(3) = 2(3) + 3$
$f(3) = 6 + 3 = 9$

What is the Purpose of Tutorial 3?

- To Solve composite function problems

A **composite function** is a function consisting of 2 or more functions.

The term composition is used when one operation is performed after another operation. For instance:



This function can be written as $f(x) = 5(x + 3)$

Suppose $f(x) = x^2$ and $g(x) = 2 + 3x$

What is fg(x)? Now fg(x) = f[g(x)]

This means apply g first and then apply f.

$$fg(x) = f(2 + 3x) = (2 + 3x)^2$$

g(x) is replaced with $2 + 3x$

It is then substituted into f(x)

What is gf(x)?

This means apply f first and then apply g.

$$gf(x) = g(x^2) = 2 + 3x^2$$

f(x) is replaced with x^2

It is then substituted into g(x)

Key Points

The composite function **gf(x)** means apply f first followed by g.

The composite function **fg(x)** means apply g first followed by f.

fg(x) can be written as fg and gf(x) can be written as gf; fg is not the same as gf.

EXAMPLE 1

f and g are functions such that $f(x) = \frac{1}{x}$ and $g(x) = 3 - 2x$

Find the composite functions (a) fg (b) gf

(a) $fg = fg(x) = f(3 - 2x)$ ← Do g first: Put $(3 - 2x)$ instead of $g(x)$

$= \frac{1}{3-2x}$ ← Substitute $(3 - 2x)$ for x in $\frac{1}{x}$

(b) $gf = gf(x) = g\left(\frac{1}{x}\right)$ ← Do f first: Put $\frac{1}{x}$ instead of $f(x)$

$= 3 - 2\frac{1}{x} = 3 - \frac{2}{x}$ ← Substitute $\frac{1}{x}$ for x in $(3 - 2x)$

EXAMPLE 2

$f(x) = 7 - 2x$ $g(x) = 4x - 1$ $h(x) = 3(x - 1)$

Find the following composite functions: (a) gf (b) gg (c) fgh

(a) $gf = gf(x) = g(7 - 2x)$ ← Do f first: Put $(7 - 2x)$ instead of $f(x)$

$= 4(7 - 2x) - 1$ ← Substitute $(7 - 2x)$ for x in $4x - 1$

$= 27 - 8x$ ← Simplify $28 - 8x - 1$

(b) $gg = gg(x) = g(4x - 1)$ ← Put $(4x - 1)$ instead of $g(x)$

$= 4(4x - 1) - 1$ ← Substitute $(4x - 1)$ for x in $4x - 1$

$= 16x - 5$ ← Simplify $16x - 4 - 1$

(c) $fgh = fgh(x) = fg[3(x - 1)]$ ← Put $3(x - 1)$ instead of $h(x)$

$= fg\,(3x - 3)$ ← Expand $3(x - 1)$

$= f\,[4(3x - 3) - 1]$ ← Substitute $(3x - 3)$ for x in $4x - 1$

$= f\,(12x - 13)$ ← Simplify $12x - 12 - 1$

$= 7 - 2(12x - 13)$ ← Substitute $(12x - 13)$ for x in $7 - 2x$

$= 33 - 24x$ ← Simplify $7 - 24x + 26$

EXAMPLE 3

$f(x) = 7 - 2x$ $\quad$ $g(x) = 4x - 1$ $\quad$ $h(x) = 3(x - 1)$

Evaluate (a) $fg(5)$ (b) $ff(-2)$ (c) $ghf(3)$

(a) $fg(5) = f(20 - 1) = f(19)$ ← Substitute for $x = 5$ in $4x - 1$

$= 7 - 2(19) = -31$ ← Substitute for $x = 19$ in $7 - 2x$

(b) $ff(-2) = f[7 - 2(-2)] = f(11)$ ← Substitute for $x = -2$ in $7 - 2x$ and simplify

$= 7 - 2(11) = -15$ ← Substitute for $x = 11$ in $7 - 2x$ and simplify

(c) $ghf(3) = gh(7 - 6) = gh(1)$ ← Substitute for $x = 3$ in $7 - 2x$ and simplify

$= g[3(1 - 1)] = g(0)$ ← Substitute for $x = 1$ in $3(x - 1)$ and simplify

$= 4(0) - 1 = -1$ ← Substitute for $x = 0$ in $4x - 1$ and simplify

EXAMPLE 4

$f(x) = 3x + 2$ and $g(x) = 7 - x$

Solve the equation $gf(x) = 2x$

$gf(x) = g(3x + 2)$ ← Put $(3x + 2)$ instead of $f(x)$

$= 7 - (3x + 2)$ ← g's rule is subtract from 7

$= 5 - 3x$ ← Simplify $7 - 3x - 2$

$5 - 3x = 2x$ ← Put $gf(x) = 2x$ and solve

$5 = 5x$ ← Add $3x$ to both sides

$x = 1$

EXAMPLE 5

(more challenging question)

Functions f, g and h are such that

f: $x \longrightarrow 4x - 1$ g: $x \longrightarrow \dfrac{1}{x+2}$, $x \neq -2$ h: $x \longrightarrow (2-x)^2$

Find (a)(i) fg(x) (ii) hh(x) (b) Show that hgf(x) = $\left(\dfrac{8x+1}{4x+1}\right)^2$

(a) $fg(x) = f\left(\dfrac{1}{x+2}\right)$ ← Substitute for g(x)

$= 4\left(\dfrac{1}{x+2}\right) - 1$ ← f's operation is × 4 − 1

$= \dfrac{4-1(x+2)}{x+2}$ ← Simplify using a common denominator of $x + 2$

$= \dfrac{2-x}{x+2}$

(b) $hh(x) = h(2-x)^2$ ← Substitute for h(x)

$= [2-(2-x)^2]^2$ ← h's operation is subtract from 2 and then square

$= [2-(4-2x+x^2)]^2$ ← $(2-x)^2 = (2-x)(2-x) = 4-2x+x^2$

$= (-2+4x-2x^2)^2$

(c) $hgf(x) = hg(4x-1)$ ← Put ($4x$ – 1) for f(x)

$= h\left(\dfrac{1}{4x-1+2}\right)$ ← Substitute ($4x$ – 1) for x in g(x)

$= \left(2-\dfrac{1}{4x+1}\right)^2$ ← $4x - 1 + 2 = 4x + 1$, so put $4x + 1$ for x in h(x)

$= \left[2\left(\dfrac{4x+1}{4x+1}\right)-\dfrac{1}{4x+1}\right]^2$ ← Simplify using a common denominator of 4x + 1

$= \left(\dfrac{8x+2-1}{4x+1}\right)^2$

$= \left(\dfrac{8x+1}{4x+1}\right)^2$

Practice 3: Show clearly the process of going from the questions to your answers

1. Find an expression for fg(x) for each of these functions:

   (a) $f(x) = 2x + 1$ and $g(x) = 4x + 3$

   (b) $f(x) = \frac{3}{x}$ and $g(x) = 2x - 1$

   (c) $f(x) = 2x^2$ and $g(x) = x + 3$

2. Find an expression for gf(x) for each of these functions:

   (a) $f(x) = x - 1$ and $g(x) = 5 - 2x$

   (b) $f(x) = 2x + 1$ and $g(x) = 4x + 3$

   (c) $f(x) = \frac{3}{x}$ and $g(x) = 2x - 1$

   (d) $f(x) = 2x^2$ and $g(x) = x + 3$

3. The function f is such that $f(x) = 2x - 3$

   Find (i) ff(2) (ii) Solve the equation $ff(a) = a$

4. Functions f and g are such that

   $f(x) = x^2$ and $g(x) = 5 + x$

   Find (a)(i) fg(x) (ii) gf(x)

   (b) Show that there is a single value of x for which fg(x) = gf(x) and find this value of x.

5. Given that $f(x) = 3x - 1$, $g(x) = x^2 + 4$ and fg(x) = gf(x), show that $x^2 - x - 1 = 0$

6. The function f is defined by $f(x) = \frac{x-1}{x}$, $x \neq 0$

   Solve $ff(x) = -2$

7. The function g is such that $g(x) = \frac{1}{1-x}$ for $x \neq 1$

   (a) Prove that $gg(x) = \frac{x-1}{x}$

   (b) Find ggg(3)

8. Functions f, g and h are such that $f(x) = 3 - x$, $g(x) = x^2 - 14$ and $h(x) = x - 2$

   Given that f(x) = gfh(x), find the values of x.

Assessment 3

Group discussions to address any misconceptions

Circle the correct answer (You must show the process for your answers)

1.

$f(x) = (x-3)$ and $g(x) = 2x^2 - 1$. $g(f(x))$ equals

A. $2x^2 - 12x + 17$

B. $2x^2 + 17$

C. $2x^2 - 19$

D. $2x^2 - 12x - 19$

2.

Given $f(x) = 2x + 1$ and $g(x) = x^2 + 5$.

Which is the correct expression to show $fg(x)$?

A	B	C	D
$2x^2 + 6$	$2x^2 + 11$	$4x^2 + 4x + 6$	$2x^3 + 5$

3

Functions f and g are given by $f(x) = 2x - 3$ and $g(x) = x^2$.
Find an expression for $g(f(x))$.

A $g(f(x)) = 4x^2 - 12x + 9$

B $g(f(x)) = x^2 + 2x - 3$

C $g(f(x)) = 4x - 9$

D $g(f(x)) = 2x^3 - 3x^2$

Tutorial 4 – Inverse functions

Is $f(x)$ the inverse function of $g(x)$?

$$f(x) = \frac{1}{2}x - \frac{5}{2}$$

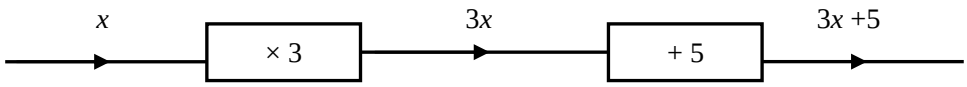
$$g(x) = 2x + 5$$

yes | no

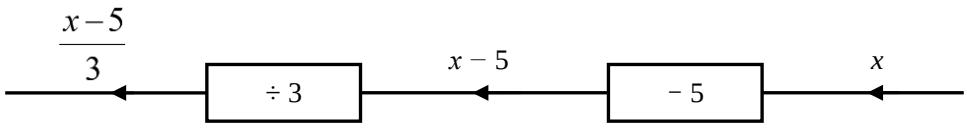
What is the Purpose of Tutorial 4?

- To solve inverse functions

The function f(x) = 3x +5 can be thought of as a sequence of operations as shown below



Now reversing the operations



The new function, $\frac{x-5}{3}$, is known as the **inverse** function.

Inverse functions are denoted as $f^{-1}(x)$.

EXAMPLE 10

Find the inverse function of $f(x) = 3x - 4$

$y = 3x - 4$ ← **Step 1:** Write out the function as $y = \ldots$

$x = 3y - 4$ ← **Step 2:** Swap the x and y

$x + 4 = 3y$ ← **Step 3:** Make y the subject

$\frac{x+4}{3} = y$

$f^{-1}(x) = \frac{x+4}{3}$ ← **Step 4:** Instead of $y =$ write $f^{-1}(x) =$

EXAMPLE 11

Find the inverse function of $f(x) = \frac{x-2}{7}$

$y = \frac{x-2}{7}$ ← **Step 1:** Write out the function as $y = \ldots$

$x = \frac{y-2}{7}$ ← **Step 2:** Swap the x and y

$7x = y - 2$ ← **Step 3:** Make y the subject

$7x + 2 = y$

$f^{-1}(x) = 7x + 2$ ← **Step 4:** Instead of $y =$ write $f^{-1}(x) =$

EXAMPLE 12

Find the inverse function of $f(x) = \sqrt{x+4}$

$y = \sqrt{x+4}$ ← **Step 1:** Write out the function as $y = \ldots$

$x = \sqrt{y+4}$ ← **Step 2:** Swap the x and y

$x^2 = y + 4$

$x^2 - 4 = y$ ← **Step 3:** Make y the subject

$f^{-1}(x) = x^2 - 4$ ← **Step 4:** Instead of $y=$ write $f^{-1}(x) =$

RULES FOR FINDING THE INVERSE $f^{-1}(x)$:

Step 1: Write out the function as $y = \ldots$

Step 2: Swap the x and y

Step 3: Make y the subject

Step 4: Instead of $y=$ write $f^{-1}(x) =$

Practice 4: Show clearly the process of going from the questions to your answers

1. Find the inverse function, $f^{-1}(x)$, of the following functions:

(a) $f(x) = 3x - 1$

(b) $f(x) = 2x + 3$

(c) $f(x) = 1 - 2x$

(d) $f(x) = x^2 + 5$

(e) $f(x) = 6(4x - 1)$

(f) $f(x) = 4 - x$

(g) $f(x) = 3x^2 - 2$

(h) $f(x) = 2(1 - x)$

(i) $f(x) = \dfrac{2}{x+1}$

(j) $f(x) = \dfrac{x+1}{x-2}$

2. The function f is such that $f(x) = 7x - 3$

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

(b) Solve the equation $f^{-1}(x) = f(x)$.

3. The function f is such that $f(x) = \dfrac{8}{x+2}$

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

(b) Solve the equation $f^{-1}(x) = f(x)$.

4. The function f is such that $f(x) = \dfrac{1}{x+4}$, $x \neq -4$.

Evaluate $f^{-1}(3)$. [Hint: First find $f^{-1}(x)$ and then substitute for $x = -3$]

5. $f(x) = \dfrac{x}{x+3}$, $x \in R$, $x \neq -3$

(a) If $f^{-1}(x) = -5$, find the value of x.

(b) Show that $ff^{-1}(x) = x$

6. Functions f and g are such that

$f(x) = 3x + 2$ $g(x) = x^2 + 1$

Find an expression for $(fg)^{-1}(x)$ [Hint: First find $fg(x)$]

Assessment 4

Discussions

Working in pairs, explain all the steps you have used to each other taking turns

Circle the correct answer (You must show the process for your answers)

1.

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

$$f^{-1}(x) = ?$$

A $2 + \frac{5}{x}$

B $\frac{5}{2+x}$

C $2 - \frac{5}{x}$

D $\frac{x-2}{5}$

2.

Given $f(x) = 5x - 4$

Which is the correct expression to represent the inverse function $f^{-1}(x)$?

A $x + 4$

B $5x + 4$

C $\frac{x+4}{5}$

D $\frac{x-4}{5}$

3.

You are given that $f(x) = \frac{2x}{5} - 6$

Choose the expression for $f^{-1}(x)$

A	B	C	D
$\frac{5}{2}x + 6$	$\frac{5(x+6)}{2}$	$\frac{5(x-6)}{2}$	$\frac{2(x+6)}{5}$

4

$$f(x) = \frac{2}{x}, \quad f f^{-1}(1) =$$

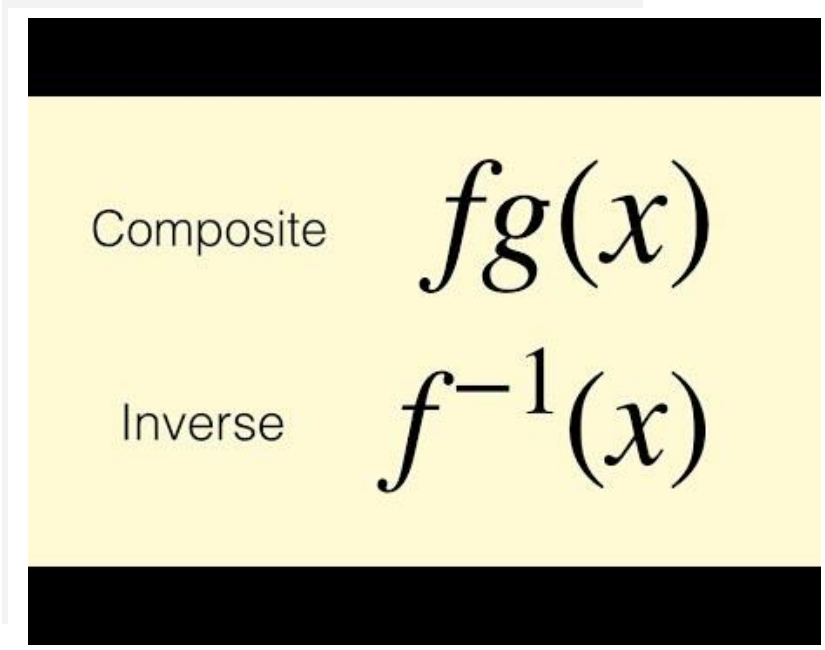
(A) 2

(B) 1

(C) $\frac{1}{2}$

(D) 0

Tutorial 5 – Mixed Exercise

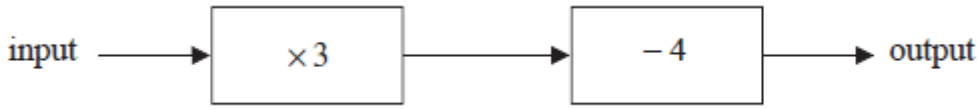


What is the Purpose of Tutorial 5?

- Mixed practice – functions

Practice 5: Show clearly the process of going from the questions to your answers

1. Here is a number machine.



(a) Work out the **output** when the input is 4

(b) Work out the **input** when the output is 11

(c) Show that there is a value of the input for which the input and the output have the same value.

2. Functions f and g is such that f(x) = 2x – 1 and g(x) = $\frac{3}{x}$

(a) Find the value of

(i) f(3)

(ii) fg(6)

(b) Express the inverse function in the form $f^{-1}(x)$) = ...

(c) Express the composite function gf in the form gf(x) = ...

3. The function f is such that $f(x) = 4x - 1$

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

The function g is such that $g(x) = kx^2$ where k is a constant.

(b) Given that $fg(2) = 12$, work out the value of k

4. Functions f and g are such that $f(x) = 3(x - 4)$ and $g(x) = \frac{x}{5} + 1$

(a) Find the value of $f(10)$

(b) Find $g^{-1}(x)$

(c) Show that $ff(x) = 9x - 48$

5. Given that $f(x) = x^2$ and $g(x) = x - 6$, solve the equation $fg(x) = g^{-1}(x)$

6. f and g are functions such that $f(x) = 2x - 3$ and $g(x) = 1 + \sqrt{x}$

(a) Calculate $f(-4)$

(b) Given that $f(a) = 5$, find the value of a.

(c) Calculate $gf(6)$.

(d) Find the inverse function $g^{-1}(x)$.

7. Functions f and g are such that

$f(x) = \frac{1}{x+2}$ and $g(x) = \sqrt{x-1}$

(a) Calculate $fg(10)$

(b) Find the inverse function $g^{-1}(x)$.

8. Functions f and g are such that

$f(x) = 3x + 2$ and $g(x) = 2x - 5$

(a) Find the composite function fg.
Give your answer as simply as possible.

(b) Find the inverse function $f^{-1}(x)$.

(c) Hence, or otherwise, solve $f^{-1}(x) = g^{-1}(x)$.

9. The function f is such that $f(x) = \frac{1}{x+3}$

(a) Find the value of $f(2)$

(b) Given that $f(a) = \frac{1}{10}$, find the value of a.

The function g is such that $g(x) = x + 2$

(c) Find the function gf.

Give your answer as a single algebraic fraction in its simplest form.

10. Functions f and g are such that $f(x) = x^2$ and $g(x) = x - 3$

(a) Find gf(x).

(b) Find the inverse function $g^{-1}(x)$.

(c) Solve the equation $gf(x) = g^{-1}(x)$.

11. The function f is such that $f(x) = (x - 1)^2$

(a) Find f(8)

The function g is such that $g(x) = \dfrac{x}{x-1}$

(b) Solve the equation g(x) = 1.2

(c) (i) Express the inverse function g^{-1} in the form $g^{-1}(x) = \ldots\ldots$

(ii) Hence write down gg(x) in terms of x.

12. f is a function such that $f(x) = \dfrac{1}{x^2+1}$

(a) Find $f(\frac{1}{2})$

g is a function such that $g(x) = \sqrt{x-1}$, $x \geq 1$

(b) Find fg(x)
Give your answer as simply as possible.

13. The function f is such that $f(x) = \dfrac{x-6}{2}$

(a) Find f(8)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

The function g is such that $g(x) = \sqrt{x-4}$

(c) Express the function gf in the form gf(x) = …
Give your answer as simply as possible.

14. Functions f and g are such that $f(x) = 3x - 2$ and $g(x) = \dfrac{10}{x+2}$

(a) Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

(b) Find gf(x)
Simplify your answer.

15. Functions f and g are such that $f(x) = \dfrac{2}{x}$ and $g(x) = \dfrac{x+1}{x}$

(a) Solve gf(x) = 3

(b) Express the inverse function g^{-1} in the form $g^{-1}(x) = \ldots$

16. Functions g and h are such that $g(x) = \dfrac{x}{2x-5}$ and $h(x) = x + 4$

(a) Find the value of $g(1)$

(b) Find $gh(x)$
Simplify your answer.

(c) Express the inverse function g^{-1} in the form $g^{-1}(x) = \ldots$

Tutorial 6 – Revision/Exam technique and Final Assessment

What is the Purpose of Tutorial 1?

- Discuss examination techniques
- Final assessment

Tutorial 7 – Feedback and post-SEF

What is the Purpose of Tutorial 7?

- To receive feedback on final assessments.
- To share examples of best practice with the other pupils in your group.
- To write targets for improvement in school lessons.
- To reflect on the programme including what was enjoyed and what was challenging.

Final assessment feedback

What I did well…	What I could have improved on…
•	•
•	•
•	•

My target for future work is…

Reflecting on Uni Pathways

What did you most enjoy about Uni Pathways?
• • •

What did you find challenging about the programme?	How did you overcome these challenges?
• • •	• • •

Notes

Notes

Notes

Functions

Key Stage 4 Programme

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