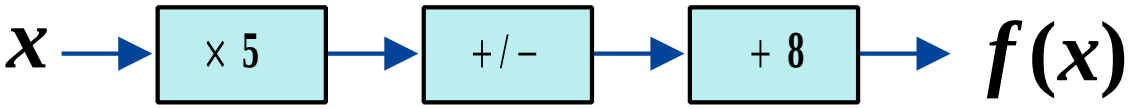
7.1 More involved Inverse Functions from Flow Diagrams

Previously we've considered flow diagrams involving two action boxes.
In this Lesson, more than two action boxes may be involved.
Previously the action boxes contained the arithmetical operations +, –, × and ÷.
In this Lesson, other arithmetical operations may be involved.

Example
The following flow diagram contains the action boxes,

- ◇ Multiply by 5
- ◇ Change sign
- ◇ Add 8



Write down the function described by the flow diagram, and also the inverse function.
Teaching Video : http://www.NumberWonder.co.uk/Video/v9002(7).mp4

☞

$f(x) \quad =$

[1 mark]

☞

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

[1 mark]

Having extracted the algebra we need from the flow diagram we can now answer a couple of easy questions.
Determine the value of,

(i) $f(1)$ **(ii)** $f^{-1}(3)$

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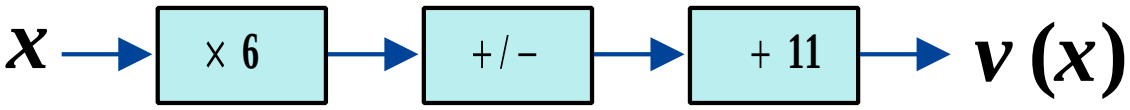
[1, 1 marks]

7.2 Exercise

Marks Available: 44

Question 1

The flow diagram action boxes are ***Multiply by 6***, ***Change sign*** and ***Add 11***.



(a) Write down **(i)** $v\,(x)$

(ii) $v^{-1}(x)$

[2 marks]

(b) Determine the value of,

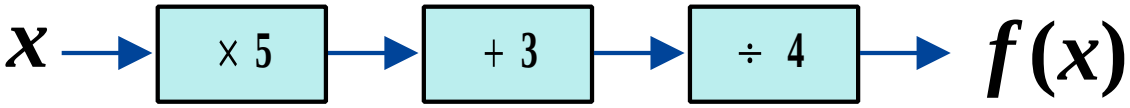
(i) $v\,(1)$ **(ii)** $v^{-1}(23)$

(iii) $v\,(-2)$ **(iv)** $v^{-1}(-1)$

[4 marks]

Question 2

The flow diagram action boxes are ***Multiply by 5***, ***Add 3*** and ***Divide by 4***.



(a) Write down **(i)** $f\,(x)$

(ii) $f^{-1}(x)$

[2 marks]

(b) Determine the value of,

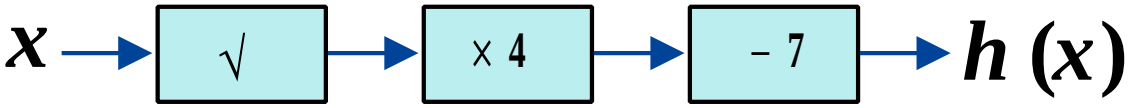
(i) $f\,(5)$ **(ii)** $f^{-1}(12)$

(iii) $f\,(-3)$ (iv) $f^{-1}(-8)$

[4 marks]

Question 3

The flow diagram action boxes are ***Square root***, ***Multiply by 4*** and ***Subtract 7***.



(a) Write down **(i)** $h(x)$

(ii) $h^{-1}(x)$

[2 marks]

(b) Determine the value of,

(i) $h(25)$ **(ii)** $h^{-1}(5)$

(iii) $h(81)$ **(iv)** $h^{-1}(57)$

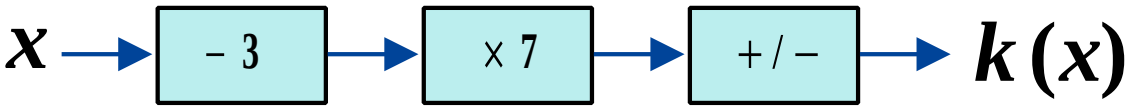
[4 marks]

(c) The domain of h is restricted such that $h \geqslant 0$.
Why ?

[1 mark]

Question 4

The flow diagram action boxes are ***Subtract 3***, ***Multiply by 7*** and ***Change sign***.



(a) Write down **(i)** $k(x)$

(ii) $k^{-1}(x)$

[2 marks]

(b) Determine the value of,

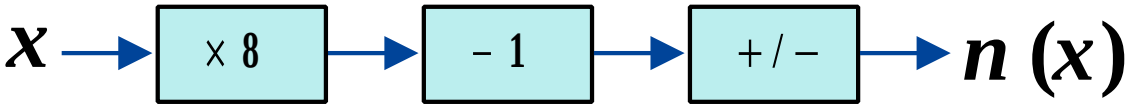
(i) $k(2)$ **(ii)** $k^{-1}(7)$

(iii) $k(5)$ **(iv)** $k^{-1}(-21)$

[4 marks]

Question 5

The flow diagram action boxes are ***Multiply by 8***, ***Subtract 1*** and ***Change sign***.



(a) Write down **(i)** $n(x)$

(ii) $n^{-1}(x)$

[2 marks]

(b) Determine the value of,

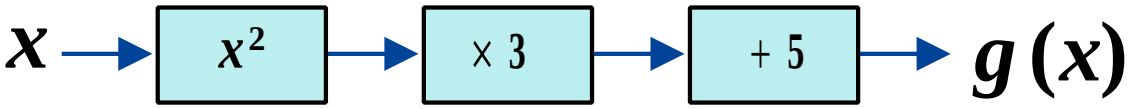
(i) $n(3)$ **(ii)** $n^{-1}(1)$

(iii) $n(-1)$ **(iv)** $n^{-1}(-7)$

[4 marks]

Question 6

The flow diagram action boxes are ***Square***, ***Multiply by 3*** and ***Add 5***.
The domain is restricted so that only positive real numbers are to be considered.



(a) Write down **(i)** $g(x)$

(ii) $g^{-1}(x)$

[2 marks]

(b) Determine the value of,

(i) $g(10)$ **(ii)** $g^{-1}(8)$

(iii) $g(5)$ (iv) $g^{-1}(53)$

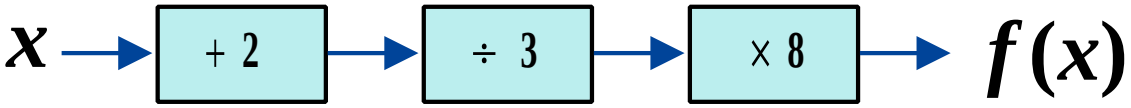
[4 marks]

(c) Why was the domain in this question restricted ?

[1 mark]

Question 7

The flow diagram action boxes are ***Add 2***, ***Divide by 3*** and ***Multiply by 8***.



(a) Write down **(i)** $s\,(x)$

(ii) $s^{-1}\,(x)$

[2 marks]

(b) Determine the value of,

(i) $s\,(1)$ **(ii)** $s^{-1}\,(16)$

(iii) $s\,(7)$ **(iv)** $s^{-1}\,(72)$

[4 marks]