FUNCTIONS

Q11/11/M/J/16

1. $f(x) = 2x - 9$

(a) Find $f\left(-\frac{3}{4}\right)$.

Answer ..... [1]

(b) Find $f^{-1}(3)$.

Answer ..... [2]

Q21/12/M/J/16

2. **(a)** The table shows the values of the function $f(x)$ for some values of x.

x	1	2	3	4	5
$f(x)$	5	7	9	11	13

Express the function $f(x)$ in terms of x.

Answer $f(x) =$ ..... [1]

(b) $g(x) = \dfrac{8-3x}{2}$

(i) Evaluate $g(-2)$.

Answer ..... [1]

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

Answer $g^{-1}(x) =$ ..... [2]

Q11/11/O/N/16

3. $f(x) = \frac{3-x}{10}$

(a) Evaluate $f(-\frac{1}{2})$.

Answer ..... [1]

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

Answer $f^{-1}(x) =$ ..... [2]

Q10/12/O/N/16

4. $f(x) = 4 + 3x$

(a) Find $f\left(-2\frac{1}{2}\right)$.

Answer ..... [1]

(b) Find $f^{-1}(5)$.

Answer ..... [2]

Q11/12/M/J/18

7. $f(x) = \frac{1}{3x+2}$

(a) Find f(–2).

Answer ..... [1]

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

Answer $f^{-1}(x) =$ ..... [2]

Q22/21/M/J/18

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

(a) Calculate ff(−3).

..... [2]

(b) Find

(i) g(2x),

..... [1]

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

$f^{-1}(x) =$ ..... [2]

Q6/11/O/N/18

9. $f(x) = \frac{3}{x+4}$

(a) Find $f(-6)$.

Answer ..... [1]

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

Answer $f^{-1}(x) =$ ..... [2]

Q6/12/O/N/18

10. $f(x) = \frac{2x+5}{3x}$

(a) Find $f(-2)$.

Answer ..... [1]

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

Answer $f^{-1}(x) =$ ..... [3]

Q23/21/O/N/18

11. $f(x) = 7 + 3x$ $g(x) = x^4$ $h(x) = 3^x$

(a) $h(3x) = k^x$

Find the value of k.

$k =$ ..... [2]

(b) Find the value of x when $f(x) = g(2)$.

$x =$ ..... [2]

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

$f^{-1}(x) =$ ..... [2]

Q25/22/O/N/18

12. **(a)** $f(x) = x^3$ $g(x) = 5x + 2$

(i) Find $gf(x)$.

..... [1]

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

$g^{-1}(x) =$ ..... [2]

(b) $h(x) = ax^2 + 1$

Find the value of a when $h(-2) = 21$.

$a =$ ..... [2]

Q10/21/M/J/19

13. $f(x) = 2x + 3$

Find $f(1 - x)$ in its simplest form.

..... [2]

Q19/11/O/N/19

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

(a) Evaluate $f\left(\frac{1}{2}\right)$.

..... [1]

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

$f^{-1}(x) =$ ..... [2]

Q24/21/O/N/19

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

(a) Find $fg(3)$.

..... [2]

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

$f^{-1}(x) =$ ..... [2]

Q17/11/M/J/20

16. $f(x) = 5 - 4x$

(a) Find $f(-3)$.

..... [1]

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

$f^{-1}(x) =$ ..... [2]

Q22/12/M/J/20

17. $f(x) = 4(3-x)$ $g(x) = \frac{5(3x-2)}{x}$

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

$f^{-1}(x) =$ ..... [2]

(b) Solve $g(x) = 6$.

$x =$ ..... [3]

Q14/21/M/J/20

18. (a) $f(x) = 4x + 3$ $g(x) = 5x - 4$

$fg(x) = 20x + p$

Find the value of p.

$p =$ ..... [2]

(b) $h(x) = \frac{5x-1}{3}$

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

$h^{-1}(x) =$ ..... [3]

Q17/21/O/N/20

19. (a) $f(x) = 3x^2 + a$ where a is an integer.
$f(-2) = 19$

Find the value of a.

$a =$ ..... [2]

(b) $g(x) = 2x + 7$ $h(x) = 3x - 8$

(i) Find $gh(x)$ in its simplest form.

..... [2]

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

$g^{-1}(x) =$ ..... [2]

Q21/11/O/N/21

20. $f(x) = \frac{6}{2-x}$

(a) Find $f(-1)$.

..... [1]

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

$f^{-1}(x) =$ ..... [3]

(c) $f(t) = f(5t+2)$

Find the value of t.

$t =$ ..... [3]

Q24/12/O/N/21

21. $f(x) = 2x^2 + 7x + 4$ $g(x) = 2x + 6$

(a) Find

(i) f(3),

..... [1]

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

$g^{-1}(x) =$ ..... [2]

(b) Solve $f(x) - g(x) = 1$.

$x =$ ..... or $x =$ ..... [3]

Q20/11/M/J/22

22. $f(x) = \frac{6x+2}{5}$

(a) Find f(3).

..... [1]

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

$f^{-1}(x) =$ ..... [3]

Q18/12/M/J/22

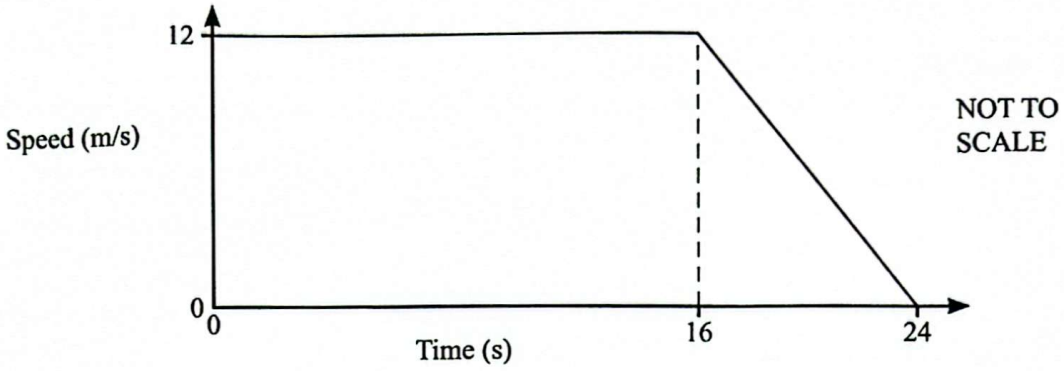
23. $f(x) = 3x-7$

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

$f^{-1}(x) =$ ..... [2]

Q20/21/M/J/22

24.



The diagram shows the speed–time graph for 24 seconds of a car journey.

Calculate

(a) the deceleration of the car in the final 8 seconds,

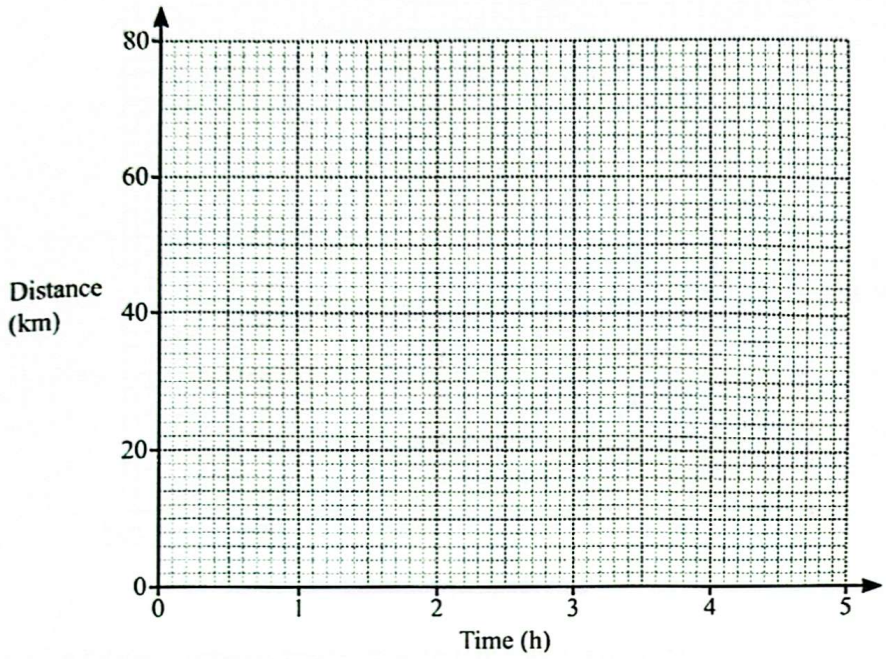
..... m/s^2 [1]

(b) the total distance travelled during the 24 seconds.

..... m [2]

Q12/22/M/J/22

25. Annette cycles a distance of 70 km from Midville to Newtown.
Leaving Midville, she cycles for 1 hour 30 minutes at a constant speed of 20 km/h and then stops for 30 minutes.
She then continues the journey to Newtown at a constant speed of 16 km/h.



(a) On the grid, draw the distance–time graph for the journey. [3]

(b) Calculate the average speed for the whole journey.

..... km/h [3]

Q21/12/O/N/22

26. $f(x) = 1 + \frac{3x}{2}$ $g(x) = \frac{2}{1-x}$

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

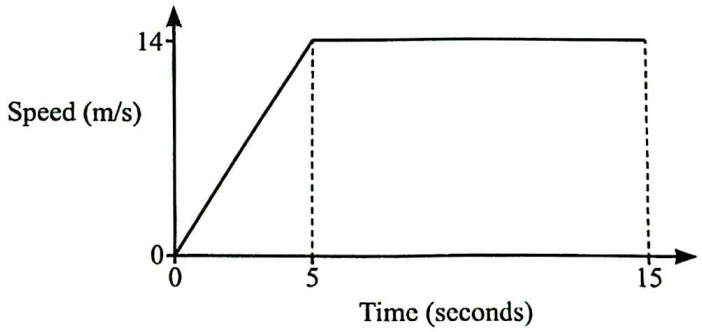
$f^{-1}(x) =$ ..... [3]

(b) Solve $g(x) = f(-4)$.

$x =$ ..... [3]

Q13/21/O/N/22

27.



NOT TO SCALE

The diagram shows the speed–time graph of the first 15 seconds of a car journey.

(a) Find the acceleration of the car during the first 5 seconds.

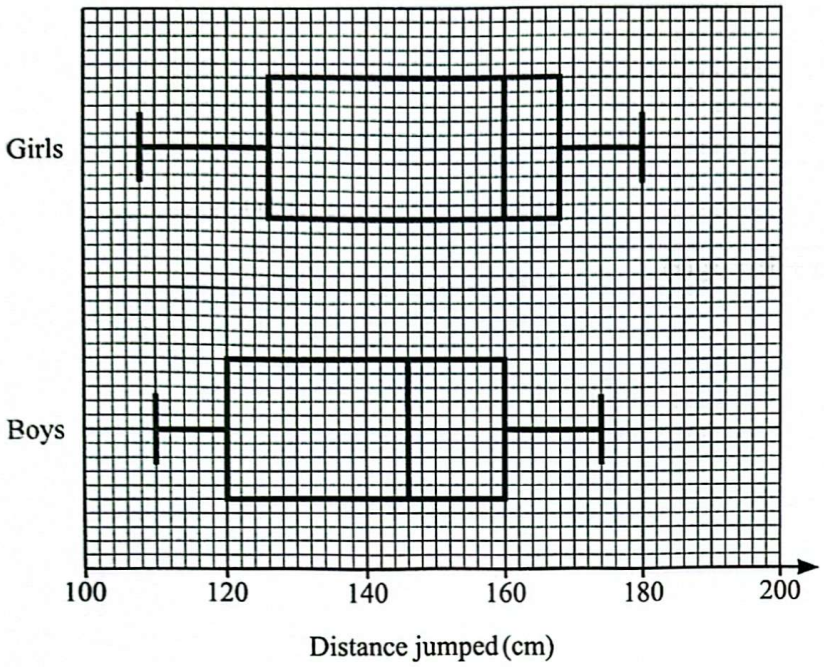
..... m/s^2 [1]

(b) Find the distance travelled during the 15 seconds.

..... m [2]

Q14/22/O/N/22

28. 136 girls and 144 boys each measure the distance they jump in centimetres.
The box-and-whisker plots show the distributions of these distances.



Each child who jumps a distance greater than 160 cm gets a certificate.

Work out an estimate of the total number of children who get a certificate.

..... [2]

Q20/11/M/J/23

29. $f(x) = 10 + 7x$

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

$f^{-1}(x) =$ ..... [2]

Q17/12/M/J/23

30. $f(x) = 2-3x \qquad g(x) = x-4$

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

$f^{-1}(x) =$ ..... [2]

(b) Solve $f(x+5) = 3g(x)$.

$x =$ ..... [3]

Q22/11/O/N/23

31. $f(x) = \frac{x}{4} + 3$ $g(x) = 2(x - 1)$

(a) Find $f(-8)$.

..... [1]

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

$f^{-1}(x) =$ ..... [2]

(c) $f(p) = g(p + 5)$

Find the value of p.

$p =$ ..... [3]

Q11/11/M/J/16

Question 1

Answers: **(a)** $-10\frac{1}{2}$ **(b)** 6

Q21/12/M/J/16

Question 2

Answer: **(a)** $2x + 3$ **(b)(i)** 7 **(b)(ii)** $\frac{8-2x}{3}$

Q11/11/O/N/16

Question 3

Answers: **(a)** 0.35 **(b)** $3 - 10x$

Q10/12/O/N/16

Question 4

Answers: **(a)** -3.5 **(b)** $\frac{1}{3}$

Q14/12/M/J/17

Question 5

Answers: **(a)** 5 **(b)** $\frac{4x+5}{3}$

Q15/11/M/J/18

Question 6

Answers: **(a)** -7 **(b)** -33 **(c)** $5 - 8x^3$

Q11/12/M/J/18

Question 7

Answers: **(a)** $-\frac{1}{4}$ **(b)** $\frac{1-2x}{3x}$

Q22/21/M/J/18

Question 8

Answer: **(a)** -17 **(b)** $4x^2+8$ **(c)** $\frac{5-x}{2}$

Q6/11/O/N/18

Question 9

Answers: **(a)** -1.5 **(b)** $\frac{3-4x}{x}$

Q6/12/O/N/18

Question 10

Answers: **(a)** $-\frac{1}{6}$ **(b)** $\frac{5}{3x-2}$

Q23/21/O/N/18

Question 11

Answers: **(a)** 27 **(b)** 3 **(c)** $\frac{x-7}{3}$

Q25/22/O/N/18

Question 12

Answers: **(a)(i)** $5x^3+2$ **(ii)** $\frac{x-2}{5}$ **(b)** 5

Q10/21/M/J/19

Question 13

10 $5 - 2x$ final answer

Q19/11/O/N/19

Question 14

19(a) 9

19(b) $\frac{5}{x+1}$

Q24/21/O/N/19

Question 15

24(a) 19

24(b) $\frac{x+5}{3}$ oe final answer

Q17/11/M/J/20

Question 16

17(a) 17

17(b) $\frac{5-x}{4}$ oe final answer

Q22/12/M/J/20

Question 17

22(a) $\frac{12-x}{4}$ or $3-\frac{x}{4}$ final answer

22(b) $x=\frac{10}{9}$ oe

Q14/21/M/J/20

Question 18

14(a) $[p =] -13$

14(b) $\frac{3x+1}{5}$

Q17/21/O/N/20

Question 19

17(a) $[a =] 7$

17(b)(i) $6x - 9$ or $3(2x - 3)$ final answer

17(b)(ii) $\frac{x-7}{2}$ final answer

Q21/11/O/N/21

Question 20

21(a) 2

21(b) $2-\frac{6}{x}$ oe or $\frac{2x-6}{x}$ oe final answer

21(c) –0.5 or $-\frac{1}{2}$ nfww

Q24/12/O/N/21

Question 21

24(a)(i) 43

24(a)(ii) $\frac{x-6}{2}$ oe final answer

24(b) $\frac{1}{2}$ and –3

Q20/11/M/J/22

Question 22

20(a) 4

20(b) $\frac{5x-2}{6}$ oe final answer

Q18/12/M/J/22

Question 23

18 $\frac{x+7}{3}$ oe final answer

Q20/21/M/J/22

Question 24

20(a) 1.5 or $1\frac{1}{2}$

20(b) 240

Q12/22/M/J/22

Question 25

12(a) correct graph

12(b) 15.6 or 15.55 to 15.56
nfww

Q21/12/O/N/22

Question 26

21(a) $\frac{2(x-1)}{3}$ or $\frac{2x-2}{3}$
oe final answer

21(b) $\frac{7}{5}$ oe

Q13/21/O/N/22

Question 27

13(a) 2.8 oe

13(b) 175

Q14/22/O/N/22

Question 28

14 104

Q20/11/M/J/23

Question 29

20 $[f^{-1}(x) =] \frac{x-10}{7}$ oe final answer

Q17/12/M/J/23

Question 30

17(a) $[f^{-1}(x) =] \frac{2-x}{3}$ oe final answer

17(b) $[x =] -\frac{1}{6}$

Q22/11/O/N/23

Question 31

22(a) 1

22(b) $4(x-3)$ or $4x-12$ final answer

22(c) $-\frac{20}{7}$ oe