Chapter 3

Functions

01. 0607_s23_qp_21 Q: 8

Rearrange this equation to make x the subject.

$$y = 7x + 2$$

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

---

02. 0607_s23_qp_21 Q: 12

$$f(x) = 3\sin(4x°)$$

Find the amplitude and period of $f(x)$.

Amplitude = ...

Period = ... [2]

---

03. 0607_s23_qp_21 Q: 13

y varies inversely as $\sqrt{x}$.

When $x = 9$, $y = 2$.

Find y in terms of x.

$y =$ ..... [2]

---

04. 0607_s23_qp_21 Q: 14

$$f(x) = x^{\frac{1}{7}}$$

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

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

---

05. 0607_s23_qp_22 Q: 14

y varies inversely as the square of $(x-3)$.
When $x = 6,\ y = 20$.

Find the value of y when $x = 9$.

..... [3]

---

06. 0607_s23_qp_22 Q: 15

(a) Write down the value of $\log_{10}(0.01)$.

..... [1]

(b) Find the value of $2\log 4 + \log 5 - 3\log 2$.

..... [3]

---

07. 0607_s23_qp_23 Q: 15

Rearrange the equation to make x the subject.

$$A+4y=A(2-3x)$$

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

---

08. 0607_m22_qp_22 Q: 18

Find the value of $\log 5+\log 8-2\log 2$.

..... [3]

---

09. 0607_s22_qp_21 Q: 16

Solve.

$$2\log 3 - \log 2 = \log p$$

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

---

10. 0607_s22_qp_22 Q: 14

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

Find the values of x when $f(x) = 15$.

..... [2]

---

11. 0607_s22_qp_22 Q: 16

Solve.

$$\log x = 1 + \log 9 - \log 8 + 2\log\frac{2}{3}$$

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

12. 0607_s22_qp_23 Q: 11

y is inversely proportional to $(x+2)^2$.
When $x = 3$, $y = 2$.

(a) Find y in terms of x.

$y =$ ..... [2]

(b) Find the positive value of x when $y = 0.5$.

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

---

13. 0607_w22_qp_21 Q: 13

Solve.

$$\log 2x = 5$$

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

---

14. 0607_w22_qp_22 Q: 9

y is inversely proportional to x^3.
When $x = 5$, $y = 2$.

Find y when $x = 10$.

$y =$ ..... [3]

---

15. 0607_w22_qp_22 Q: 12

$f(x) = 11x + 2$ $g(x) = \sin x°$

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

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

(b) Find $g(f(8))$.

..... [2]

---

16. 0607_w22_qp_22 Q: 14

$$4\log y + 3\log x = 2$$

Find y in terms of x.

..... [3]

---

17. 0607_w22_qp_23 Q: 10

Rearrange the formula to write x in terms of a and y.

$$y = \sqrt{x^2 + 2a^2}$$

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

---

18. 0607_w22_qp_23 Q: 15

$$\log y = \log h + \log p - \log x$$

Find y in terms of h, p and x.

$y =$ ..... [1]

---

19. 0607_w22_qp_23 Q: 16

$$8^{\frac{4}{3}} = 32^{x}$$

Find the value of x.

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

---

20. 0607_m21_qp_22 Q: 12

Rearrange this formula to make x the subject.

$$y = \frac{a-x}{3x}$$

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

---

21. 0607_s21_qp_21 Q: 4

Solve.

(a) $2-4(5-2x)=0$

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

(b) $|2x-5|=9$

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

---

22. 0607_s21_qp_21 Q: 9

Rearrange this equation to make x the subject.

$$\frac{a}{2x-3}=\frac{b}{5x}$$

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

---

23. 0607_s21_qp_22 Q: 11

$$y = \frac{2}{x+3}$$

Rearrange the formula to make x the subject.

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

---

24. 0607_s21_qp_23 Q: 3

Find the value of $x^2 - x$ when $x = -3$.

..... [1]

---

25. 0607_s21_qp_23 Q: 14

$$A = P(1+x)^3$$

Rearrange the formula to write x in terms of A and P.

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

---

26. 0607_s21_qp_23 Q: 16

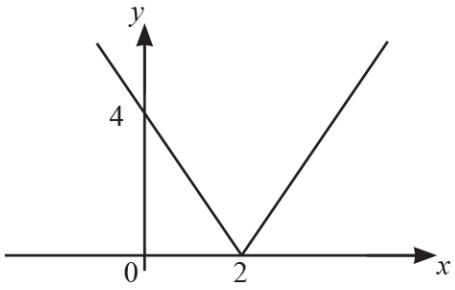
p varies inversely as the square root of q.
When $q = 9$, $p = 12$.

Find p when $q = 16$.

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

---

27. 0607_s21_qp_23 Q: 18



NOT TO SCALE

The diagram shows the graph of $y = |ax + b|$, where $a > 0$.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [2]

---

28. 0607_s21_qp_23 Q: 20

$2\log p = 3\log x - \log y$

Find p in terms of x and y.

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

---

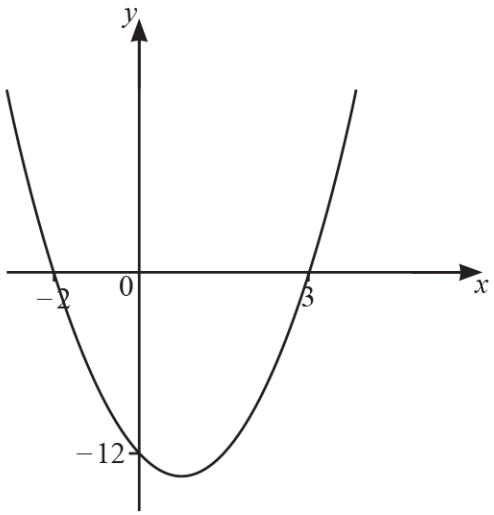
29. 0607_w21_qp_21 Q: 9

y varies inversely as the square of $(x+2)$.
When $x = 4$, $y = 0.5$.

Find y in terms of x.

$y =$ ..... [2]

30. 0607_w21_qp_21 Q: 13



NOT TO SCALE

The equation of the curve is $y = ax^2 + bx - 12$.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

31. 0607_w21_qp_21 Q: 14

Solve.

(a) $\log_3 x = 4$

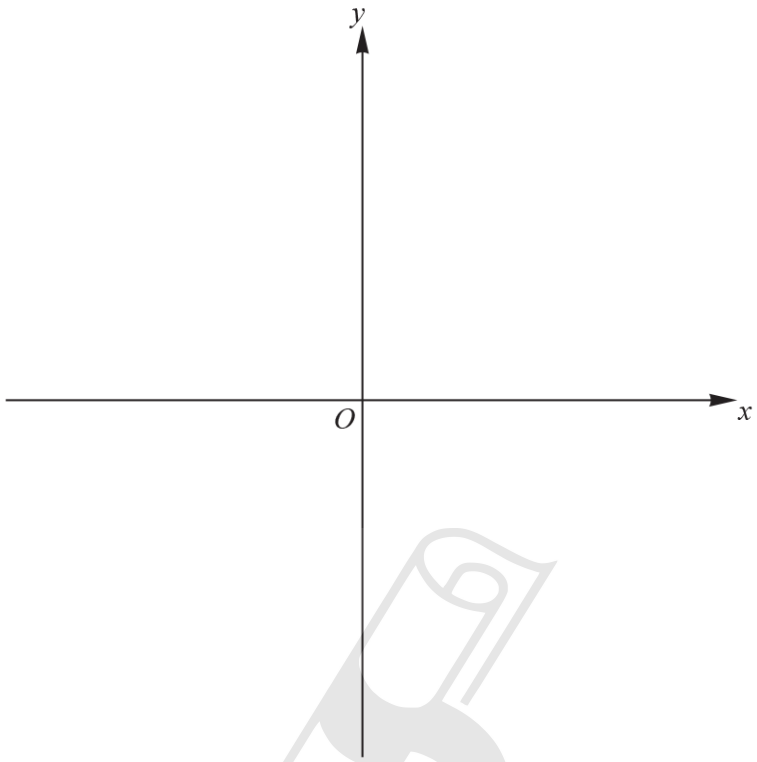
$x =$ ..... [1]

(b) $2\log x - 3\log 2 = \log 50$

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

32. 0607_w21_qp_22 Q: 8

On the diagram, sketch the graph of $y = \frac{1}{x}$.



[2]

---

33. 0607_w21_qp_22 Q: 11

$$y = \frac{w^2}{2}$$

Rearrange the formula to make w the subject.

$w =$ ..... [1]

---

34. 0607_w21_qp_22 Q: 19

$$\log 48 + \log 18 - 2\log 24 = \log t$$

Find the value of t.

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

---

35. 0607_w21_qp_23 Q: 11

$$f(x) = \frac{1}{2x-5}, \qquad x \neq 2.5$$

(a) Find $f(2)$.

..... [1]

(b) Solve $f(x) = 5$.

..... [2]

---

36. 0607_s20_qp_21 Q: 8

$A = 2\pi rh + 3\pi r^2$

Rearrange the formula to write h in terms of π, r and A.

$h =$ ..... [2]

---

37. 0607_s20_qp_21 Q: 11

y is inversely proportional to $\sqrt{x}$.
When $x = 9$, $y = 2$.

Find y in terms of x.

$y =$ ..... [2]

---

38. 0607_s20_qp_21 Q: 12

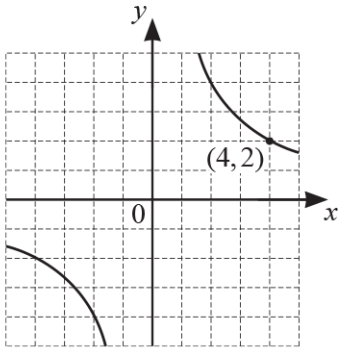
$3\log y = 2\log x - \log w$

Find y in terms of x and w.

$y =$ ..... [3]

---

39. 0607_s20_qp_21 Q: 14



In the diagram, the graph passes through the point (4, 2).

Write down the equation of the graph.

..... [2]

---

40. 0607_s20_qp_22 Q: 10

Rearrange the formula to make x the subject.

$$y(x+4) = 2$$

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

---

41. 0607_s20_qp_23 Q: 13

Solve.

(a) $\log_x 9 = 2$

$x =$ ..... [1]

(b) $2\log x - \log 4 = \log 9$

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

---

42. 0607_s20_qp_23 Q: 14

y varies inversely as the square root of x.
When $x = 25$, $y = 6$.

Find y in terms of x.

$y =$ ..... [2]

---

43. 0607_w20_qp_21 Q: 7

y varies inversely as x.
When $x = 3$, $y = 16$.

Find x when $y = 6$.

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

---

44. 0607_w20_qp_22 Q: 5

$v = u + at$

Find v when $u = 5$, $a = -3$ and $t = 4$.

$v =$ ..... [2]

---

45. 0607_w20_qp_22 Q: 13

(a) Find $\log_3\left(\frac{1}{9}\right)$.

..... [1]

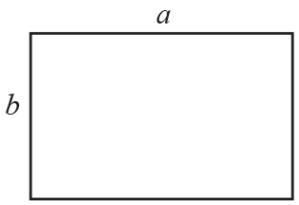
(b) Solve $\log x + 2\log 5 = \log 15$.

..... [2]

---

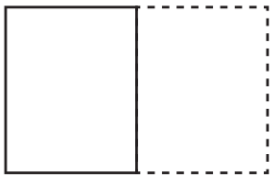
46. 0607_w20_qp_22 Q: 14

A rectangular piece of paper has sides of length a cm and b cm.



NOT TO SCALE

The paper is cut in half.



The ratio of the length of the longer side to the length of the shorter side in both pieces of paper is the same.

Find a in terms of b.

$a =$ ..... [3]

---

47. 0607_w20_qp_23 Q: 8

Find the value of

(a) $\left(\frac{1}{2}\right)^{-3}$,

..... [1]

(b) $\log_5 125$.

..... [1]

---

48. 0607_w20_qp_23 Q: 10

$$J = m(k^2 + h^2)$$

Rearrange the formula to make h the subject.

$h =$ ..... [3]

---

49. 0607_w20_qp_23 Q: 14

y varies inversely as $(x-3)^2$.
When $x = 1$, $y = 4$.

Find y in terms of x.

$y =$ ..... [2]

---

50. 0607_w20_qp_23 Q: 15

$\log x = 2\log 3 - 5\log 2$

Find the value of x.

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

---

51. 0607_s19_qp_21 Q: 13

Rearrange this formula to make b the subject.

$$A = \frac{(a+b)}{2}h$$

$b =$ ..... [3]

---

52. 0607_s19_qp_21 Q: 14

(a) Find the value of $\log_{25} 5$.

..... [1]

(b) Simplify $\log 63 - 2\log 3$.

..... [2]

---

53. 0607_s19_qp_22 Q: 4

$t = 3p^2$

(a) Find the value of t when $p = 4$.

$t =$ ..... [1]

(b) Re-arrange the formula to write p in terms of t.

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

---

54. 0607_s19_qp_22 Q: 17

y is inversely proportional to $\sqrt{x+4}$.
When $x = 5$, $y = 12$.

Find y in terms of x.

$y =$ ..... [2]

---

55. 0607_s19_qp_22 Q: 19

(a) $2\log x = 3\log 4$

Find the value of x.

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

(b) $\log x + \log u - \log v = \log p$

Find p in terms of x, u and v.

$p =$ ..... [1]

---

56. 0607_s19_qp_23 Q: 2

$f(x) = 1 - 3x$

Find the value of $f(-1)$.

..... [1]

---

57. 0607_s19_qp_23 Q: 13

Make a the subject of $s = ut + \frac{1}{2}at^2$.

$a =$ ..... [3]

---

58. 0607_w19_qp_21 Q: 11

y varies inversely as $\sqrt{x}$.
When $x = 16$, $y = 9$.

Find y in terms of x.

$y =$ ..... [2]

---

59. 0607_w19_qp_21 Q: 14

Make l the subject of the formula $T = 2\pi\sqrt{\frac{l}{g}}$.

$l =$ ..... [3]

---

60. 0607_w19_qp_22 Q: 13

Solve the equation.

$$3\log x - \log 4 = 4\log 2$$

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

---

61. 0607_w19_qp_22 Q: 14

Rearrange the formula to make x the subject.

$$y = 1 - \frac{x}{3x - 5}$$

$x =$ ..... [4]

---

62. 0607_w19_qp_23 Q: 10

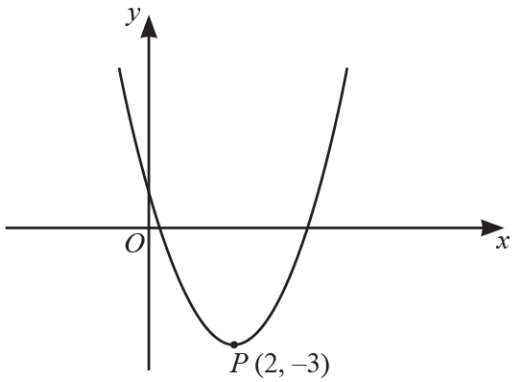
Rearrange this formula to make a the subject.

$$y = \frac{3a - 2}{a - 1}$$

..... [3]

---

63. 0607_w19_qp_23 Q: 14



NOT TO SCALE

The diagram shows a sketch of the graph $y = x^2 + bx + c$.
The minimum point is at $P(2, -3)$.

Find the value of b and the value of c.

$b =$ ..... $c =$ ..... [3]

---

64. 0607_s18_qp_21 Q: 8

y varies inversely as x^2.
When $x = 3$, $y = 4$.

Find y in terms of x.

$y =$ ..... [2]

---

65. 0607_s18_qp_21 Q: 10

$v^2 = u^2 - 2as$

Find s in terms of a, u and v.

$s =$ ..... [2]

---

66. 0607_s18_qp_21 Q: 14

(a) Write down the value of $\log_9 3$.

..... [1]

(b) $2\log 2 + \log 11 = \log x$.

Find the value of x.

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

---

67. 0607_s18_qp_23 Q: 5

$v = \dfrac{uf}{u - f}$

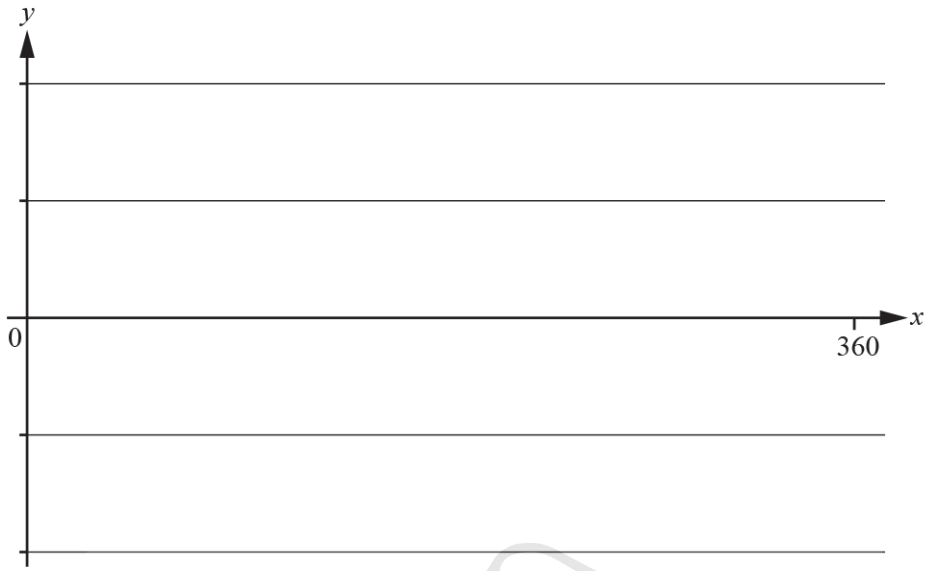
Find v when $u = 30$ and $f = 10$.

$v =$ ..... [2]

---

68. 0607_s18_qp_23 Q: 12

(a) On the grid, sketch the graph of $y = \sin x°$ for $0 \leqslant x \leqslant 360$.



[2]

(b) The point $(a, 0.5)$ is on the graph of $y = \sin x°$.

Find the two possible values of a.

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

---

69. 0607_s18_qp_23 Q: 14

Rearrange this formula to make x the subject.

$$y = \frac{ax}{bx + c}$$

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

---

70. 0607_s18_qp_23 Q: 15

(a) Solve $3\log 2 - 2\log 5 = \log x$.

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

(b) Solve $\log_y 4 = \frac{1}{3}$.

$y =$ ..... [1]

---

71. 0607_w18_qp_22 Q: 5

$f(x) = |2x - 7|$ for all real x.

(a) Find $f(2)$.

..... [1]

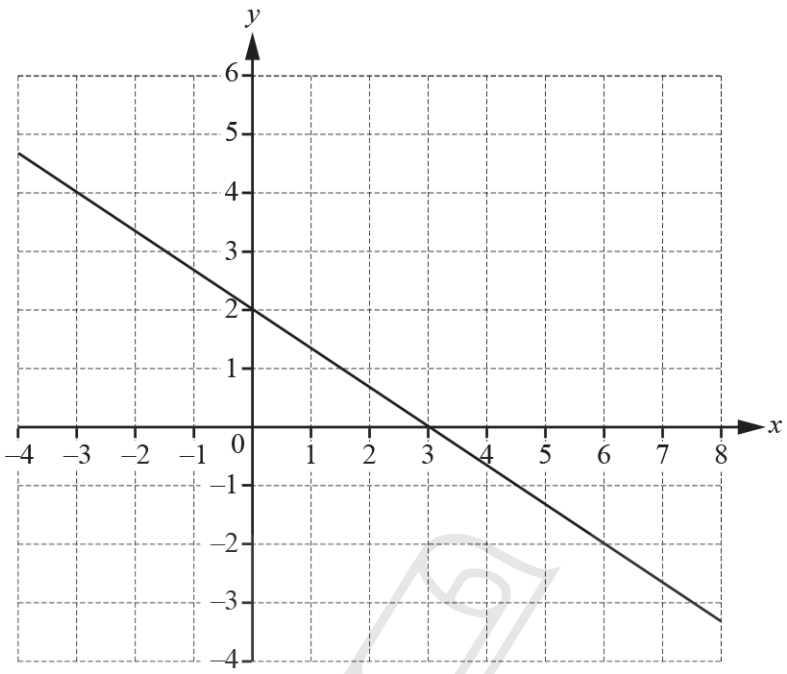
(b) Write down the range of $f(x)$.

..... [1]

---

72. 0607_w18_qp_22 Q: 6

The line with equation $2x+3y=6$ is drawn on the grid.

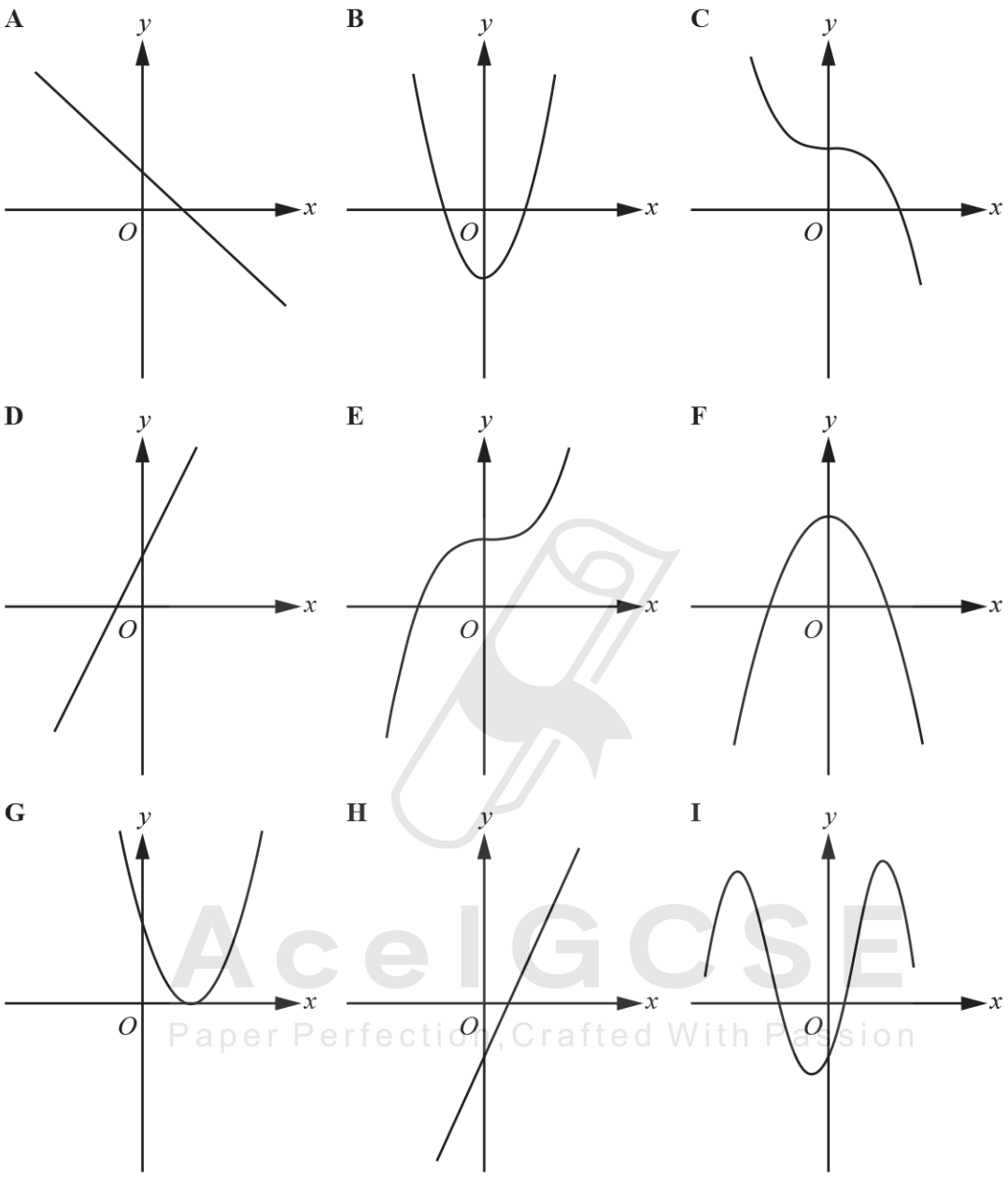


On the grid, show clearly the **single** region defined by these three inequalities.

$2x+3y \leqslant 6$ $x \geqslant -3$ $y \leqslant -1$ [3]

73. 0607_w18_qp_22 Q: 11

The diagram shows nine sketch graphs.



Write the letter of the graph which shows each of these functions.

$f(x) = 2x - 3$ Graph .....

$f(x) = x^2 - 3$ Graph .....

$f(x) = 3 - x^3$ Graph .....

$f(x) = (x-3)^2$ Graph ..... [4]

74. 0607_w18_qp_22 Q: 14

(a) Find the value of n when $\log 5 + \log 3 - \log 2 = \log n$.

..... [1]

(b) Find $\log_3(3^{1.4})$.

..... [1]

---

75. 0607_w18_qp_22 Q: 15

$f(x) = 3\sin 2x°$

(a) Write down the amplitude of the graph of $f(x)$.

..... [1]

(b) The graph of $y = f(x)$ goes through the points (75, 1.5) and (a, 1.5) .

Find a possible value of a, greater than 75.

..... [1]

---

76. 0607_w18_qp_23 Q: 1

$y = mx + c$

(a) Find y when $m = \frac{1}{2}$, $x = -2$ and $c = 4$.

$y =$ ..... [2]

(b) Rearrange the formula to write m in terms of x, y and c.

$m =$ ..... [2]

---

77. 0607_s17_qp_21 Q: 7

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

Find the value of x when $f(x) = 25$.

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

---

78. 0607_s17_qp_21 Q: 16

Simplify.

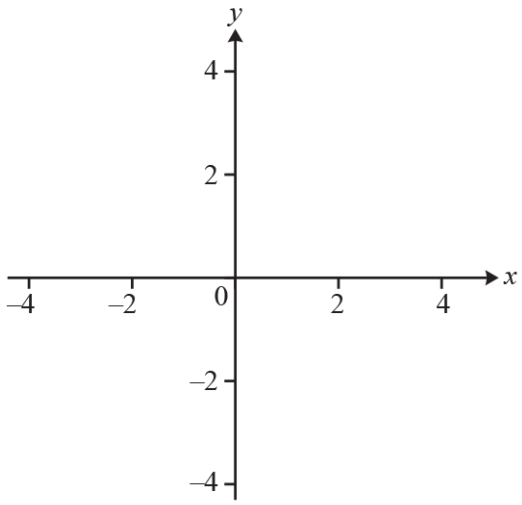
$2\log 3 - 3\log 2 + 2\log\frac{2}{3}$

..... [3]

---

79. 0607_s17_qp_22 Q: 11

Sketch the graph of $y = |x+2|$.



[3]

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80. 0607_s17_qp_22 Q: 13

$p = 5+2\sqrt{3}$ $q = 5-2\sqrt{3}$

Find $p^2 - q^2$, writing your answer in its simplest form.

..... [3]

---

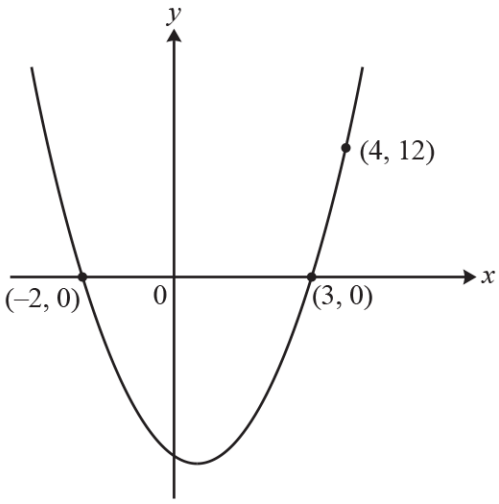
81. 0607_s17_qp_22 Q: 14

Find the value of x when $5\log 2 - \log 8 = \log x$.

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

---

82. 0607_s17_qp_22 Q: 15



NOT TO SCALE

The equation of this curve is $y = ax^2 + bx + c$.
Find the values of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [3]

83. 0607_s17_qp_23 Q: 7

$v = u + at$

Rearrange the formula to write t in terms of a, u and v.

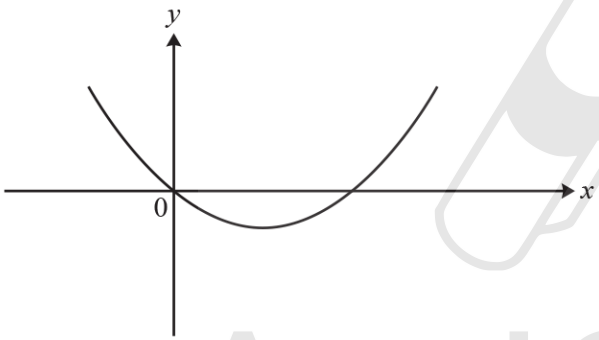
$t =$ ..... [2]

---

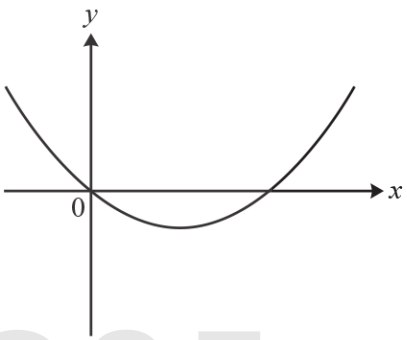
84. 0607_s17_qp_23 Q: 11

Each diagram shows the graph of $y = \mathrm{f}(x)$.

On each diagram, sketch the function indicated.



$y = \mathrm{f}(x) - 2$



$y = -\mathrm{f}(x)$

[2]

---

85. 0607_s17_qp_23 Q: 18

$\mathrm{f}(x) = 10^x$

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

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

---

86. 0607_w17_qp_21 Q: 10

y is inversely proportional to the square root of x.
When $x = 9$, $y = 12$.

Find y when $x = 100$.

..... [3]

---

87. 0607_w17_qp_22 Q: 4

$f(x) = 2x - 3$

Find the range of $f(x)$ for the domain $\{0, 1, 2\}$.

{..... } [1]

---

88. 0607_w17_qp_22 Q: 6

$y = 2x^2 - 1$

Rearrange the formula to write x in terms of y.

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

---

89. 0607_w17_qp_22 Q: 12

y is proportional to $\frac{1}{\sqrt{x}}$.

When $x = 4$, $y = 2$.

Find y when $x = 64$.

$y =$ ..... [3]

---

90. 0607_w17_qp_22 Q: 15

(a) $\log k = 2\log 3 - 5\log 2$

Find the value of k.

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

(b) $\log_2 p = -1$

Find the value of p.

$p =$ ..... [1]

---

91. 0607_w17_qp_23 Q: 14

Rearrange the formula to make x the subject.

$$A = \frac{3x}{2x-5}$$

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

01. 0607_s23_ms_21 Q: 8

Question	Answer	Marks	Partial Marks
	$\frac{y-2}{7}$ or $\frac{y}{7}-\frac{2}{7}$ final answer	**2**	**M1** for $y-2=7x$ or $\frac{y}{7}=x+\frac{2}{7}$

02. 0607_s23_ms_21 Q: 12

Question	Answer	Marks	Partial Marks
	Amplitude = 3 Period = 90 oe	**2**	**B1** for each or **SC1** for answers reversed

03. 0607_s23_ms_21 Q: 13

Question	Answer	Marks	Partial Marks
	$\frac{6}{\sqrt{x}}$ oe	**2**	**M1** for $y=\frac{k}{\sqrt{x}}$ or $y\sqrt{x}=k$

04. 0607_s23_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
	x^7	**1**	

05. 0607_s23_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	5	**3**	**M1** for $y=\frac{k}{(x-3)^2}$ oe **A1** for $k=180$ OR **M2** for $20\div\frac{(9-3)^2}{(6-3)^2}$ oe or **M1** for $\frac{y}{20}=\frac{\frac{1}{(9-3)^2}}{\frac{1}{(6-3)^2}}$ oe

06. 0607_s23_ms_22 Q: 15

Question	Answer	Marks	Partial Marks
(a)	–2	**1**	
(b)	1	**3**	**B2** for log 10 OR **M1** for any correct use of $a\log b = \log b^a$ or $\log a + \log b = \log ab$ or $\log a - \log b = \log\left(\frac{a}{b}\right)$

07. 0607_s23_ms_23 Q: 15

Question	Answer	Marks	Partial Marks
	$[x =] \frac{A-4y}{3A}$ oe	**3**	**B1** for $2A - 3Ax$ **M1** for correctly isolating *their x* term **M1** for correct division to find *their x* in a 3-term equation Maximum of 2 if answer not fully correct

08. 0607_m22_ms_22 Q: 18

Question	Answer	Marks	Partial Marks
	1	**3**	**M1** for $2\log 2 = \log 4$ soi **M1** for correct use of $\log p + \log q = \log pq$ or $\log p - \log q = \log\frac{p}{q}$

09. 0607_s22_ms_21 Q: 16

Question	Answer	Marks	Partial Marks
	4.5 or $\frac{9}{2}$ oe	**2**	**M1** for correct use of one rule of logs E.g. $\log\frac{9}{2} = \log 4.5$, or $2\log 3 = \log 3^2$

10. 0607_s22_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	$[x =] 6, \quad [x =] -9$	**2**	**B1** for each

11. 0607_s22_ms_22 Q: 16

Question	Answer	Marks	Partial Marks
	5	3	**B1** for $1 = \log 10$ **M1** for one correct use of log laws eg $\log a + \log b = \log ab$ $\log a^b = b \log a$

12. 0607_s22_ms_23 Q: 11

Question	Answer	Marks	Partial Marks
(a)	$\frac{50}{(x+2)^2}$	2	**M1** for $y = \frac{k}{(x+2)^2}$
(b)	8	2	**M1** for $(x+2)^2 =$ *their* $50 \div 0.5$

13. 0607_w22_ms_21 Q: 13

Question	Answer	Marks	Partial Marks
	50000 or 5×10^4	2	**B1** for $2x = 10^5$

14. 0607_w22_ms_22 Q: 9

Question	Answer	Marks	Partial Marks
	$\frac{1}{4}$ oe	3	**M1** for $y = \frac{k}{x^3}$ oe **A1** for $k = 250$ OR **M2** for $2 \div \left(\frac{10}{5}\right)^3$ oe or **M1** for $\frac{y}{2} = \frac{\frac{1}{10^3}}{\frac{1}{5^3}}$ oe

15. 0607_w22_ms_22 Q: 12

Question	Answer	Marks	Partial Marks
(a)	$\frac{x-2}{11}$ oe final answer	2	**M1** for $y - 2 = 11x$ or $\frac{y}{11} = x + \frac{2}{11}$ or $x = 11y + 2$
(b)	1	2	**M1** for sin $(11x + 2)$ soi or **B1** for 90

16. 0607_w22_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	$y = [\pm]\sqrt[4]{\frac{100}{x^3}}$	3	**M1** for one correct use of $n\log a = \log a^n$ or $\log(a \times b) = \log a + \log b$ or $\log\left(\frac{a}{b}\right) = \log a - \log b$ **B1** for 100

17. 0607_w22_ms_23 Q: 10

Question	Answer	Marks	Partial Marks
	$[\pm]\ \sqrt{y^2 - 2a^2}$ final answer	3	**M1** for correct squaring **M1** for correct rearranging for x term **M1** for correct square root Max 2 marks if answer incorrect

18. 0607_w22_ms_23 Q: 15

Question	Answer	Marks	Partial Marks
	$\frac{hp}{x}$ final answer	1	

19. 0607_w22_ms_23 Q: 16

Question	Answer	Marks	Partial Marks
	$\frac{4}{5}$ oe	2	**M1** for 16 or 2^4 or 2^{5x} seen

20. 0607_m21_ms_22 Q: 12

Question	Answer	Marks	Partial Marks
	$[x =]\frac{a}{3y+1}$ final answer	3	**M1** for correct removal of fraction(s) **M1** for isolating terms in x **M1** for correct division by a linear expression **maximum 2 marks if final answer incorrect**

21. 0607_s21_ms_21 Q: 4

Question	Answer	Marks	Partial Marks
(a)	2.25 oe final answer	2	**M1** for $2 - 20 + 8x[= 0]$ oe
(b)	7 –2	2	**B1** for each

22. 0607_s21_ms_21 Q: 9

Question	Answer	Marks	Partial Marks
	$[x =] \frac{-3b}{5a-2b}$ or $\frac{3b}{2b-5a}$ final answer	3	**M1** for correctly eliminating fractions **M1** for correctly expanding brackets and collecting x terms **M1** for correctly factorising and solving equation in form $kx = m$ to $x = \frac{m}{k}$ Max mark **M2** if final answer is incorrect

23. 0607_s21_ms_22 Q: 11

Question	Answer	Marks	Partial Marks
	$\frac{2-3y}{y}$ or $\frac{2}{y}-3$ oe final answer	3	**M1** for $y(x + 3) = 2$ oe **M1FT** for $xy = 2 – 3y$ oe OR **M2** for $\frac{2}{y} = x+3$

24. 0607_s21_ms_23 Q: 3

Question	Answer	Marks	Partial Marks
	12	1	

25. 0607_s21_ms_23 Q: 14

Question	Answer	Marks	Partial Marks
	$\sqrt[3]{\frac{A}{P}}-1$ final answer	3	**M1** for correct division by P **M1** for correct cube root **M1** for correct subtraction of 1 Maximum mark of **M2** if answer incorrect

26. 0607_s21_ms_23 Q: 16

Question	Answer	Marks	Partial Marks
	9	3	**B2** for $p = \frac{36}{\sqrt{q}}$ oe or $\frac{12\times\sqrt{9}}{\sqrt{16}} = p$ or better or **M1** for $p = \frac{k}{\sqrt{q}}$ oe or $12\times\sqrt{9} = p\times\sqrt{16}$

27. 0607_s21_ms_23 Q: 18

Question	Answer	Marks	Partial Marks
	[a =] 2 [b =] –4	**2**	**B1** for each

28. 0607_s21_ms_23 Q: 20

Question	Answer	Marks	Partial Marks
	$\sqrt{\frac{x^3}{y}}$ oe final answer	**3**	**M1** for $\log p^2$ or $\log x^3$ **M1** for correct use of $\log u - \log v = \log \frac{u}{v}$

29. 0607_w21_ms_21 Q: 9

Question	Answer	Marks	Partial Marks
	$\frac{18}{(x+2)^2}$	**2**	**M1** for $\frac{k}{(x+2)^2}$ oe

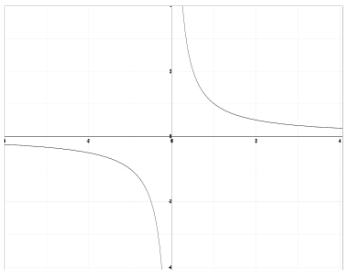
30. 0607_w21_ms_21 Q: 13

Question	Answer	Marks	Partial Marks
	$a = 2$ $b = -2$ [$c = -12$]	**3**	**B1** for one correct. **M1** for $(x + 2)(x – 3)$ OR **M1** for correct substitution of 3 points into $y = ax^2 + bx + c$

31. 0607_w21_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
(a)	81	**1**	
(b)	20	**3**	**M1** for one correct use of $a\log x = \log x^a$ **M1** for one correct use of $\log a + \log b = \log ab$ or $\log a - \log b = \log \frac{a}{b}$

32. 0607_w21_ms_22 Q: 8

Question	Answer	Marks	Partial Marks
	Correct sketch 	2	**B1** for each branch

33. 0607_w21_ms_22 Q: 11

Question	Answer	Marks	Partial Marks
	$\sqrt{2y}$ final answer	1	

34. 0607_w21_ms_22 Q: 19

Question	Answer	Marks	Partial Marks
	1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$	3	**M1** for correct use of $\log p \pm \log q$ **M1** for correct use of $n \log p$

35. 0607_w21_ms_23 Q: 11

Question	Answer	Marks	Partial Marks
(a)	-1	1	
(b)	$\frac{13}{5}$ oe	2	**M1** for $2x-5=\frac{1}{5}$ or $5(2x-5)=1$ or better

36. 0607_s20_ms_21 Q: 8

Question	Answer	Marks	Partial Marks
	$\frac{A-3\pi r^2}{2\pi r}$ oe final answer	2	**M1** for correct rearrangement for term in h **M1** for correct division by $2\pi r$

37. 0607_s20_ms_21 Q: 11

Question	Answer	Marks	Partial Marks
	$\frac{6}{\sqrt{x}}$	2	**M1** for $2=\frac{k}{\sqrt{9}}$

38. 0607_s20_ms_21 Q: 12

Question	Answer	Marks	Partial Marks
	$\sqrt[3]{\frac{x^2}{w}}$	3	**M1** for $2\log x = \log x^2$ or $3\log y = \log y^3$ (implied by cube root in answer). **M1** for correct use of $\log p - \log q = \log\left(\frac{p}{q}\right)$

39. 0607_s20_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
	$y = \frac{8}{x}$ oe	2	**M1** for $y = \frac{k}{x}$ oe

40. 0607_s20_ms_22 Q: 10

Question	Answer	Marks	Partial Marks
	$x = \frac{2-4y}{y}$ oe or $x = \frac{2}{y} - 4$ oe	2	**B1** for $yx + 4y = 2$ or $x + 4 = \frac{2}{y}$

41. 0607_s20_ms_23 Q: 13

Question	Answer	Marks	Partial Marks
(a)	3	1	
(b)	6	2	**M1** for any correct use of $\log a - \log b = \log\left(\frac{a}{b}\right)$ or $\log a + \log b = \log(a \times b)$ or $n\log a = \log a^n$

42. 0607_s20_ms_23 Q: 14

Question	Answer	Marks	Partial Marks
	$y = \frac{30}{\sqrt{x}}$	2	**M1** for $y = \frac{k}{\sqrt{x}}$ oe

43. 0607_w20_ms_21 Q: 7

Question	Answer	Marks	Partial Marks
	8	3	**M2** for $6 = \frac{48}{x}$ or $x = \frac{16 \times 3}{6}$ or **M1** for $y = \frac{k}{x}$ or $16 \times 3 = 6 \times x$

44. 0607_w20_ms_22 Q: 5

Question	Answer	Marks	Partial Marks
	–7	2	**M1** for substitution of $u = 5$, $a = -3$ and $t = 4$ into $v = u + at$

45. 0607_w20_ms_22 Q: 13

Question	Answer	Marks	Partial Marks
(a)	–2	1	
(b)	$\frac{15}{25}$ or $\frac{3}{5}$ or 0.6	2	**M1** for one correct use of $a\log b = \log b^a$ or $\log a - \log b = \log \frac{b}{a}$ or $\log a + \log b = \log(ab)$

46. 0607_w20_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	$a = b\sqrt{2}$ or $a = \sqrt{2b^2}$ or $a = \frac{2}{\sqrt{2}}b$ final answer	3	**B2** for $a^2 = 2b^2$ or $a = \sqrt{\frac{b \times b}{\frac{1}{2}}}$ oe or **M1** for $\frac{a}{b} = \frac{b}{\frac{1}{2}a}$ oe e.g. $a : b = b : 0.5a$

47. 0607_w20_ms_23 Q: 8

Question	Answer	Marks	Partial Marks
(a)	8 cao	1	
(b)	3 cao	1	

48. 0607_w20_ms_23 Q: 10

Question	Answer	Marks	Partial Marks
	$[\pm]\sqrt{\frac{J-mk^2}{m}}$ or $[\pm]\sqrt{\frac{J}{m}-k^2}$ final answer	3	**M1** for correct division by m **M1** for correct rearrangement for h or h^2 term **M1** for correct square root

49. 0607_w20_ms_23 Q: 14

Question	Answer	Marks	Partial Marks
	$y=\frac{16}{(x-3)^2}$	2	**M1** for $y=\frac{k}{(x-3)^2}$ oe

50. 0607_w20_ms_23 Q: 15

Question	Answer	Marks	Partial Marks
	$\frac{9}{32}$	2	**M1** for correct use of $n\log x = \log x^n$ or correct use of $\log p - \log q = \log\frac{p}{q}$

51. 0607_s19_ms_21 Q: 13

Question	Answer	Marks	Partial Marks
	$[b=]\frac{2A}{h}-a$ or $[b=]\ \frac{2A-ah}{h}$ oe Final answer	3	**M2** for $2A - ah = bh$ or $\frac{2A}{h} = a + b$ or **M1** for $2A = (a + b)h$ or $\frac{A}{h}=\frac{a+b}{2}$

52. 0607_s19_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
(a)	$\frac{1}{2}$ or 0.5	1	
(b)	log 7	2	**M1** for correct use of $\log a^n = n\log a$ or $\log(a \div b) = \log a - \log b$

53. 0607_s19_ms_22 Q: 4

Question	Answer	Marks	Partial Marks
(a)	48	1	
(b)	$\sqrt{\frac{t}{3}}$	2	**M1** for correct division **M1** for correct square root, involving t

54. 0607_s19_ms_22 Q: 17

Question	Answer	Marks	Partial Marks
	$\frac{36}{\sqrt{x+4}}$	2	**M1** for $12 = \frac{k}{\sqrt{5+4}}$

55. 0607_s19_ms_22 Q: 19

Question	Answer	Marks	Partial Marks
(a)	8	2	**B1** for answer 2^3 or **M1** for $\log(x^2)$ or for $\log(4^3)$ seen
(b)	$\frac{xu}{v}$	1	

56. 0607_s19_ms_23 Q: 2

Question	Answer	Marks	Partial Marks
	4	1	

57. 0607_s19_ms_23 Q: 13

Question	Answer	Marks	Partial Marks
	$[a =]\frac{2s-2ut}{t^2}$ oe	3	**M1** for correctly multiplying by 2 **M1** for correctly collecting terms **M1** for correctly dividing by t^2

58. 0607_w19_ms_21 Q: 11

Question	Answer	Marks	Partial Marks
	$y = \frac{36}{\sqrt{x}}$	2	**M1** for $y = \frac{k}{\sqrt{x}}$

59. 0607_w19_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
	$g\left(\frac{T}{2\pi}\right)^2$ or $\frac{gT^2}{4\pi^2}$ final answer	3	**M1** for correct division by 2π or $4\pi^2$ **M1** for correct multiplication by g or g^2 **M1** for correct squaring

60. 0607_w19_ms_22 Q: 13

Question	Answer	Marks	Partial Marks
	4	3	**M2** for $\log x^3 = \log(2^4 \times 4)$ or **M1** for one correct use of rules of logs

61. 0607_w19_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	$x=\frac{5y-5}{3y-2}$ or $x=\frac{5-5y}{2-3y}$	4	**M1** for correctly eliminating fractions **M1** for correctly collecting *their* x terms **M1** for correct final division of *their* terms

62. 0607_w19_ms_23 Q: 10

Question	Answer	Marks	Partial Marks
	$\frac{y-2}{y-3}$ oe	3	**M1** for $y(a-1)=3a-2$ oe **M1 FT** for $ay-3a=y-2$ **M1 FT** for completion

63. 0607_w19_ms_23 Q: 14

Question	Answer	Marks	Partial Marks
	$[b=]-4$, $[c=]1$	3	**B2** for either value or **M1** for $(x-2)^2+p$ or $(x+q)^2-3$

64. 0607_s18_ms_21 Q: 8

Question	Answer	Marks	Partial Marks
	$\frac{36}{x^2}$	2	**M1** for $y=\frac{k}{x^2}$ oe or $yx^2=k$

65. 0607_s18_ms_21 Q: 10

Question	Answer	Marks	Partial Marks
	$\frac{u^2-v^2}{2a}$ oe	2	**M1** for correct rearrangement to isolate the s term or **M1** for correct division by $2a$ or $-2a$

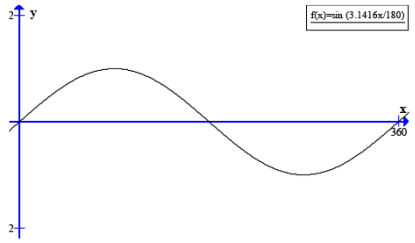
66. 0607_s18_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
(a)	$\frac{1}{2}$ or 0.5	1	
(b)	44	2	**M1** for correct use of $2\log 2=\log 2^2$ oe or for correct use of $\log p+\log q=\log pq$

67. 0607_s18_ms_23 Q: 5

Question	Answer	Marks	Partial Marks
	15	2	**B1** for numerator 300 or denominator 20

68. 0607_s18_ms_23 Q: 12

Question	Answer	Marks	Partial Marks
(a)	Correct Sketch 	2	**B1** for zeros at approx 0, 180, 360 **B1** for max at approx (90, 1) and min at approx (270, –1)

Question	Answer	Marks	Partial Marks
(b)	30, 150	2	**B1** for each

69. 0607_s18_ms_23 Q: 14

Question	Answer	Marks	Partial Marks
	$x = \frac{cy}{a - by}$ oe final answer	3	**M1** for $bxy + cy = ax$ oe **M1FT** for $cy = ax - bxy$ oe **M1FT** for completion from *their* isolated x terms

70. 0607_s18_ms_23 Q: 15

Question	Answer	Marks	Partial Marks
(a)	$\frac{8}{25}$ or 0.32	3	**M1** for correct use of $n\log a = \log a^n$ **M1** for correct use of $\log a - \log b = \log(a \div b)$
(b)	64	1	

71. 0607_w18_ms_22 Q: 5

Question	Answer	Marks	Partial Marks
(a)	3	1	
(b)	f(x) ⩾ 0	1	

72. 0607_w18_ms_22 Q: 6

Question	Answer	Marks	Partial Marks
	$x = -3$ ruled $y = -1$ ruled Correct region clearly shown	3	**B1** for each

73. 0607_w18_ms_22 Q: 11

Question	Answer	Marks	Partial Marks
	H, B, C, G	**4**	**B1** for each

74. 0607_w18_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
(a)	7.5	**1**	
(b)	1.4	**1**	

75. 0607_w18_ms_22 Q: 15

Question	Answer	Marks	Partial Marks
(a)	3	**1**	
(b)	195 or 255 or 375 or 435 etc.	**1**	

76. 0607_w18_ms_23 Q: 1

Question	Answer	Marks	Partial Marks
(a)	3	**2**	**M1** for $\frac{1}{2}\times(-2)+4$
(b)	$\frac{y-c}{x}$ oe final answer	**2**	**M1** for correct rearrangement to isolate the m term **M1** for correct division by x

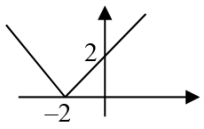
77. 0607_s17_ms_21 Q: 7

Question	Answer	Marks	Part Marks
	3	**2**	**M1** for $x^3 = 27$

78. 0607_s17_ms_21 Q: 16

Question	Answer	Marks	Part Marks
	$\log\frac{1}{2}$ or $-\log 2$ final answer	**3**	**M2** for $\log\left(\frac{3^2}{2^3}\times\left(\frac{2}{3}\right)^2\right)$ or better or **M1** for one correct use of log rules.

79. 0607_s17_ms_22 Q: 11

Question	Answer	Marks	Partial Marks
		3	**B2** for basic shape with cusp on –ve x-axis or **B1** for a basic 'v' shape modulus graph

80. 0607_s17_ms_22 Q: 13

Question	Answer	Marks	Partial Marks
	$40\sqrt{3}$	3	**M1** for $(p + q)(p – q)$ soi **A1** for $p + q = 10$ or $p – q = 4\sqrt{3}$ OR **B1** for $37 + 20\sqrt{3}$ oe **B1** for $37 – 20\sqrt{3}$ OR **B2** for $10\sqrt{3} + 10\sqrt{3} + 10\sqrt{3} + 10\sqrt{3}$

81. 0607_s17_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	4	2	**M1** for $\log 2^5$ or $\log \frac{a}{8}$ or $3\log 2$ or $\log 2^3$

82. 0607_s17_ms_22 Q: 15

Question	Answer	Marks	Partial Marks
	$a = 2$ $b = –2$ $c = –12$	3	**B2** for 2 correct or **M2** for $k(x + 2)(x – 3)$ and substitution of (4, 12) or **M1** for $(x + 2)(x – 3)$ soi by $a = 1$, $b = –1$, $c = –6$ or three correct equations in a, b, c If 0 scored, **B1** for 1 correct.

83. 0607_s17_ms_23 Q: 7

Question	Answer	Marks	Part Marks
	$\frac{v-u}{a}$ oe final answer	2	**M1** for correct rearrangement for at or t **M1** for correct division by a

84. 0607_s17_ms_23 Q: 11

Question	Answer	Marks	Part Marks
	Correct sketches	2	**B1** for each

85. 0607_s17_ms_23 Q: 18

Question	Answer	Marks	Part Marks
	$\log x$	1	

86. 0607_w17_ms_21 Q: 10

Question	Answer	Marks	Partial Marks
	3.6	3	**M2** for $12 \times \frac{\sqrt{9}}{\sqrt{100}}$ oe or $y = \frac{36}{\sqrt{x}}$ or **M1** for $\frac{y}{\sqrt{9}} = \frac{12}{\sqrt{100}}$ or $y = \frac{k}{\sqrt{x}}$

87. 0607_w17_ms_22 Q: 4

Question	Answer	Marks	Partial Marks
	$-3, -1, 1$	1	

88. 0607_w17_ms_22 Q: 6

Question	Answer	Marks	Partial Marks
	$[\pm]\sqrt{\frac{y+1}{2}}$ oe	3	**M1** for correct rearrangement **M1** for correct division by 2 **M1** for correct square root

89. 0607_w17_ms_22 Q: 12

Question	Answer	Marks	Partial Marks
	0.5 oe	3	**M1** for $y = \frac{k}{\sqrt{x}}$ oe **A1** for $k = 4$ OR **M2** for $\frac{y}{2} = \frac{\sqrt{4}}{\sqrt{64}}$ or better

90. 0607_w17_ms_22 Q: 15

Question	Answer	Marks	Partial Marks
(a)	$\frac{9}{32}$	**2**	**M1** for correct use of $a\log b = \log b^a$ or $\log p - \log q = \log \frac{p}{q}$
(b)	0.5 oe	**1**	

91. 0607_w17_ms_23 Q: 14

Question	Answer	Marks	Partial Marks
	$x = \frac{5A}{2A-3}$ or $x = \frac{-5A}{3-2A}$ final answer	**3**	**M1** for correctly eliminating fractions **M1** for correctly collecting *their x* terms **M1** for correct final division of *their* terms