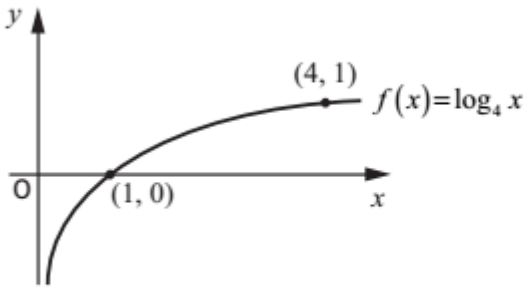
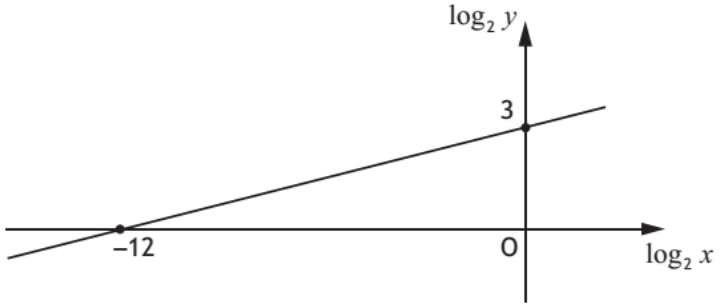
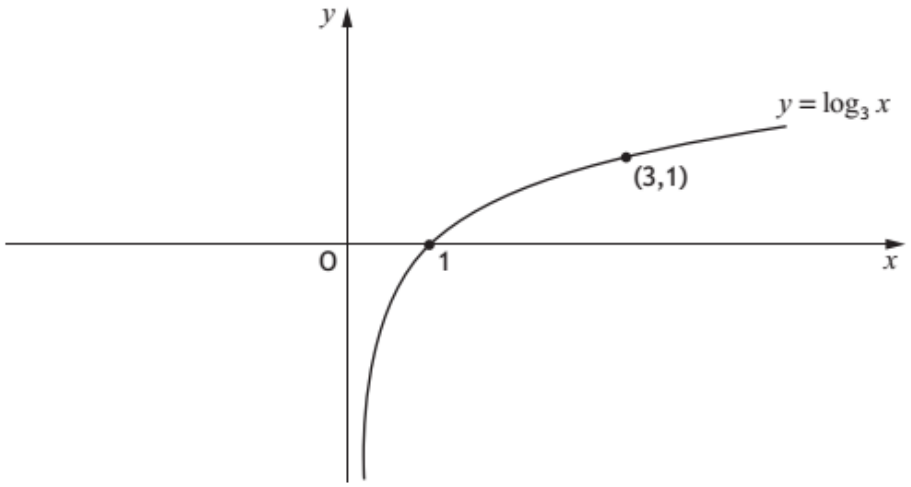
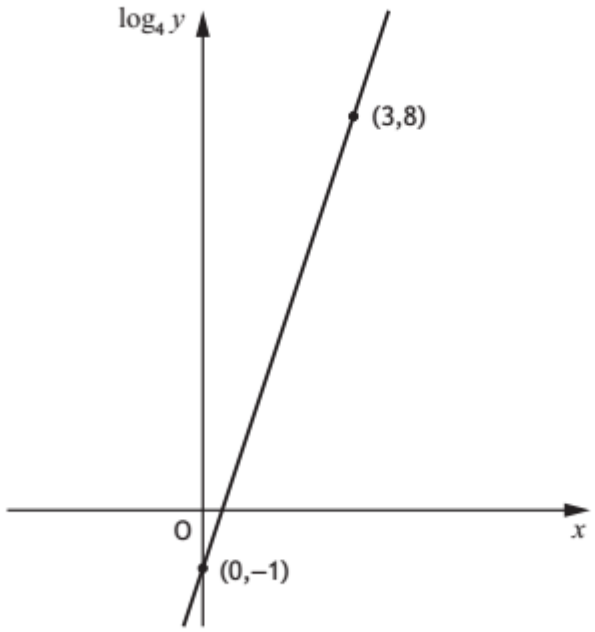
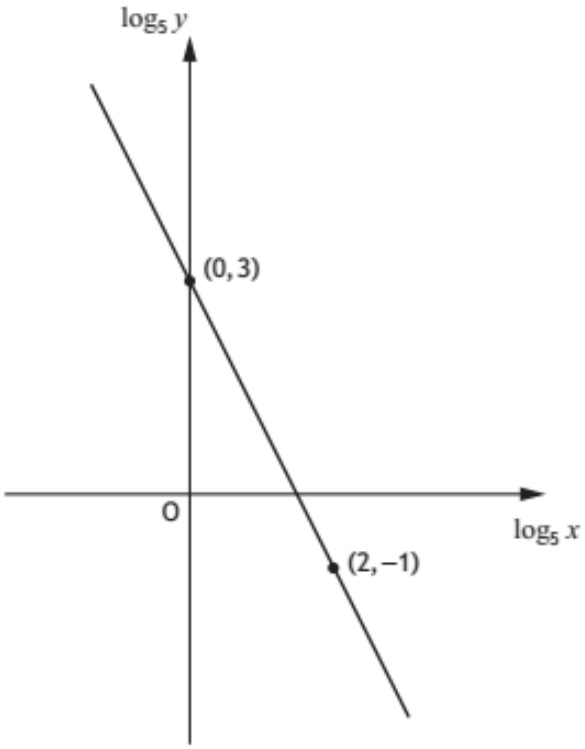
Y	Q	P	LOGS
15	6	1	Evaluate $\log_6 12 + \frac{1}{3}\log_6 27$. **3**
16	10	1	` The diagram below shows the graph of the function $f(x) = \log_4 x$, where $x > 0$.  The inverse function, f^{-1}, exists. On the diagram in your answer booklet, sketch the graph of the inverse function. **2**
16	14	1	(a) Evaluate $\log_5 25$. **1** (b) Hence solve $\log_4 x + \log_4 (x-6) = \log_5 25$, where $x > 6$. **5**
16	6	2	Scientists are studying the growth of a strain of bacteria. The number of bacteria present is given by the formula $$B(t) = 200\, e^{0{\cdot}107t},$$ where t represents the number of hours since the study began. (a) State the number of bacteria present at the start of the study. **1** (b) Calculate the time taken for the number of bacteria to double. **4**
17	12	1	Given that $\log_a 36 - \log_a 4 = \frac{1}{2}$, find the value of a. **3**
17	9	2	Two variables, x and y, are connected by the equation $y = kx^n$. The graph of $\log_2 y$ against $\log_2 x$ is a straight line as shown.  Find the values of k and n. **5**

18	6	1	Find the value of $\log_5 250 - \frac{1}{3}\log_5 8$. **3**
18	11	2	The diagram shows the curve with equation $y = \log_3 x$.  (a) On the diagram in your answer booklet, sketch the curve with equation $y = 1 - \log_3 x$. **2** (b) Determine the exact value of the x-coordinate of the point of intersection of the two curves. **3**
19	14	1	(a) Evaluate $\log_{10} 4 + 2\log_{10} 5$. **3** (b) Solve $\log_2(7x-2) - \log_2 3 = 5, \quad x \geq 1$. **3**
19	9	2	Electricity on a spacecraft can be produced by a type of nuclear generator. The electrical power produced by this generator can be modelled by $$P_t = 120e^{-0.0079t}$$ where P_t is the electrical power produced, in watts, after t years. (a) Determine the electrical power initially produced by the generator. **1** (b) Calculate how long it takes for the electrical power produced by the generator to reduce by 15%. **4**

19	12	2	Two variables, x and y, are connected by the equation $y = ab^x$. The graph of $\log_4 y$ against x is a straight line as shown.  Find the values of a and b. **5**
22	2	1	Evaluate $2\log_3 6 - \log_3 4$. **3**
22	8	1	Solve $\log_6 x + \log_6 (x+5) = 2$, where $x > 0$. **4**
22	7	2	Two variables, x and y, are connected by the equation $y = kx^n$. The graph of $\log_5 y$ against $\log_5 x$ is a straight line as shown.  Find the values of k and n. **5**

22	10	2	The heptathlon is an athletics contest made up of seven events. Athletes score points for each event. In the 200 metres event, the points are calculated using the formula $$P = 4.99087\left(42.5 - T\right)^{1.81}$$ where P is the number of points awarded, and T is the athlete's time, in seconds. (a) Calculate how many points would be awarded for a time of 24.55 seconds in the 200 metres event. **1** In the long jump event, the points are calculated using the formula $$P = 0.188807\left(D - 210\right)^{k}$$ where P is the number of points awarded, D is the distance jumped, in centimetres, and k is a constant. (b) Given that 850 points are awarded for a jump of 600 cm, calculate the value of k. **4**