

[07-16-16-NAM11]

DO

#1 all parts

#3 a

#5

#7c

1. Solve the following equations.
 - (a) $3^{2x} = 27$
 - (b) $4^x = 32$
 - (c) $(\sqrt{2})^{3x} = \frac{1}{8}$
 - (d) $\left(\frac{1}{9}\right)^{x+2} = 3$
 - (e) $4^x(5^{2x}) = 10$
 - (f) $5^x - 25 = 0$
 - (g) $7^{x^2-4} - 1 = 0$
 - (h) $8^x = 4^{x+1}$
 - (i) $9^x = (\sqrt{3})^{x+2}$
 - (j) $\frac{4^x}{2^{x-1}} = 8^{2-x}$
 - (k) $2^{x^2} = 4^{2(x-1)}$
 - (l) $7^{x^2} = 49^{6-2x}$
 - (m) $4^{x^2-6} - 16^{x+1} = 0$
 - (n) $3^{x^2} = \frac{9^{x+1}}{27^x}$
2. Given that $y = ax^n - 23$, and that $y = 4$ when $x = 3$ and $y = 220$ when $x = 9$, find the value of a and of n .
3. Solve the following simultaneous equations.
 - (a) $5^x(25^{2y}) = 1$ and $3^{5x}(9^y) = \frac{1}{9}$
 - (b) $2(4^x) = 32^y$ and $\frac{125^x}{25^y} = 625$
 - (c) $\frac{3^x}{9^y} = 27$ and $4^{2x}(2^{6y}) = \frac{1}{4}$
4. Show that $\sqrt[n]{2 \times 4^m} = 2^{\frac{2m+1}{n}}$. Hence find the value of m and of n which satisfy the equations $\sqrt[n]{2 \times 4^m} = 8$ and $\frac{27^m}{9^{n+1}} = 81$ simultaneously.
5. By using the substitution $y = 2^x$, find the value of x such that $3(2^{x-1}) = 2^x + 4$.
6. By using the substitution $y = 3^x$, find the values of x such that
 - (a) $3^x = 4 - 3(3^{-x})$,
 - (b) $3^{2x} - 3^{x+2} = 3^x - 9$.
7. By using appropriate substitutions or otherwise, solve the following equations.
 - (a) $5^{2x} - 6(5^x) + 5 = 0$
 - (b) $2^{2x} - 10(2^x) + 16 = 0$
 - (c) $2(16^x) - 5(4^x) + 2 = 0$
 - (d) $7^{x+1} - 2 = 2(7^x) + 3$
 - (e) $9^{x+1} + 1 = 10(3^x)$
 - (f) $6(3^{x-1}) = 3^4 - 3^x$
8. Show that the equation $2^{2x+1} = 3(2^x) + 2$ is satisfied by only one value of x .
9. Solve the following equations.
 - (a) $8\left(\frac{1}{2}\right)^x + 2 = 2^x$
 - (b) $4^x = 2^{\frac{8}{x}}$
 - (c) $3^{x+1}(9^{2-x}) = \frac{1}{3}$
 - (d) $4^{x+\frac{1}{2}} - 2^{x+3} = 8 + 7(2^x)$
 - (e) $\frac{5^{x+1} - 20}{10 + 5^x} = 3$
 - (f) $2^x(5^x) = \frac{1}{100}(10^{x-1})^4$
10. If $\frac{r^2}{4}(3x)^r\left(\frac{2}{9x^2}\right)^{6-r}$ can be simplified to $\frac{k}{x^3}$, find the values of the constants r and k .
- *11. Solve the simultaneous equations $64(4^y) = 16^x$ and $3^y = 4(3^{x-2}) - 1$.
- *12. By using an appropriate substitution, find the value of x for which $x^{\frac{3}{2}} - 8x^{-\frac{3}{2}} = 7$.

Exercise 1.2 (p. 5)

1. (a) $\frac{3}{2}$ (b) $\frac{5}{2}$ (c) -2 (d) $-\frac{5}{2}$ (e) $\frac{1}{2}$ (f) 2
(g) $2, -2$ (h) 2 (i) $\frac{2}{3}$ (j) $\frac{5}{4}$ (k) 2 (l) $-6, 2$
(m) $-2, 4$ (n) $-2, 1$
2. $a = 3, n = 2$
3. (a) $x = -\frac{4}{9}, y = \frac{1}{9}$ (b) $x = 2, y = 1$ (c) $x = 1, y = -1$
4. $m = 4, n = 3$ 5. 3
6. (a) $0, 1$ (b) $0, 2$
7. (a) $0, 1$ (b) $1, 3$ (c) $-\frac{1}{2}, \frac{1}{2}$ (d) 0 (e) $-2, 0$ (f) 3
9. (a) 2 (b) ± 2 (c) 6 (d) 3 (e) 2 (f) 2
10. $r = 3, k = \frac{2}{3}$ 11. $x = 1, y = -1$ or $x = 2, y = 1$ 12. 4