

The City School
 North Nazimabad Boys Campus
 Add Maths Grade9
 Revision
 worksheet



- Q1** (a) Solve the equation $\lg(x + 12) = 1 + \lg(2 - x)$.]
- (b) $\lg(5x + 10) + 2 \lg 3 = 1 + \lg(4x + 12)$,]

Q2 Given that $p = \frac{\sqrt{3} + 1}{\sqrt{3} - 1}$, express in its simplest surd form,

(i) p ,

(ii) $p - \frac{1}{p}$.

Q3 (i) Given that $\frac{2^{x-3}}{8^{2y-3}} = 16^{x-y}$, show that $3x + 2y = 6$.

(ii) Given also that $\frac{5^y}{125^{x-2}} = 25$, find the value of x and of y .

Q4 Express $\frac{(4\sqrt{5} - 2)^2}{\sqrt{5} - 1}$ in the form $\sqrt{p} + q$, where p and q are integers.]

Q2 Solve the equation $\lg(3x - 2) + \lg(x + 1) = 2 - \lg 2$.

Q5 The remainder when the expression $x^3 - 11x^2 + kx - 30$ is divided by $x - 1$ is 4 times the remainder when this expression is divided by $x - 2$. Find the value of the constant k . [

Q6 Solve the equation $x^3 - 4x^2 - 8x + 8 = 0$, expressing non-integer solutions in the form $a \pm \sqrt{b}$, where a and b are integers.

Q7 (i) Using the substitution $y = 5^x$, show that the equation $5^{2x+1} - 5^{x+1} + 2 = 2(5^x)$
 $ay^2 + by + 2 = 0$, where a and b are constants to be found.

(ii) Hence solve the equation $5^{2x+1} - 5^{x+1} + 2 = 2(5^x)$.

8 Given that $6x^3 + 5ax - 12a$ leaves a remainder of -4 when divided by $x - a$, find the possible values of a .

1 It is given that $f(x) = 4x^3 - 4x^2 - 15x + 18$.

(i) Show that $x + 2$ is a factor of $f(x)$. [1]

(ii) Hence factorise $f(x)$ completely and solve the equation $f(x) = 0$. [4]

3 Without using a calculator, solve, for x and y , the simultaneous equations

$$\begin{aligned}8^x \div 2^y &= 64, \\ 3^{4x} \times \left(\frac{1}{9}\right)^{y-1} &= 81.\end{aligned}$$

5 (i) Given that $2^{5x} \times 4^y = \frac{1}{8}$, show that $5x + 2y = -3$.]

(ii) Solve the simultaneous equations $2^{5x} \times 4^y = \frac{1}{8}$ and $7^x \times 49^{2y} = 1$. [4]

7 (i) Use the substitution $u = 2^x$ to solve the equation $2^{2x} = 2^{x+2} + 5$. [5]

5 Solve the equation

(i) $\frac{4^x}{2^{5-x}} = \frac{2^{4x}}{8^{x-3}}$, [3]

(ii) $\lg(2y + 10) + \lg y = 2$. [3]

2 Do not use a calculator in this question.

Express $\frac{(4\sqrt{5} - 2)^2}{\sqrt{5} - 1}$ in the form $p\sqrt{5} + q$, where p and q are integers. [4]

8 (a) The remainder when the expression $x^3 - 11x^2 + kx - 30$ is divided by $x - 1$ is 4 times the remainder when this expression is divided by $x - 2$. Find the value of the constant k . [4]

10 (a) Solve $\lg(7x - 3) + 2 \lg 5 = 2 + \lg(x + 3)$. [4]

(b) Use the substitution $u = 3^x$ to solve the equation $3^{x+1} + 3^{2-x} = 28$. [5]

4 (i) Using the substitution $y = 5^x$, show that the equation $5^{2x+1} - 5^{x+1} + 2 = 2(5^x)$ can be written in the form $ay^2 + by + 2 = 0$, where a and b are constants to be found. [2]

(ii) Hence solve the equation $5^{2x+1} - 5^{x+1} + 2 = 2(5^x)$. [4]

2 The expression $x^3 + ax^2 - 15x + b$ has a factor $x - 2$ and leaves a remainder of 75 when divided by $x + 3$. Find the value of a and of b . [5]

8 Solve the equation

(i) $\lg(5x + 10) + 2 \lg 3 = 1 + \lg(4x + 12)$, [4]

(ii) $\frac{9^{2y}}{3^{7-y}} = \frac{3^{4y+3}}{27^{y-2}}$. [3]

Q3 (i) Given that $\frac{2^{x-3}}{8^{2y-3}} = 16^{x-y}$, show that $3x + 2y = 6$.

(ii) Given also that $\frac{5^y}{125^{x-2}} = 25$, find the value of x and of y .

3 Solve the equation $2 \lg x - \lg\left(\frac{x+10}{2}\right) = 1$.

5 (a) Solve the following equations to find p and q .

$$8^{q-1} \times 2^{2p+1} = 4^7$$

$$9^{p-4} \times 3^q = 81 \quad [4]$$

5 Solve the simultaneous equations

$$\frac{4^x}{256^y} = 1024,$$

$$3^{2x} \times 9^y = 243. \quad [5]$$

10 (a) Solve $\lg(7x-3) + 2 \lg 5 = 2 + \lg(x+3)$. [4]

(b) Use the substitution $u = 3^x$ to solve the equation $3^{x+1} + 3^{2-x} = 28$. [5]

9 (a) Express $(2 - \sqrt{5})^2 - \frac{8}{3 - \sqrt{5}}$ in the form $p + q\sqrt{5}$, where p and q are integers. [4]

(b) Given that $\frac{a^x}{b^{3-x}} \times \frac{b^y}{(a^{y+1})^2} = ab^6$, find the value of x and of y . [4]

8 (a) Find the value of each of the integers p and q for which $\left(\frac{25}{16}\right)^{-\frac{3}{2}} = 2^p \times 5^q$. [2]

(b) (i) Express the equation $4^x - 2^{x+1} = 3$ as a quadratic equation in 2^x . [2]

(ii) Hence find the value of x , correct to 2 decimal places. [3]

9 The function $f(x) = x^3 - 6x^2 + ax + b$, where a and b are constants, is exactly divisible by $x - 3$ and leaves a remainder of -55 when divided by $x + 2$.

(i) Find the value of a and of b . [4]

(ii) Solve the equation $f(x) = 0$. [4]

