HCF, LCM of a no. e.g. 5040, 1512

(1)

2 | 5040	2 | 1512	$5040 = 2\times2\times2\times2\times3\times3\times5\times7$
2 | 2520	2 | 756	$1512 = 2\times2\times2\times3\times3\times3\times7$
2 | 1260	2 | 378	
2 | 630	3 | 189	
3 | 315	3 | 63	
3 | 105	3 | 21	
5 | 35	7 | 7	
7 | 7	1	
1		

L.C.M. = Lowest no they both go into = write one then see what you need to add so both no's in there

$2\times2\times2\times2\times3\times3\times5\times7\times\underline{\underline{3}} = \text{LCM}$

HCF : $2\times2\times2\times2\times3\times3\times5\times7$
$2\times2\times2\times3\times3\times3\times7$

whats common to both? $= 2\times2\times2\times3\times3\times7 = \text{HCF}$

Algebra: Factorising = x^3-y^3, x^3+y^3, this$^3 \pm$ that^3 x^4-y^4

Dividing $2x^3-11x+6 \div 2x^2+4x-3$ Ans $(x-2)$ Q 10 p23

algebraic fractions (factorise top factorise bottom to simplify)

Simplify $\dfrac{y-\dfrac{x^2+y^2}{y}}{\dfrac{1}{x}-\dfrac{1}{y}}$

if $ax^3+bx^2+cx+d = px^3+qx^2+rx+s$ $*\forall x*$ then $a=p$, $b=q$, $c=r$, $d=s$.

Given that $(x-t)^2$ is a factor of $x^3+3px+c$, show $p=-t^2$, $c=2t^3$

$\dfrac{1}{(x+1)(x-2)} = \dfrac{A}{(x+1)} + \dfrac{B}{(x-2)}$ $\forall x$, find A, B

Manipulating formulae : if $\sqrt{\dfrac{x+y}{x-y}} = \dfrac{1}{2}$ express y in terms of x

Ex 5 pg 37

Solve $2x+3\sqrt{x}=5$

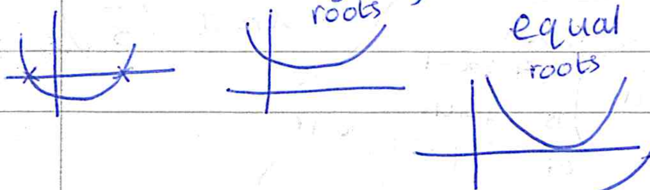
Discriminant : $\sqrt{b^2-4ac}$

Discriminant $>0 \Rightarrow$ 2 real roots

Discriminant $<0 \Rightarrow$ imag. roots

Discriminant $=0 \Rightarrow$ 2 equal roots

real roots imaginary roots equal roots



prove : $(k-2)x^2+2x-k=0$ has real roots for any value of k

Find k s.t. $(k-2)x^2+x(2k+1)+k=0$ has equal roots

Show there is no point of intersection between $x-y=5$ and $y=x^2+5x+1$

Find 2 consequtive ~~even~~ numbers, the sum of the squares of which $=52$

p60 Q15 ! Q16 !

Completing the square : Q10 p67

REM if ax^2+bx+c = perfect sqr then

$(gx+d)(gx+d)$ $g=\sqrt{a}$

$(gx)(gx)=ax^2$

$gdx+gdx=b$

$2gd=b$

$gd=b/2$

Q12 pg 67

if graph $f(x)=a(x-p)^2+q$ then min point is $x=p$, $f(x)=q$

(p,q)

Surds

$\sqrt{a}\sqrt{b}=\sqrt{ab}$

$\sqrt{ab}=\sqrt{a}\sqrt{b}$

$\frac{\sqrt{a}}{\sqrt{b}}=\sqrt{\frac{a}{b}}$ and $\sqrt{\frac{a}{b}}=\frac{\sqrt{a}}{\sqrt{b}}$

$a\sqrt{b}\pm c\sqrt{b}=(a\pm c)\sqrt{b}$

DIVIDING by surds → rationalise the denominator

$\frac{1}{a-\sqrt{b}}\times\frac{a+\sqrt{b}}{a+\sqrt{b}}=\frac{a+\sqrt{b}}{a^2-b^2}$

Express $\frac{4}{\sqrt{5}+1}$ in simplest form

$\frac{4}{\sqrt{5}+1}\times\frac{\sqrt{5}-1}{\sqrt{5}-1}=\frac{4(\sqrt{5}-1)}{5-1}=\frac{4\sqrt{5}-4}{4}=\sqrt{5}-1$

If there is one surd in an equation ISOLATE it and square both sides...

If there are two surds: move one to each side of eqn, square both sides, isolate remaining surd, square both sides again

Do: $\sqrt{5x+6}-\sqrt{2x}=2$

(*) if you have squared both sides CHECK your ans's

Q11 p74

FACTOR THEOREM:

If $f(k)=0$ then $x-k$ is a factor

if $(x-2)$ and $(x+1)$ are both factors of ax^3+3x^2-9x+b find a, b using factor theorem

Conversely, If $(x-k)$ is a factor then $f(k)=0$

if $(ax-k)$ is a factor then $f(k/a)=0$

if $f(x)=(ax-k)(\sim)(\sim)(\sim)$ then when $ax-k=0$ $f(x)=0$

$ax=k$

$x=k/a$

investigate if $3x-1$ is factor of $6x^3-5x^2+4x+5$ $f(1/3)\neq 0$

Solve $2x^3-4x^2-22x+24=0$ (try out $f(0)$, $f(1)$ .... etc to find one root)

* ~~repeated roots = equal roots~~

Do ex 2 pg 81

Q12 p84

Do revision Q's!!

What is a surd?

Is $\sqrt{\frac{9}{25}}$ a surd? an irrational no?

Construct $\sqrt{2}$

Construct $\sqrt{3}$

Write a value of x that makes $\sqrt{3-x}$ rational

What does $3-x$ have to be for $\sqrt{3-x}$ to be rational?

given x^2+ax-1 is a factor of x^3+px^2+qx+r show $q=-(ar+1)$

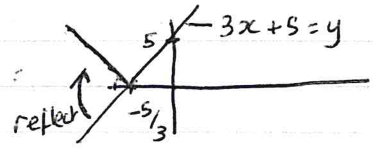
(Algebra 3) $-9 < 3 - 4x \leq 1$ $x \in \mathbb{R}$ (Solve)

(Quadratic inequalities) : Find range of values for which :
$x^2 + (k-4)x + k - 1 = 0$, has real roots (Ex 2 p 227)

The width of a rectangle is to be 3m shorter than its length.
If ratio of length to width is less than 5, find range for (i) length
(ii) width

(Modulus) Sketch $f(x) = |3x+5|$ & hence solve $|3x+5| = 2$
(i.) draw $f(x) = 3x+5$ $(y = 3x+5)$
(ii) reflect ⊖ part of $f(x)$ in x axis :

Ex



Solve $|2x-5| = 3 \Rightarrow |2x-5| = 3$ or $2x-5 = -3$

Solve $|2x-5| < 3 \Rightarrow -3 < 2x-5 < 3$

if there are 2 inequalities then SQUARE BOTH SIDES !!

Solve $|x+3| < |3x-7|$ graphically algebraicly

Solve : $27^{x-3} = 3 \times 9^{x-2}$ Ex p297

RULES of INDICES in log tables

Simplify $\left(\dfrac{x^2 y^{-3}}{x^{-4} y^5}\right)$, $\dfrac{\sqrt{a^3}}{\sqrt[4]{a} \times \sqrt[3]{a}}$

$\sqrt{x^5} = (x^5)^{1/2} = x^{5/2}$

$\sqrt[4]{x^3} = (x^3)^{1/4} = x^{3/4} = (x^{1/4})^3$

Ex 2 p242

!! Show $\dfrac{5^{n+1} - 4(5^n)}{5^{n-2} + 5^n} = \dfrac{25}{26}$ E3 p242

$5^{n+1} = 5^n . 5$ $\quad 5^{n-2} = 5^n . 5^{-2} = \dfrac{5^n}{5^2}$

$\sqrt{3^{2n+1}} \times \sqrt[3]{3^{-3n}} = 3k$ find k Q10 p243

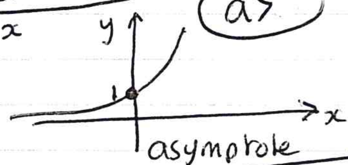
Solve

$3^{2x} - 4.3^x + 3 = 0$ E2 p245

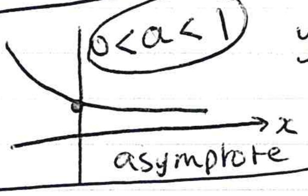
$2^{2x+1} - 2^{x+3} - 2^x + 4 = 0$ Q10 p245

$3^x + 81(3^{-x}) - 30 = 0$ Q15 p246

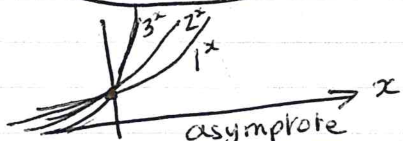
Exponential fns :
$y = a^x$ ($a>$)



($0<a<1$)



$y = a^x$



$y = Aa^x$ = general exp. function (also Geometric Series)

State increasing or decreasing $\left(\frac{1}{4}\right)^x$, $(0.8)^x$, $4(2^x)$, $3(4^{-x})$

Ex 2 p248!

log of a number = power that base must be raised by to give the no:

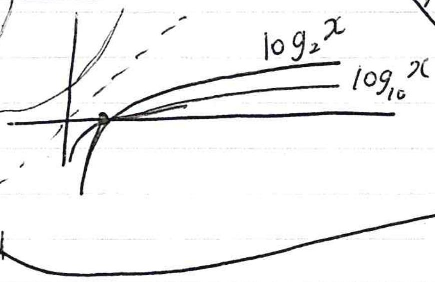
Q7 pg 250 !!! ,,

$\log_b a = c \Rightarrow b^c = a$

Show $T_n = \ln a^x$ is an arithmetic seq

Prove its arithmetic

$y = \log_a x$ is inverse function of $y = a^x$



always increasing

Solve : $\log_3 x + 3 \log_x 3 = 4$
Ex 6 p255

$\log_{\text{any base}} 1 = 0$ $\quad \log_a 0$ = undefined

y axis asymptote
$\log(-)$ undefined

Q8 p258 $y = \log_{10} x + 2$ (shift up 2) $y = \log_{10}(x+2)$ (Shift left 2)

$y = \log_{10} x - 2$ (Shift down 2) $y = 2\log_{10}(x)$ (scaled)

$y = -\log_{10}(x)$ (reflected in x axis)

(Q9) 2014 (exp / logs !!)

Proof by induction :

(i) Prove for all values of $n \in \mathbb{N}$ $3 + 3^2 + 3^3 + \dots \; 3^n = \frac{3}{2}(3^n - 1)$

(ii) Prove $\frac{1}{1(2)} + \frac{1}{2(3)} + \frac{1}{3(4)} + \dots \frac{1}{n(n+1)} = \frac{n}{n+1}$ $n \in \mathbb{N}$

(iii) $8^n - 7n + 6$ is $\div$ by 7 for all $n \in \mathbb{N}$ (E5 p 268)

(iv) $n! > 2^n$, $n > 4$ $n \in \mathbb{N}$ (E8 p270)