


Maths Notes

Strand: 4 Chapter/Topic: Algebra 2

Key words: Quadratic Equation, Discriminant, nature of roots, Linear/Quad-Simultaneous Equ., Sum/Product roots, Complete square

Question type: Solve? Nature of roots - real/imaginary? Solve Simultaneous Eqs With Linear and Quadratic, Form equation from roots, max/min?


2.1 Remember...
 $f(x) = ax^2 + bx + c = 0$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 OR FACTORISE!



2.2 Remember...
 $\Delta = \text{Discriminant}$
 $\Delta = b^2 - 4ac$


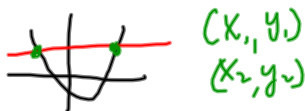
$\Delta > 0$	$\Delta < 0$	$\Delta = 0$
2 real	2 imag.	2 real eq.

\cup \cap \cup



2.3 Remember... SOLVE: LINEAR/QUADRATIC


STEPS (1) Rewrite linear $x=y$
 (2) Sub into Quad & solve
 (3) Sub ans. into linear in (1)


2.5 Remember... Sum/Product roots

$$x^2 - (\text{sum})x + (\text{product}) = 0$$


$r_1 + r_2 = \text{sum}$ $r_1 r_2 = \text{product}$



2.5 Remember...
 $ax^2 + bx + c = 0$
 $\Rightarrow x^2 + \frac{b}{a}x + \frac{c}{a} = 0$
 $r_1 + r_2 = -b/a$ $r_1 r_2 = c/a$



2.6 Remember... Complete square
 format of quadratic eqns.
 eg., $4x^2 + 4x + 2$
 $4[x^2 + x + \frac{1}{2}]$



	x	x^2	$\frac{1}{2}x$
$\frac{1}{2}$	$\frac{1}{2}x$	$\frac{1}{4}$	

$$4 \left[\underbrace{x^2 + x + \frac{1}{4}}_{(x + \frac{1}{2})^2} - \frac{1}{4} + \frac{1}{2} \right]$$

$$4 \left[(x + \frac{1}{2})^2 + \frac{1}{4} \right]$$

$$4(x + \frac{1}{2})^2 + 1$$

Maths Notes


Strand: 4 Chapter/Topic: Algebra 2

Key words: max/min quadratic? SURDS, RATIONALISE, RATIONAL NO.

Question type: find max/min? add/subtract/multiply/divide/reduce surd?
rationalise denominator?

2.6 Remember...


$$a(x+p)^2 + q$$

$$\text{max/min} = (-p, q)$$


2.7 Remember...


SURD - IRRATIONAL SQUARE ROOT.
eg. $\sqrt{2}$ is surd
.. $\sqrt{4}$ is not surd

IRRATIONAL \Rightarrow can't be expressed as a fraction with 2 whole numbers.

$$\sqrt{p} \neq \frac{a}{b} ; a, b \in \mathbb{Z}$$


2.7 Remember...

ADD $\Rightarrow 3\sqrt{2} + \sqrt{2} = 4\sqrt{2}$
 SUBTRACT $\Rightarrow 2\sqrt{3} - 5\sqrt{3} = -3\sqrt{3}$
 MULTIPLY $\Rightarrow (3)(\sqrt{5}) = 3\sqrt{5}$
 $\Rightarrow (\sqrt{5})(\sqrt{5}) = 5$




2.7 Remember... DIVIDE
RATIONALISE DENOMINATOR

$$\frac{2}{\sqrt{3}} = \frac{2(\sqrt{3})}{\sqrt{3}(\sqrt{3})} = \frac{2\sqrt{3}}{3}$$

$$\frac{1}{2+\sqrt{3}} = \frac{1(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})} = \frac{2-\sqrt{3}}{4-3} = 2-\sqrt{3}$$

\uparrow DIFF. 2 SQUARES



2.7 Remember... Reduce:


$$\sqrt{75} = \sqrt{25(3)} = 5\sqrt{3}$$

$$\sqrt{3}\sqrt{2} = \sqrt{6}$$

$$\sqrt[3]{16} = \frac{\sqrt[3]{64}}{\sqrt[3]{4}} = \frac{4}{\sqrt[3]{4}}$$


SQUARE

4
9
16
25
36



2.8 Remember... SURD EQUATIONS

- ISOLATE SURD
- SQUARE BOTH SIDES (careful)
- SOLVE
- CHECK ANSWER

$$*(a+b)^2 = a^2 + 2ab + b^2$$


Maths Notes


Strand: 4 Chapter/Topic: Algebra 2

Key words: FACTOR THEOREM, SOLUTIONS/ROOTS - FACTORS, CUBIC EQUATION
GRAPHS

Question type: Use factor theorem to solve problems, solve cubic equations,
graph shapes


Remember... FACTOR THEOREM

If $f(a) = 0$ (a is sol_s)
 $\Rightarrow (x-a)$ is factor.




Remember... SOLVE CUBIC (3 sol_s)


- ① TRIAL/ERROR FIND $f(x) = 0$
- ② DIVIDE BY RELATED FACTOR
- ③ SOLVE QUADRATIC
- ④ SAY FACTORS ARE/SOLNS ARE



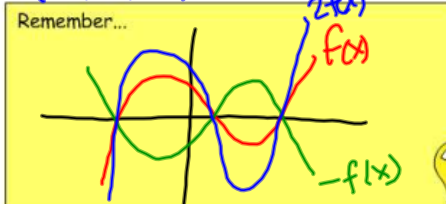
Remember... GRAPHS OF CUBICS




3 REAL 3 REAL 1 REAL
2 IMAGINARY



Remember... GRAPH SHAPES



2(x) f(x)
-f(x)



Remember...



Remember...

