Practice Questions for Matric Students to strengthen

XI-Mathematics

FROM THE DESK OF: FAIZAN AHMED

SKYPE NAME: ncrfaizan

(Suggestions are always welcome in case of any mistake or error, I shall be much thankful)

ALGEBRA

ALGEBRAIC FORMULAE

- $(a+b)^2 = a^2 + 2ab + b^2$
- $(a-b)^2 = a^2 - 2ab + b^2$
- $(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$
- $(a+b)^2 - (a-b)^2 = 4ab$
- $(a+b)^2 = (a-b)^2 + 4ab$
- $(a-b)^2 = (a+b)^2 - 4ab$
- $(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
- $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
- $a^3 - b^3 = (a-b)(a^2 - ab + b^2)$
- $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
- $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$
- $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$

SIMPLIFY

- $\left(1 - \frac{a+b}{a-b}\right) \div \frac{4a}{2a^2 - 2ab}.$
- $\frac{4x-3y}{9x^2 - 4y^2} - \frac{1}{3x-2y}.$
- $\frac{1}{a-b} - \frac{b}{a^2 - b^2} - \frac{a}{a^2 + b^2}.$
- $\frac{1}{1-a+a^2} - \frac{1}{1+a+a^2} - \frac{2a}{1+a^2+a^4}.$
- $\frac{1}{x^2 - 4y^2} + \frac{1}{x-2y} + \frac{1}{x-2y}.$

USING FORLUMAE:

- **Find the value of $a^2 + \frac{1}{a^2}$ when $a - \frac{1}{a} = 4$.**
- **If a + b = 5 and a – b = 3, find the value of $a^2 + b^2$.**

- If $a+b=9$, $ab=20$ then find the value of a^2+b^2.

ALGEBRAIC SENTENCES

Note: 'Solve the equation' means to find the value of unknown variable.

SOLVE THE FOLLOWING:

- $5(x+1)-2(x-2)=17$
- $\sqrt{4(3x-1)}=2\sqrt{x+8}$

SOLVE THE FOLLOWING USING MIDDLE TERM OR QUADRATIC FORMULA.

- $x^2+10x-24=0$
- $-x^2+\frac{3}{2}x+1=0$
- $\frac{1}{2}x^2+x+1=0$
- $-\frac{1}{8}x^2+x=\frac{7}{4}$

FACTORIZE THE FOLLOWING USING MIDDLE TERM

1. $6x^2+15x-36$ 2. $8x^2+4x-60$ 3. $12x^2+10x+2$ 4. $18x^2-39x+18$ 5. $12x^2+10x-2$ 6. $4x^2-22x+24$

7. $35x^2+55x-30$ 8. $6a^2b^2-19ab-20$ 9. $6x^2y^2+5xy-6$ 10. $16+8xy+x^2y^2$ 11. $25-10hk+h^2k^2$

12. $7hk-15+2h^2k^2$ 13. $3-8mn+4m^2n^2$ 14. $12p^2q^2-40+14pq$ 15. $13hk+6+5h^2k^2$ 16. $e^2-16e+64$

17. $d^2+6d-27$ 18. $a^2-12a+36$ 19. $q^2+7q-60$ 20. $b^2-7b-120$ 21. $10a^2-3a-1$

22. $k^2-2k-63$ 23. $3p^2-10p+8$ 24. $2m^2+5m-3$ 25. $x^2-x+110$ 26. $x^2-x-600$

MATRICES

- Find A^{-1} also prove that $A.A^{-1}=I$ if: (a) $A=\begin{bmatrix}3 & 2\\ 1 & 0\end{bmatrix}$ (b) $A=\begin{bmatrix}11 & 0\\ 1 & -1\end{bmatrix}$ (c) $A=\begin{bmatrix}-4 & 1\\ 3 & 0\end{bmatrix}$

SOLVE THE FOLLOWING EQUATIONS WITH THE HELP OF CRAMER'S RULE.

- $2x - 3y = 1$

  $x + 4y = 6$

- $2x - y = -2$

  $x + 2y = 3$

EVALUATE THE FOLLOWING:

Note: (a) For Addition and Subtraction, ORDER should be same.

(b) For Multiplication, COLUMN of Ist should be equal to ROWS of 2nd.

(a) $\begin{bmatrix}-1\\2\end{bmatrix}+\begin{bmatrix}3\\4\end{bmatrix}$ (b) $\begin{bmatrix}2 & 3\\-1 & 5\end{bmatrix}-\begin{bmatrix}7\\6\end{bmatrix}$ (c) $\begin{bmatrix}1\\0\end{bmatrix}[32 \quad -1 \quad 0]$ (d) $[2 \quad 3 \quad -1]\begin{bmatrix}0\\1\\2\end{bmatrix}$ (e) $[-3 \quad 2]\begin{bmatrix}5 & 9\\0 & -1\end{bmatrix}$

TRIGONOMETRY

BASIC FORMULAE:

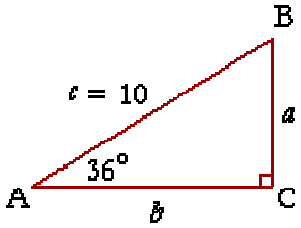
- $Sin\theta = \dfrac{1}{\operatorname{cosec}\theta}$
- $Cos\theta = \dfrac{1}{\sec\theta}$
- $Tan\theta = \dfrac{\sin\theta}{\cos\theta}$
- $Sin^2\theta + \cos^2\theta = 1$
- $1 + \tan^2\theta = \sec^2\theta$
- $1 + \cot^2\theta = \operatorname{cosec}^2\theta$

PROVE THAT:

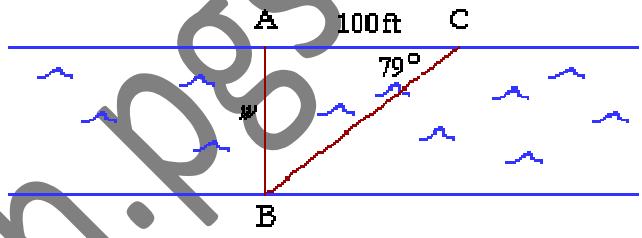
- $\dfrac{Sin\theta}{1-\cos\theta} = \dfrac{1+\cos\theta}{\sin\theta}$
- $cot\beta + tan\beta = cot\beta sec^2\beta$
- $\sin 260^o + \cos 260^o = 1$.
- $(\cos\theta - \sin\theta)^2 + 2\sin\theta.\cos\theta = 1$.

- $\dfrac{1-\cos\theta}{\cos\theta}=\dfrac{\cos\theta}{1}+\sin\theta$
- $(\tan\theta+\cot\theta)\sin\theta\cos\theta=1$.
- $(\operatorname{cosec}^2\theta-1)\sin^2\theta=\cos^2\theta$.
- $1+\cot^2\theta=\operatorname{cosec}^2\theta$.

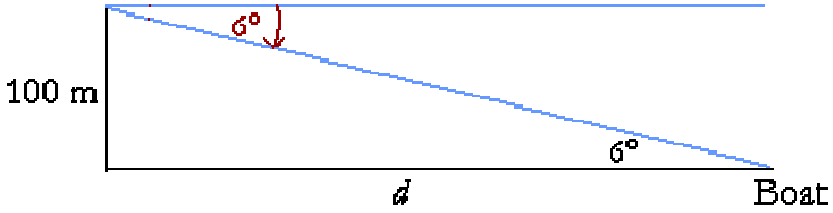
Problem 1. Solve the triangle for side *a*



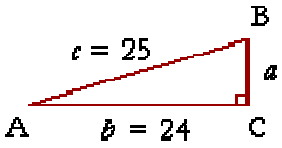
Problem 2. To measure the width of a river. Two trees stand opposite one another, at points A and B, on opposite banks of a river.



Example 2. Find the distance of a boat from a lighthouse if the lighthouse is 100 meters tall, and the angle of depression is 6°.



Example 3. Given two sides of a right triangle. **Solve the right triangle ABC given that side $c = 25$ cm and side $b = 24$ cm.**



An open **CHALLENGE** to tell the Numbers of the clock which are purely in language of **Mathematics.**