udisl jdr mÍCIKh - 2023
Monthly Test - 2023

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12 fY%aKsh
GRADE 12

ixhqla; .Ks;h
COMBINED MATHEMATICS

02 meh
02 Hour

- **Answer four questions only.**

01. a). Express as rational number.

i). $\mathbf{0.1\dot{6}}$

ii). $\mathbf{0.1\dot{2} \times 0.\dot{3}}$

b). Rationalize the denominator.

i). $\dfrac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ ii). $\dfrac{3}{1-\sqrt{2}+\sqrt{3}}$

c). Simplify,

i). $\dfrac{a^2-b^2}{a-b} - \dfrac{a^3-b^3}{a^2+b^2} + \dfrac{b-a}{b^2-a^2}$

ii). $\dfrac{1}{(a-b)(a-c)} + \dfrac{1}{(b-c)(b-a)} + \dfrac{1}{(c-a)(c-b)}$

d). If $\dfrac{x}{b-c} = \dfrac{y}{c-a} = \dfrac{z}{a-b}$ then show that,

$x+y+z = 0$

02. a). Solve the equation,

$$x - \sqrt{x + 1} = 5$$

b). Solve the equation,

$$\sqrt[3]{x^2} - \sqrt[3]{x} - 6 = 0$$

c). Solve the simultaneous equations.

$$2x - 3y = 4 \text{ and } 2x^2 - 3y^2 = 38$$

03. a). The function f(x) is defined as,

$$f(x) = \frac{x - 1}{x + 3} + 2 \ , \ x \neq -3$$

Find,

i). the domain and range of the function.

ii). $f(-2)$

iii). $f^{-1}(2)$

b). The functions $f(x)$ and $g(x)$ defined as,

$f(x) = \frac{1}{x}$ and $g(x) = (x + 5)$ Find,

i). $fg(x)$ ii). $gf(x)$ iii). $f^{-1}(x)$ iv). $gg(x)$

c). The functions f and g are defined by

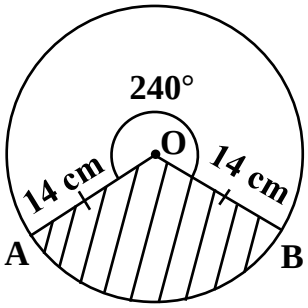
$f : x \rightarrow 5x + 4$

$g : x \rightarrow 6x + k$, Where $x \in R$ and k is a constant.

i). Find the value of k for which $fg = gf$

ii). Prove that $fff : x \rightarrow 125x + 124$

04. a).



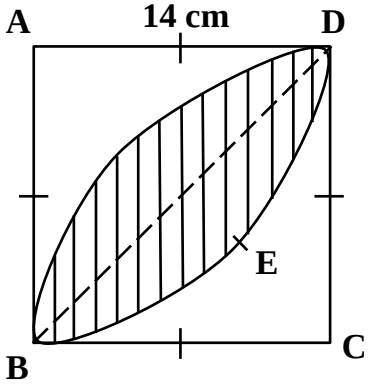
O is the center of the circle of radius $14\ cm$. Find,

i). The length of major arc AB

ii). The area of shaded region.

iii). The perimeter of the major sector.

b).



$ABCD$ is a square of the side $14\ cm$.

Find,

i). Area of ABD triangle.

ii). Area of ABD sector.

iii). Area of the shaded region

iv). Perimeter of the shaded region.

05. a). Find the values of the following.

i). $2\,Sin^2\,30° + 2\,Cos^2\,60°$

ii). $tan\,{}^{\pi}/_{4} - tan\,{}^{\pi}/_{6} + Cot\,\frac{2\pi}{3}$

iii). $\frac{2\,Sin\,90° - 3\,Cos\,90°}{3\,Cos\,90° + 2\,Sin\,90°} + \frac{2 \times Sin\,60° - Cos\,60°}{\sqrt{3} \times Sin\,60° + 2\,Cos\,30°}$

iv). $\frac{Sin\,75°}{Cos\,15°} \times \frac{Cos\,89}{Sin\,01}$

b). If $\boldsymbol{Sin\,\theta} = \frac{\mathbf{5}}{\mathbf{13}}$ and $\boldsymbol{\theta}$ in the second quadrant, then find the values of the following.

i). $\boldsymbol{Cos\,\theta}$

ii). $\frac{\boldsymbol{Sin\,\theta + Cos\,\theta}}{\boldsymbol{tan\,\theta}}$

iii). Simplify, $\frac{\boldsymbol{Cos\,(90 + \theta)\,.\,Sec\,(-\theta)\,.\,tan\,(180 - \theta)}}{\boldsymbol{Sec\,(360 - \theta)\,.\,Sin\,(180 + \theta)\,.\,Cot\,(90 - \theta)}}$

iv). Simplify, $\frac{\boldsymbol{Cosec\,(\pi + \theta)\,.\,Cos\,(\pi/2 - \theta)}}{\boldsymbol{Sin\left(\frac{3\pi}{2} + \theta\right)}}$

c). Prove that,

i). $\boldsymbol{\frac{1 + Sin\,\theta}{Cos\,\theta} + \frac{Cos\,\theta}{1 + Sin\,\theta} = 2\,Sec\,\theta}$

ii). $\boldsymbol{\sqrt{\frac{1 + Cos\,\theta}{1 - Cos\,\theta}} = Cot\,\theta + Cosec\,\theta}$

iii). $\boldsymbol{Cos\,2\,\theta = \frac{1 - tan^2\,\theta}{1 + tan^2\,\theta}}$