Hwa Chong Institution
Integrated Programme/mainstream
Secondary Three Mathematics

Name: _____ ***( )*** ***Class:*** _____ ***Date:*** _____

Surds & Indices, Equations involving Indices & Surds **AM Revision Practice 1**

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1 Express $\dfrac{25^{n+\frac{1}{2}}-5^{2n-1}}{3\left(5^{n}\right)}$ in the form $a\left(5^{n}\right)$, where a is a constant, and state the value of a. [3]

2 Solve the equation $\sqrt{x^2+\sqrt{7-2x}}=x-1$. [4]

3 **Without** using tables or calculators, evaluate 10^{x}, given that $2^{2x-1}\times5^{x+1}=2^{x+3}$. [3]

4 Given that $5^{2x}\left(\sqrt{5}\right)^{y}=125$ and $81^{x}\left(3^{-2y}\right)=\dfrac{1}{27}$, find the values of x and y. [4]

5 By using appropriate **substitution**, or otherwise, solve the equation $16^{x}-12(4^{x+1})=64\left(4^{x-1}+1\right)-4^{x}$. [4]

6 A rectangular block has a square base. The length of each side of the base is $\left(\sqrt{2}+\sqrt{3}\right)$ cm and the volume of the block is $(2\sqrt{3}+3\sqrt{2})\text{ cm}^3$. Find, **without** the use of a calculator,

(a) the area of the base, [2]

(b) the height of the block in the form $\left(a\sqrt{2}+b\sqrt{3}\right)$cm, where a and b are integers. [3]

7 **Without** using a calculator, find the value of m such that $\left(\dfrac{6}{\sqrt{12}}+\dfrac{\sqrt{108}}{27}-\dfrac{9}{\sqrt{243}}\right)\times\dfrac{2}{\sqrt{2}}=m\sqrt{6}$. [4]

Be consistent in your practice!!

Solutions to AM Revision Practice 2

1
$$\frac{25^{n+\frac{1}{2}}-5^{2n-1}}{3\left(5^n\right)}$$
$$=\frac{5^{2\left(n+\frac{1}{2}\right)}-\frac{5^{2n}}{5}}{3\left(5^n\right)}$$
$$=\frac{5^{2n+1}-\frac{5^{2n}}{5}}{3\left(5^n\right)}$$
$$=\frac{5^{2n}\left(5-\frac{1}{5}\right)}{3\left(5^n\right)}$$
$$=\frac{5^n\left(\frac{24}{5}\right)}{3}$$
$$=\frac{8}{5}\left(5^n\right)$$

2 $\sqrt{x^2+\sqrt{7-2x}}=x-1$

$x^2+\sqrt{7-2x}=x^2-2x+1$

$\sqrt{7-2x}=1-2x$

$7-2x=1-4x+4x^2$

$0=4x^2-2x-6$

$0=2x^2-x-3$

$0=(2x-3)(x+1)$

$x=-1$ (rej) or $x=\frac{3}{2}$

you forgot to reject again??!!

3 $2^{2x-1}\times5^{x+1}=2^{x+3}$

$2^{2x-1-x-3}\times5^{x+1}=1$

$2^{x-4}\times5^x\times5=1$

$10^x=\frac{16}{5}$

4 $5^{2x}\left(\sqrt{5}\right)^y=125$

$5^{2x+\frac{1}{2}y}=5^3$

$2x+\frac{y}{2}=3$

$4x+y=6....(1)$

$81^x\left(3^{-2y}\right)=\frac{1}{27}$

$3^{4x-2y}=3^{-3}$

$4x-2y=-3.....(2)$

$2(1)+(2)$

$8x+2y+4x-2y=12-3$

$12x=9$

$x=\frac{3}{4}$

$\therefore y=6-4\left(\frac{3}{4}\right)$

$=3$

$x=\frac{3}{4},\ y=3$

5 $16^x - 12(4^{x+1}) = 64\left(4^{x-1}+1\right) - 4^x$

$4^{2x} - 12(4^x \times 4) = 64\left(\frac{4^x}{4}+1\right) - 4^x$

Let $y = 4^x$

$y^2 - 48y - 16y - 64 + y = 0$

$y^2 - 63y - 64 = 0$

$(y-64)(y+1) = 0$

$y = 64$ or $y = -1$ (n.a)

$4^x = 64$

$\therefore x = 3$

Gotcha! reject $y = -1$

6 (a) Area of base $= \left(\sqrt{2}+\sqrt{3}\right)^2$

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

$= 5 + 2\sqrt{6}$

(b) Height $= \frac{2\sqrt{3}+3\sqrt{2}}{5+2\sqrt{6}}$

$= \frac{2\sqrt{3}+3\sqrt{2}}{5+2\sqrt{6}} \times \frac{5-2\sqrt{6}}{5-2\sqrt{6}}$

$= \frac{10\sqrt{3}-4\sqrt{18}+15\sqrt{2}-6\sqrt{12}}{25-4(6)}$

$= 10\sqrt{3} - 12\sqrt{2} + 15\sqrt{2} - 12\sqrt{3}$

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

$a = 3,\ b = -2$

7 $\left(\frac{6}{\sqrt{12}} + \frac{\sqrt{108}}{27} - \frac{9}{\sqrt{243}}\right) \times \frac{2}{\sqrt{2}} = m\sqrt{6}$

$\left(\frac{6\sqrt{12}}{\sqrt{12}\sqrt{12}} + \frac{6\sqrt{3}}{27} - \frac{9\sqrt{243}}{\sqrt{243}\sqrt{243}}\right) \times \sqrt{2} = m\sqrt{6}$

$\left(\frac{\sqrt{4}\sqrt{3}}{2} + \frac{2\sqrt{3}}{9} - \frac{\sqrt{3}\sqrt{81}}{27}\right) \times \sqrt{2} = m\sqrt{6}$

$\left(\sqrt{3} + \frac{2}{9}\sqrt{3} - \frac{1}{3}\sqrt{3}\right) \times \sqrt{2} = m\sqrt{6}$

$\frac{8}{9}\sqrt{3} \times \sqrt{2} = m\sqrt{6}$

$\frac{8}{9}\sqrt{6} = m\sqrt{6}$

$m = \frac{8}{9}$

healthy and positive results??!!!