RAFFLES INSTITUTION
MATHEMATICS DEPARTMENT
2021 YEAR 3 RP MATHEMATICS
TOPIC 1: SURDS (MATHS 1)

SUPPLEMENTARY WORKSHEET

Name: Class: Sec 3 (   )   Date:

1   **2019/Y3RP/M1/T1/Q1**

Simplify $\left(3-\sqrt{7}\right)^2 - \dfrac{3}{2+\sqrt{7}} + \dfrac{112}{\sqrt{28}}$, leaving your answer in the form $a+b\sqrt{7}$.   [3]

[Ans: $18+\sqrt{7}$]

2   **2019/Y3RP/M1/T1/Q2**

Solve the equation $\sqrt{3x+2}+\sqrt{x+3}=\sqrt{1-2x}$.   [4]

[Ans: $-2/3$]

3   **2018/Y3RP/M1/T1/Q1**

In optics, the focal length, f cm, of a lens, can be found using the formula $\dfrac{1}{f}=\dfrac{1}{u}+\dfrac{1}{v}$,

where u cm is the object distance and v cm is the image distance from the centre of the lens. Given that $f=\sqrt{2}$ and $u=\sqrt{5}$, without using a calculator, find the value of v, leaving your answer in surd form.   [4]

[Ans: $v=\dfrac{5\sqrt{2}+2\sqrt{5}}{3}$]

4   **2018/Y3RP/M1/T1/Q2**

Solve the equation $\sqrt{9x+13}-2\sqrt{2x+1}=\sqrt{x-3}$.   [4]

[Ans: x = 4]

5   **2017/Y3RP/T1/Q1**

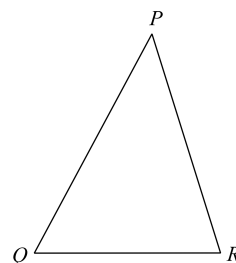Solve the equation $\sqrt{10x+6}-\sqrt{x+1}=\sqrt{5x+1}$ [4]

[Ans: x = 3]

6   **2017/Y3RP/T1/Q2**

(i)   Simplify $3\sqrt{48}+2\sqrt{75}-\dfrac{48}{\sqrt{24}}$.   [2]

(ii)   Given that the area of triangle PQR, as shown in the diagram,

is $\left(3\sqrt{48}+2\sqrt{75}-\dfrac{48}{\sqrt{24}}\right)$cm^2 and the length of QR is

$\left(11-2\sqrt{2}\right)$cm , calculate the exact shortest distance from P to QR.   [3]

[Ans: (i) $22\sqrt{3}-4\sqrt{6}$ (ii) $4\sqrt{3}$ cm]

7   **2016/Y3RP/T1/Q2**

A triangle has an area of $\left(4+3\sqrt{3}\right)$cm^{2}and a height of $\left(6-\sqrt{3}\right)$cm. Express the base of the triangle in the form $\left(a+b\sqrt{3}\right)$cm, where a and b are rational numbers.   [3]

[Ans: $\left(2+\dfrac{4}{3}\sqrt{3}\right)$cm]

8   **2015/Y3RP/T1/Q1**

Simplify $\dfrac{\sqrt{48}}{2+\sqrt{3}} - \dfrac{(2\sqrt{3}-3)^2}{\sqrt{3}}$ without using a calculator.   [3]

[Ans: $\sqrt{3}$]

9   **2015/Y3RP/T1/Q3**

Solve the equation $\sqrt{2x+1} - 2 = \sqrt{x+1}$.   [3]

[Ans: 24]

10   **2014/Y3RP/T1/Q1**

Given that $s = 3 - \sqrt{5}$, express $\dfrac{s^2 - 2}{s+2}$ in the form $a + b\sqrt{5}$, where a and b are rational

numbers.   [4]

[Ans: $\dfrac{3}{2} - \dfrac{9}{10}\sqrt{5}$]

11   **2014/Y3RP/T1/Q2**

Solve the equation $\sqrt{3-2x} - \sqrt{x+2} = \sqrt{3x-1}$.   [4]

[Ans: 1/3]

12   **2013/Y3RP/T1/Q1**

Given that $\dfrac{6+4\sqrt{3}}{a+b\sqrt{3}} = 1 - \sqrt{3}$, where a and b are rational numbers, find the values of a

and b.   [4]

[Ans: $a = -9$, $b = -5$]

13   **2013/Y3RP/T1/Q2**

Solve the equation $\sqrt{3x+1} + \sqrt{x+1} = \sqrt{3x+7}$.   [4]

[Ans: 7/11]

14   **2012/Y3RP/T1/Q1**

Express $\dfrac{2\sqrt{2}-\sqrt{3}}{\sqrt{2}+2\sqrt{3}} + \dfrac{6}{\sqrt{96}}$ in the form $a + b\sqrt{6}$.   [3]

[Ans: $-1 + \dfrac{3}{4}\sqrt{6}$]

15   **2012/Y3RP/T1/Q2**

Solve the equation $\sqrt{8x+3} - \sqrt{4x+1} = \sqrt{4x-2}$.   [4]

[Ans: 3/4]

16   **2011/Y3RP/T1/Q2**

Solve the equation $\sqrt{x-1} - \sqrt{9-5x} = \sqrt{4-2x}$, leaving your answer(s) in surd form. [5]

[Ans: $\dfrac{9+\sqrt{3}}{6}$]

17   **2009/Y3RP/T1/Q1**

Solve the equation $\sqrt{2x-1} - \sqrt{5-3x} = \sqrt{x-1}$.   [5]

[Ans: 3/2]

18   **2009/Y3RP/T1/Q2**

Without the use of a calculator, simplify $\dfrac{1+\sqrt{2}}{\sqrt{3}+\sqrt{5}} + \dfrac{1-\sqrt{2}}{\sqrt{3}-\sqrt{5}}$.   [3]

[Ans: $\sqrt{10} - \sqrt{3}$]

19   **2008/Y3RP/T1/Q3**

Solve the equation $\sqrt{2x} + \sqrt{11-x} = \sqrt{9+8x}$.   [4]

[Ans: 2]