



BUKIT SION HIGH SCHOOL

Score :

ACADEMIC YEAR 2019-2020

Where the abundance in life flows.....

Subject : Mathematics Class : 11.1 / 11.2 / 11.3 / 11.4
 Day / date :, August 2019 Duration : 40 minutes
 Topic : Surds and Indices Name :

Instructions:

- Use black or dark blue ink. Don't use erasable pen.
- Do not use correction tape/fluid.
- Do not use calculator.

1. Simplify:

- a. $\sqrt{75}$ [1]
 b. $\sqrt{6} \times \sqrt{12}$ [1]
 c. $\frac{\sqrt{72}}{\sqrt{3}}$ [1]
 d. $\sqrt{12} + \sqrt{75} - \sqrt{27}$ [2]
 e. $(2 - \sqrt{3})^2$ [2]

- f. $(2 + \sqrt{3})(2 - \sqrt{3})$ [2] 1
 g. $(3 - 2\sqrt{2})(2 + 3\sqrt{2})$ [2]
 h. $\frac{(5p^2q^4)^{\frac{1}{2}}}{(25pq^2)^{-\frac{1}{2}}}$ [2]

h. $5^{\frac{1}{2}} p q^2 (5^2 p q^2)^{\frac{1}{2}}$ [1]
 $= 5^{\frac{1}{2}} p^{\frac{1}{2}} q^3$ [1]

1 a. $\sqrt{75} = \sqrt{25 \times 3} = 5\sqrt{3}$ [1]
 b. $\sqrt{72} = \sqrt{36 \times 2} = 6\sqrt{2}$ [1]
 c. $\sqrt{24} = 2\sqrt{6}$ [1]
 d. $2\sqrt{3} + 5\sqrt{3} - 3\sqrt{3}$ [1]
 $= 4\sqrt{3}$ [1]

e. $4 - 4\sqrt{3} + 3$ [1]
 $= 7 - 4\sqrt{3}$ [1]
 f. $4 - 3 = 1$ [1]
 g. $6 + 9\sqrt{2} - 4\sqrt{2} - 12$ [1]
 $= 5\sqrt{2} - 6$ [1]

2. Rationalise the denominators, then simplify:

- a. $\frac{6}{\sqrt{2}}$ [2] 1
 b. $\frac{2}{4 - \sqrt{2}}$ [3]

- c. $\frac{5 - \sqrt{3}}{5 + \sqrt{3}}$ [3]
 d. $\frac{2}{\sqrt[5]{4}}$ [2] 3

2a. $3\sqrt{2}$

b. $\frac{2}{4 - \sqrt{2}} \times \frac{4 + \sqrt{2}}{4 + \sqrt{2}}$
 $= \frac{2(4 + \sqrt{2})}{14}$
 $= \frac{1}{7} (4 + \sqrt{2})$

c. $\frac{5 - \sqrt{3}}{5 + \sqrt{3}} \times \frac{5 - \sqrt{3}}{5 - \sqrt{3}}$ [1]
 $= \frac{25 - 10\sqrt{3} + 3}{22}$ [1]
 $= \frac{28 - 10\sqrt{3}}{22} = \frac{14 - 5\sqrt{3}}{11}$ [1]

d. $\frac{2}{\sqrt[5]{4}} \times \frac{\sqrt[5]{2^3}}{\sqrt[5]{2^3}}$ [1]
 $= \frac{2\sqrt[5]{8}}{2}$ [1]
 $= \sqrt[5]{8}$ [1]

3. Simplify $\sqrt{6} \times \sqrt[6]{\frac{27}{8}}$ by writing each factor in index notation.

$(2 \times 3)^{\frac{1}{2}} \times \left(\frac{3^3}{2^3}\right)^{\frac{1}{6}}$ [1]
 $= 2^{\frac{1}{2}} \times 3^{\frac{1}{2}} \times 3^{\frac{1}{2}} \times 2^{-\frac{1}{2}}$ [1]
 $= 3$ [1]

[2] 3

4. Given $y = 8x^{\frac{3}{2}}$, find

a. y when $x = 4 = 2^2$

b. x when $y = 125 = 5^3$

a. $y = 8 \cdot (2^2)^{\frac{3}{2}} \quad [1]$

$= 8 \times 8 = 64 \quad [1]$

b.

$$5^3 = 8 \cdot x^{\frac{3}{2}} \quad [2]$$

$$\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = \left[\frac{5^3}{2^3}\right]^{\frac{2}{3}} \quad [1]$$

[2]

[2]

$$x = \left(\frac{5}{2}\right)^2 = \frac{25}{4} \quad [1]$$

5. Solve the following equations:

a. $8^x = 4^{x+1} \quad [2]$

b. $\frac{4^x}{2^{x-1}} = 8^{2-x} \quad [3]$

c. $(\sqrt{2})^{3x} = \frac{1}{8} \quad [3]$

d. $x - 3\sqrt{x} = -2 \quad [3]$

5a. $2^{3x} = 2^{2x+2} \quad [1]$

$3x = 2x + 2$

$x = 2 \quad [1]$

c. $(2^{\frac{1}{2}})^{3x} = 2^{-3} \quad [1]$

$\frac{3}{2}x = -3 \quad [1]$

$x = -\frac{6}{3} = -2 \quad [1]$

b. $\frac{2^{2x}}{2^{x-1}} = 2^{3(2-x)} \quad [1]$

$2^{2x-x+1} = 2^{6-3x}$

$x+1 = 6-3x \quad [1]$

$4x = 5$

$x = \frac{5}{4} \quad [1]$

d. $x - 3\sqrt{x} = -2 \quad \text{Let } \sqrt{x} = A$

$A^2 - 3A + 2 = 0 \quad [1]$

$(A-2)(A-1) = 0 \quad [1]$

$A = 2 \quad \text{or} \quad A = 1$

$\sqrt{x} = 2 \quad \sqrt{x} = 1 \quad [1]$

$x = 4 \quad \text{or} \quad x = 1$

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

$(x+2)^2 = (3\sqrt{x})^2 \quad [1]$

$x^2 + 4x + 4 = 9x$

$x^2 - 5x + 4 = 0$

$(x-1)(x-4) = 0 \quad [1]$

$x = 1 \quad \text{or} \quad x = 4 \quad [1]$