

YEAR 8AP MATHEMATICS

SEMESTER 1 EXAM REVISION-2013

SOLUTIONS

Surds and Indices (Chapters ² and ¹⁰ 18)

1 Simplify the following surds:

a. $\sqrt{50}$ $\sqrt{50} = \sqrt{25} \sqrt{2} = 5\sqrt{2}$

b. $\sqrt{48}$ $\sqrt{48} = \sqrt{16} \sqrt{3} = 4\sqrt{3}$

2 Simplify the following surds:

a. $4\sqrt{52}$ $4\sqrt{52} = 4\sqrt{4} \sqrt{13} = 4 \times 2\sqrt{13}$
 $= 8\sqrt{13}$

b. $8\sqrt{45}$ $8\sqrt{45} = 8\sqrt{9} \sqrt{5} = 24\sqrt{5}$

3 Write as entire surds:

a. $7\sqrt{5}$ $7\sqrt{5} = \sqrt{49} \sqrt{5} = \sqrt{245}$

b. $5\sqrt{10}$ $5\sqrt{10} = \sqrt{25} \sqrt{10} = \sqrt{250}$

4 Simplify the following surd expressions:

a. $3\sqrt{11} - 9\sqrt{11} + 2\sqrt{13} - 6\sqrt{11} + 13\sqrt{13}$

$$= 3\sqrt{11} - 9\sqrt{11} - 6\sqrt{11} + 2\sqrt{13} + 13\sqrt{13}$$

$$= -12\sqrt{11} + 15\sqrt{13}$$

b. $6\sqrt{8} - 2\sqrt{3} + 4\sqrt{50} - 8\sqrt{63}$

$$= 6\sqrt{4} \sqrt{2} - 2\sqrt{3} + 4\sqrt{25} \sqrt{2} - 8\sqrt{9} \sqrt{7}$$

$$= 12\sqrt{2} - 2\sqrt{3} + 20\sqrt{2} - 24\sqrt{7}$$

c. $3\sqrt{125} + 2\sqrt{24} - \sqrt{80} + 7\sqrt{54}$

$$= 3 \times 2\sqrt{2} - 2\sqrt{3} - 24\sqrt{7}$$

$$= 3\sqrt{25} \sqrt{5} + 2\sqrt{4} \sqrt{6} - \sqrt{16} \sqrt{5} + 7\sqrt{9} \sqrt{6}$$

$$= 15\sqrt{5} + 4\sqrt{6} - 4\sqrt{5} + 21\sqrt{6}$$

$$= 11\sqrt{5} + 25\sqrt{6}$$

5 a. Write as a fraction: $11^{-1} = \frac{1}{11}$

b. Write as a fraction with one denominator:

$$3^{-1} + \left(\frac{5}{2}\right)^{-1} = \frac{1}{3} + \frac{2}{5} \\ = \frac{5}{15} + \frac{6}{15} = \frac{11}{15}$$

6 a. Simplify: $\left(\frac{3}{5}\right)^{-1} = \frac{5}{3}$

b. Simplify: $\left(\frac{2}{11}\right)^{-2} = \left(\frac{11}{2}\right)^2 = \frac{121}{4}$

c. Simplify: $\left(\frac{3}{10}\right)^{-3} = \left(\frac{10}{3}\right)^3 = \frac{1000}{27}$

8 Write these fractions in simplest form.

(a) $\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3} = \frac{8}{27}$

(b) $\left(\frac{9}{10}\right)^2 = \frac{9^2}{10^2} = \frac{81}{100}$

9 Evaluate $\sqrt{\frac{25}{169}}$. $= \frac{\sqrt{25}}{\sqrt{169}} = \frac{5}{13}$

10 Write each of the following as a basic numeral:

(a) 2^5 32
(b) 4^3 64
(c) $(-9)^3$ -729
(d) $\left(\frac{3}{2}\right)^5$ $\frac{243}{32}$

11 Simplify: a. $(-2e)^4$ $(-2)^4 e^4 = 16e^4$

b. $(-4p)^3$ $(-4)^3 p^3 = -64p^3$

Q14 (a)

$$\begin{aligned} q^{10} \div q^2 \\ = q^{10-2} \\ = q^8 \end{aligned}$$

$$\begin{aligned} (b) d^{16} \div d^2 \times d^5 \\ = d^{16-2+5} \\ = d^{19} \end{aligned}$$

$$\begin{aligned} (c) \frac{12a^{15}}{16a^3} \\ = \frac{3a^{15-3}}{4} \\ = \frac{3a^{12}}{4} \end{aligned}$$

$$\begin{aligned} (d) \frac{8p^9 \times 4p^6}{24p^{10}} \\ = \frac{32p^{15}}{24p^{10}} \\ = \frac{8p^5}{3} \end{aligned}$$

$$\begin{aligned} (e) \frac{27a^8 \times 18b^{12} \times 4c^3}{18a^6 \times 12b^5 \times 2c^2} \\ = \frac{3a^{8-6} \times 3b^{7} \times 2c^1}{2 \times 2} \\ = \frac{9a^2 b^7 c \times 2}{4} \\ = \frac{9a^2 b^7 c}{2} \end{aligned}$$

$$\begin{aligned} (f) \frac{5k^9}{7l^{10}} \div \frac{6k^5}{l^7} \\ = \frac{5k^9}{7l^{10}} \times \frac{l^7}{6k^5} \\ = \frac{5k^4}{42l^3} \end{aligned}$$

Q16. (a) $243^0 = 1$

(b) $f^0 g^3 h^4 = g^3 h^4$

$$\begin{aligned} (c) 2(138)^0 + 7^0 - 38^0 \\ = 2 \times 1 + 1 - 1 \\ = 2 \end{aligned}$$

$$\begin{aligned} \text{Q16 (d)} \quad & \frac{144h^2i^{13}}{12h^2i^{13}} \\ & = 12h^0i^0 \\ & = 12 \end{aligned}$$

$$\text{Q18. (a)} \quad \sqrt[3]{27} = 3$$

$$(b) \quad \sqrt[3]{1000} = 10$$

$$(c) \quad \sqrt[3]{4913} = 17$$

$$\begin{aligned} (d) \quad \sqrt{289s^{10}t^{18}} & = \sqrt{289} \times (s^{10}t^{18})^{\frac{1}{2}} \\ & = 17s^5t^9 \end{aligned}$$

$$\text{Q19. (a)} \quad \sqrt{81f^4} = 9\sqrt{f^4} = 9f^2$$

$$(b) \quad \sqrt{121h^4} = \sqrt{121} (h^4)^{1/2} = 11h^2$$

$$(c) \quad \sqrt{169h^8p^{12}} = 13h^4p^6$$

$$(d) \quad \sqrt{289s^{10}t^{18}} = 17s^5t^9$$

$$\text{Q20 (a)} \quad \sqrt[3]{512u^3t^6} = \sqrt[3]{512} (u^3t^6)^{\frac{1}{3}} = 8ut^2$$

$$(b) \quad \sqrt[3]{64q^9w^{12}} = 4q^3w^4$$

$$(c) \quad \sqrt[3]{343t^6u^{18}} = 7t^2u^6$$

$$(d) \quad \sqrt[3]{-1331c^{15}l^{21}} = -11c^5l^7$$

$$\text{Q21.} \quad \sqrt[3]{2197x^9y^3z^6} = 13x^3yz^2$$