Surds 3

9 Simplify each of these.

a $6\sqrt{12} \div 2\sqrt{3}$ b $3\sqrt{15} \div \sqrt{3}$ c $6\sqrt{12} \div \sqrt{2}$ d $4\sqrt{24} \div 2\sqrt{8}$

e $12\sqrt{40} \div 3\sqrt{8}$ f $5\sqrt{3} \div \sqrt{3}$ g $14\sqrt{6} \div 2\sqrt{2}$ h $4\sqrt{21} \div 2\sqrt{3}$

i $9\sqrt{28} \div 3\sqrt{7}$ j $12\sqrt{56} \div 6\sqrt{8}$ k $25\sqrt{6} \div 5\sqrt{6}$ l $32\sqrt{54} \div 4\sqrt{6}$

10 Simplify each of these.

a $4\sqrt{2} \times \sqrt{3} \div 2\sqrt{2}$ b $4\sqrt{5} \times \sqrt{3} \div \sqrt{15}$ c $2\sqrt{32} \times 3\sqrt{2} \div 2\sqrt{8}$

d $6\sqrt{2} \times 2\sqrt{8} \div 3\sqrt{8}$ e $3\sqrt{5} \times 4\sqrt{8} \div 2\sqrt{8}$ f $12\sqrt{3} \times 4\sqrt{3} \div 2\sqrt{3}$

g $3\sqrt{8} \times 3\sqrt{12} \div 3\sqrt{48}$ h $4\sqrt{7} \times 2\sqrt{3} \div 8\sqrt{3}$ i $15\sqrt{2} \times 2\sqrt{7} \div 3\sqrt{2}$

j $8\sqrt{2} \times 2\sqrt{18} \div 4\sqrt{3}$ k $5\sqrt{6} \times 5\sqrt{6} \div 5\sqrt{3}$ l $2\sqrt{5} \times 3\sqrt{6} \div \sqrt{30}$

11 Simplify each of these expressions.

a $a\sqrt{b} \times c\sqrt{b}$ b $a\sqrt{b} \div c\sqrt{b}$ c $a\sqrt{b} \times c\sqrt{b} \div a\sqrt{b}$

9 d) $\dfrac{4\sqrt{24}}{2\sqrt{8}} = 2\sqrt{\frac{24}{8}} = 2\sqrt{3}$

9 h) $\dfrac{4\sqrt{21}}{2\sqrt{3}} = 2\sqrt{7}$

9 l) $\dfrac{32\sqrt{54}}{4\sqrt{6}} = 8\sqrt{9} = 8 \times 3 = 24$

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10 c) $\dfrac{2\sqrt{32} \times 3\sqrt{2}}{2\sqrt{8}} = \dfrac{6\sqrt{64}}{2\sqrt{8}} = \dfrac{48}{2\sqrt{8}} = \dfrac{24}{\sqrt{8}} = \dfrac{3 \times 8}{\sqrt{8}} = 3\sqrt{8}$

10f) $\dfrac{12\sqrt{3} \times 4\cancel{\sqrt{3}}}{2\cancel{\sqrt{3}}} = \dfrac{48\sqrt{3}}{2} = 24\sqrt{3}$

10i) $\dfrac{\overset{5}{\cancel{15}}\cancel{\sqrt{2}} \times 2\sqrt{7}}{\underset{1}{\cancel{3}}\cancel{\sqrt{2}}} = 10\sqrt{7}$

10l) $\dfrac{2\sqrt{5} \times 3\sqrt{6}}{\sqrt{30}} = \dfrac{6\sqrt{30}}{\sqrt{30}} = 6$

11c) $\dfrac{\cancel{a\sqrt{b}} \times c\sqrt{b}}{\cancel{a\sqrt{b}}} = c\sqrt{b}$

Please do the rest of Q9, Q10, Q11

ANSWERS

ANSWERS: CHAPTER 10

Exercise 10J

1 a $\sqrt{6}$ **b** $\sqrt{15}$ **c** 2 **d** 4 **e** $2\sqrt{10}$ **f** 3 **g** $2\sqrt{3}$ **h** $\sqrt{21}$ **i** $\sqrt{14}$ **j** 6 **k** 6 **l** $\sqrt{30}$

2 a 2 **b** $\sqrt{5}$ **c** $\sqrt{6}$ **d** $\sqrt{3}$ **e** $\sqrt{5}$ **f** 1 **g** $\sqrt{3}$ **h** $\sqrt{7}$ **i** 2 **j** $\sqrt{6}$ **k** 1 **l** 3

3 a $2\sqrt{3}$ **b** 15 **c** $4\sqrt{2}$ **d** $4\sqrt{3}$ **e** $8\sqrt{5}$ **f** $3\sqrt{3}$ **g** 24 **h** $3\sqrt{7}$ **i** $2\sqrt{7}$ **j** $6\sqrt{5}$ **k** $6\sqrt{3}$ **l** 30

4 a $\sqrt{3}$ **b** 1 **c** $2\sqrt{2}$ **d** $\sqrt{2}$ **e** $\sqrt{5}$ **f** $\sqrt{3}$ **g** $\sqrt{2}$ **h** $\sqrt{7}$ **i** $\sqrt{7}$ **j** $2\sqrt{3}$ **k** $2\sqrt{3}$ **l** 1

5 a a **b** 1 **c** $\sqrt{a}$

6 a $3\sqrt{2}$ **b** $2\sqrt{6}$ **c** $2\sqrt{3}$ **d** $5\sqrt{2}$ **e** $2\sqrt{2}$ **f** $3\sqrt{3}$ **g** $4\sqrt{3}$ **h** $5\sqrt{3}$ **i** $3\sqrt{5}$ **j** $3\sqrt{7}$ **k** $4\sqrt{2}$ **l** $10\sqrt{2}$ **m** $10\sqrt{10}$ **n** $5\sqrt{10}$ **o** $7\sqrt{2}$ **p** $9\sqrt{3}$

7 a 36 **b** $16\sqrt{30}$ **c** 54 **d** 32 **e** $48\sqrt{6}$ **f** $48\sqrt{6}$ **g** $18\sqrt{15}$ **h** 84 **i** 64 **j** 100 **k** 50 **l** 56

8 a $20\sqrt{6}$ **b** $6\sqrt{15}$ **c** 24 **d** 16 **e** $12\sqrt{10}$ **f** 18 **g** $20\sqrt{3}$ **h** $10\sqrt{21}$ **i** $6\sqrt{14}$ **j** 36 **k** 24 **l** $12\sqrt{30}$

9 a 6 **b** $3\sqrt{5}$ **c** $6\sqrt{6}$ **d** $2\sqrt{3}$ **e** $4\sqrt{5}$ **f** 5 **g** $7\sqrt{3}$ **h** $2\sqrt{7}$ **i** 6 **j** $2\sqrt{7}$ **k** 5 **l** 24

10 a $2\sqrt{3}$ **b** 4 **c** $6\sqrt{2}$ **d** $4\sqrt{2}$ **e** $6\sqrt{5}$ **f** $24\sqrt{3}$ **g** $3\sqrt{2}$ **h** $\sqrt{7}$ **i** $10\sqrt{7}$ **j** $8\sqrt{3}$ **k** $10\sqrt{3}$ **l** 6

11 a abc **b** $\frac{a}{c}$ **c** $c\sqrt{b}$

12 a 20 **b** 24 **c** 10 **d** 24 **e** 3 **f** 6

13 a $\frac{3}{4}$ **b** $8\frac{1}{3}$ **c** $\frac{5}{16}$ **d** 12 **e** 2

Exercise 10K

1 $11 + 6\sqrt{2}$

2 a $2\sqrt{3} - 3$ **b** $3\sqrt{2} - 8$ **c** $10 + 4\sqrt{5}$ **d** $12\sqrt{7} - 42$ **e** $15\sqrt{2} - 24$ **f** $9 - \sqrt{3}$

3 a $2\sqrt{3}$ **b** $1 + \sqrt{5}$ **c** $-1 - \sqrt{2}$ **d** $\sqrt{7} - 30$ **e** -41 **f** $7 + 3\sqrt{6}$ **g** $9 + 4\sqrt{5}$ **h** $3 - 2\sqrt{2}$ **i** $11 + 6\sqrt{2}$

4 a $3\sqrt{2}$ cm **b** $2\sqrt{3}$ cm **c** $2\sqrt{10}$ cm

5 a $\sqrt{3} - 1$ cm^2 **b** $2\sqrt{5} + 5\sqrt{2}$ cm^2 **c** $2\sqrt{3} + 18$ cm^2

6 a $\frac{\sqrt{3}}{3}$ **b** $\frac{\sqrt{2}}{2}$ **c** $\frac{\sqrt{5}}{5}$ **d** $\frac{\sqrt{3}}{6}$ **e** $\sqrt{3}$ **f** $\frac{5\sqrt{2}}{2}$ **g** $\frac{3}{2}$ **h** $\frac{5\sqrt{2}}{2}$ **i** $\frac{\sqrt{21}}{3}$ **j** $\frac{\sqrt{2}+2}{2}$ **k** $\frac{2\sqrt{3}-3}{3}$ **l** $\frac{5\sqrt{3}+6}{3}$

7 a i 1 **ii** -4 **iii** 2 **iv** 17 **v** -44

b They become whole numbers. Difference of two squares makes the 'middle terms' (and surds) disappear.

c i $\frac{5+5\sqrt{5}}{-4}$ **ii** $\frac{5+3\sqrt{3}}{2}$