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SURDS

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What are Surds ?

Irrational Numbers

Cannot be written exactly

the best way to right them is to leave as a surds

Denotes a route sign

$\sqrt{\ }$ $\sqrt[3]{\ }$

It has infinite numbers of non recuring decimals

- Writing surds in simple form
- Addition of Surds
- Subtraction of Surds
- Multiplication of Surds
- Division of Surds
- Expanding brackets with Surds
- Rationalizing Surds
- Surds Word problems

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Simplifying Surds

a) Write the number as prime factors

b) Write the pairs as single number outside the surds sign.

c) Write in simple form

Q1 Write $\sqrt{48}$ in a simple form.

Q2 Write $3\sqrt{27}$ in simple form.

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Simplifying Surds

a) Write the number as prime factors

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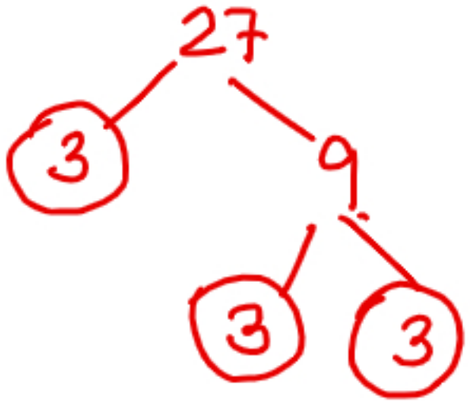

a) Write $\sqrt{48}$ in simple form.

$\sqrt{2\times2\times2\times2\times3}$

$2\times2\sqrt{3}$

$4\sqrt{3}$

b) Write $3\sqrt{27}$ in simple form.

$3\sqrt{3\times3\times3}$

$3\times3\sqrt{3}$

$9\sqrt{3}$

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ADDITION OF SURDS

a) $\sqrt{5} + 2\sqrt{5}$

b) $5\sqrt{7} + \sqrt{7}$

c) $5\sqrt{2} + 3\sqrt{6} + 3\sqrt{2}$

d) $7\sqrt{20} + 4\sqrt{45}$

a) Write the surds in simple form

b) If the surds digit is same then add the whole number only and keep the surds unchanged.

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ADDITION OF SURDS

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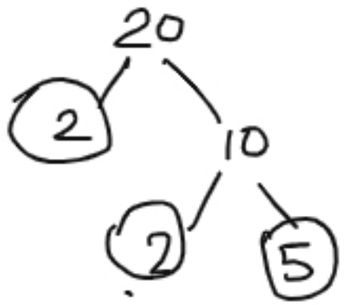
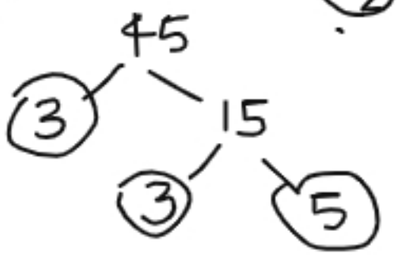
a) $\sqrt{5} + 2\sqrt{5} = 3\sqrt{5}$

b) $5\sqrt{7} + \sqrt{7} = 6\sqrt{7}$

c) $5\sqrt{2} + 3\sqrt{6} + 3\sqrt{2}$

$8\sqrt{2} + 3\sqrt{6}$





d) $7\sqrt{20} + 4\sqrt{45}$

$7\sqrt{2 \times 2 \times 5} + 4\sqrt{3 \times 3 \times 5}$

$7 \times 2\sqrt{5}$

$14\sqrt{5} + 12\sqrt{5}$

$26\sqrt{5}$

a) Write the surds in simple form

b) If the surds digit is same then add the whole number only and keep the surds unchanged.

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SUBTRACTION OF SURDS

a) $3\sqrt{7} - \sqrt{7}$

b) $\sqrt{12} - \sqrt{27}$

c) $5\sqrt{2} + 3\sqrt{6} - 3\sqrt{2}$

d) $2\sqrt{12} + 3\sqrt{5} - \sqrt{20}$

a) Write the surds in simple form

b) If the surds digit is same then add the whole number only and keep the surds unchanged.

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SUBTRACTION OF SURDS

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a) $3\sqrt{7} - \sqrt{7} = 2\sqrt{7}$

b) $\sqrt{12} - \sqrt{27}$

$= \sqrt{2\times2\times3} - \sqrt{3\times3\times3}$

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

$-\sqrt{3}$

c) $5\sqrt{2} + 3\sqrt{6} - 3\sqrt{2}$

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

d) $2\sqrt{12} + 3\sqrt{5} - \sqrt{20}$

$2\times2\sqrt{3} + 3\sqrt{5} - 2\sqrt{5}$

$4\sqrt{3} + 3\sqrt{5} - 2\sqrt{5}$

$4\sqrt{3} + \sqrt{5}$

12 → 2, 6 → 2, 3

a) Write the surds in simple form

b) If the surds digit is same then add the whole number only and keep the surds unchanged.

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MULTIPLICATION OF SURDS

a) $\sqrt{8} \times \sqrt{8} = \sqrt{64} = 8$

b) $5\sqrt{2} \times 4\sqrt{6} = 20\sqrt{12}$

$= 20\sqrt{2 \times 2 \times 3}$

$= 40\sqrt{3}$

c) $3\sqrt{2} \times 4\sqrt{2} = 12\sqrt{4}$

$= 12 \times 2$

$= 24$

d) $2\sqrt{2} \times 3\sqrt{32} = 6\sqrt{64}$

$= 6 \times 8 = 48$.

Mutiply the whole number together

Multiple the surds together

Solve

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DIVIDING SURDS

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a) $\frac{\sqrt{75}}{\sqrt{3}} = \sqrt{\frac{75}{3}} \quad 25 = \sqrt{25} = 5$

c) $\sqrt{\frac{12}{121}} = \frac{2\sqrt{3}}{11}$

b) $15\sqrt{6} \div 5\sqrt{3}$

$= 3\sqrt{2}$

$\frac{15\sqrt{6}}{5\sqrt{3}} \quad \frac{3}{\cancel{15}}\sqrt{\frac{\cancel{6}2}{\cancel{3}}}$

- Divide the whole numbers together
- Divide the surds together
- Simplify and Solve

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EXPANDING SURDS BRACKET

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a) $(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})$

$25 - 5\sqrt{2} + 5\sqrt{2} - 2 = 25 - 2$

$= 23$

b) $\sqrt{5}(3\sqrt{5} + 2\sqrt{20})$

$3\sqrt{25} + 2\sqrt{100}$

$3 \times 5 + 2 \times 10$

$15 + 20 = 35$

c) $(2+3\sqrt{5})(3+2\sqrt{5})$

$6 + 4\sqrt{5} + 9\sqrt{5} + 30$

$36 + 13\sqrt{5}$

Follow the rules of Surds addition, multiplication and subtraction.

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RATIONALISING SURDS

a) $\frac{1}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$

b) $\frac{5}{1+\sqrt{2}} \times \frac{1-\sqrt{2}}{1-\sqrt{2}}$

$\frac{5(1-\sqrt{2})}{(1+\sqrt{2})(1-\sqrt{2})} = \frac{5-5\sqrt{2}}{1-2}$

$= \frac{5-5\sqrt{2}}{-1} = \frac{5\sqrt{2}-5}{1}$

c) $\frac{6}{4-\sqrt{3}} \times \frac{4+\sqrt{3}}{4+\sqrt{3}} = \frac{6(4+\sqrt{3})}{(4-\sqrt{3})(4+\sqrt{3})}$

$= \frac{24+6\sqrt{3}}{16-3} = \frac{24+6\sqrt{3}}{13}$

d) $\frac{3}{2+\sqrt{2}}$

If denominator is a single surds then multiply and divide by the surds

If denominator is an expression then you reverse the sign and multiply and divide with the opposite sign.

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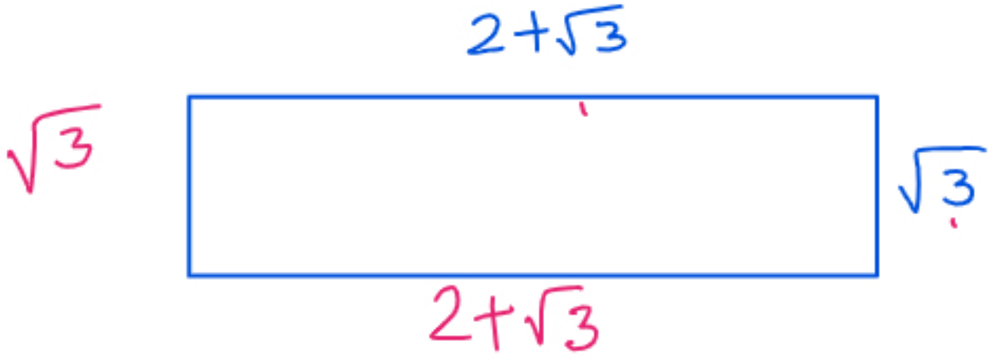
SURDS WORD PROBLEMS

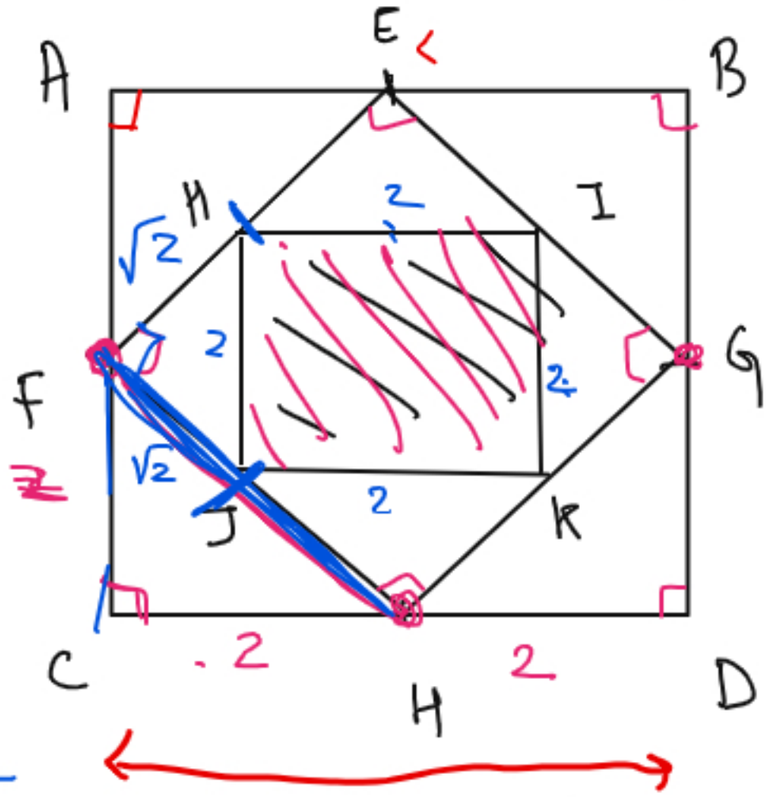


Find the perimeter and the area of the shape.

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

$4+4\sqrt{3}$

Find area of the shaded region



Shaded region

Area = Area

$FH = \sqrt{2^2+2^2}$

$= \sqrt{8}$

$HJ = \sqrt{(\sqrt{2})^2+(\sqrt{2})^2}$

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NEXT STEP !!!!

- Check the specification
- Do Exam Questions