Manipulating Surds

Simplify

(a) $4\sqrt{3}+2\sqrt{3}$ (b) $4\sqrt{3}-2\sqrt{3}$

(c) $2\sqrt{3}-4\sqrt{3}$ (d) $2\sqrt{3}-4\sqrt{5}$

(e) $-4\sqrt{2}+2\sqrt{2}$ (f) $\sqrt{2}-2\sqrt{2}$

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

(h) $\sqrt{3}-2\sqrt{3}+7\sqrt{3}$

Expand and simplify where possible

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

(c) $\sqrt{5}(\sqrt{2}-\sqrt{3})$ (d) $5(\sqrt{2}-\sqrt{3})$

(e) $\sqrt{3}(\sqrt{3}-7)$ (f) $\sqrt{3}(2+\sqrt{3})$

(g) $5\sqrt{2}(2+\sqrt{3})$ (h) $\sqrt{5}(2\sqrt{3}+\sqrt{5})$

(i) $\sqrt{5}(\sqrt{2}+2\sqrt{3})$ (j) $3\sqrt{5}(2\sqrt{2}+3\sqrt{3})$

Expand and simplify where possible

(a) $(2+\sqrt{3})(1+\sqrt{3})$

(b) $(2+\sqrt{3})(4+\sqrt{3})$

(c) $(5-\sqrt{5})(4+\sqrt{5})$

(d) $(2+\sqrt{5})(4-\sqrt{5})$

(e) $(1+2\sqrt{3})(4-\sqrt{3})$

(f) $(2+3\sqrt{5})(4-2\sqrt{5})$

Calculate the areas of these shapes, giving answers in their simplest form

(a) A square with side length $2+\sqrt{5}$ cm

(b) A rectangle width length $\sqrt{7}$ cm and width $1+\sqrt{3}$ cm

(c) A triangle with base $\sqrt{8}$ cm and height $2\sqrt{8}$ cm

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