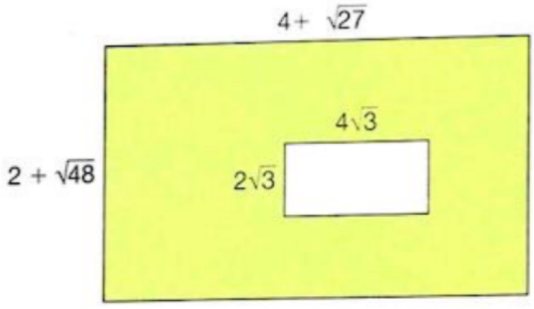
Surds Problems

8 Find the size of the shaded area.
Give your answer in the form $p(1 + \sqrt{3})$
where p is an integer.

WRONG



Large Rectangle Area

$(4+\sqrt{27})(2+\sqrt{48})$

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

$= 8 + 6\sqrt{3} + 16\sqrt{3} + 36$

$= 44 + 22\sqrt{3}$

Small Rectangle Area $= 4\sqrt{3} \times 2\sqrt{3}$

$= 24$

Shaded Area $= 44 + 22\sqrt{3} - 24$

$= 20 + 22\sqrt{3}$

$= 2(10 + 11\sqrt{3})$

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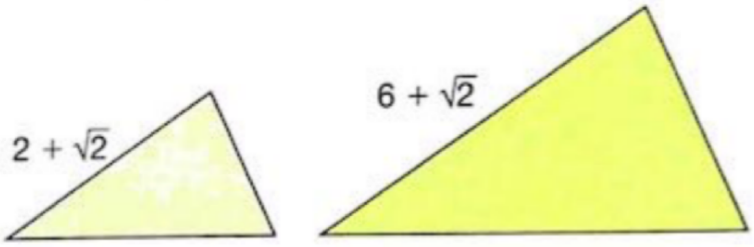
9 The diagram shows two similar triangles.



Find the scale factor of enlargement.
Give your answer in simplified surd form.

Enlargement scale factor $= \dfrac{6+\sqrt{2}}{2+\sqrt{2}}$

$$= \frac{6+\sqrt{2}}{2+\sqrt{2}} \times \frac{2-\sqrt{2}}{2-\sqrt{2}} = \frac{12+2\sqrt{2}-6\sqrt{2}-2}{2^2-\sqrt{2}^2}$$

$$= \frac{10-4\sqrt{2}}{4-2}$$

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

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10 The numbers X, Y and Z are such that $Y^2 = XZ$.

a Find the number Z if $X = \sqrt{3}$ and $Y = 1 - \sqrt{3}$.
Give your answer in the form $p + q\sqrt{3}$.

b Explain why it would not be possible to find Y if $X = \sqrt{5}$ and $Z = 1 - \sqrt{5}$.

$$(1-\sqrt{3})^2 = \sqrt{3} \times Z$$

$$\frac{(1-\sqrt{3})^2}{\sqrt{3}} = Z$$

$$Z = \frac{(1-\sqrt{3})(1-\sqrt{3})}{\sqrt{3}} = \frac{1-\sqrt{3}-\sqrt{3}+3}{\sqrt{3}}$$

$$= \frac{4-2\sqrt{3}}{\sqrt{3}}$$

$$= \frac{(4-2\sqrt{3})}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{4\sqrt{3}-6}{3}$$

$$= \frac{4}{3}\sqrt{3} - 2$$

b) Suppose $y^2 = x2$

$$y^2 = \sqrt{5}(1-\sqrt{5})$$

$$y^2 = \sqrt{5} - 5 < 0$$

Cannot have square root of negative number

Practise Your Multiplying

Examples

1) $2\sqrt{5} \times 3\sqrt{5} = 2 \times \sqrt{5} \times 3 \times \sqrt{5}$

$= 6 \times 5$

$= 30$

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

$= 12\sqrt{6}$

3) $-7\sqrt{5} \times 5\sqrt{5} = -35 \times 5 = -175$

Exercise

1) $3\sqrt{7} \times 4\sqrt{7} = 12 \times 7 = 84$

2) $2\sqrt{3} \times 8\sqrt{3} = 16 \times 3 = 48$

3) $-5\sqrt{2} \times 10\sqrt{2} = -50 \times 2 = -100$

4) $-3\sqrt{3} \times -4\sqrt{3} = 12 \times 3 = 36$

5) $5\sqrt{20} \times 3\sqrt{5} = 15 \times \sqrt{100} = 15 \times 10 = 150$

Revision for Indices Test Tomorrow

Ex1 $25^{-3/2} = \dfrac{1}{25^{3/2}} = \dfrac{1}{(\sqrt{25})^3} = \dfrac{1}{5^3} = \dfrac{1}{125}$

Ex2 $6a^2b^3c \times 4ab^2c^2 = 24a^3b^5c^3$

Ex3 $\dfrac{25p^2q^2r^2}{5pq^2r^3} = 5pr^{-1}$ or $\dfrac{5p}{r}$

Ex4 $\left(\dfrac{36}{49}\right)^{-\frac{1}{2}} = \left(\dfrac{49}{36}\right)^{\frac{1}{2}} = \sqrt{\dfrac{49}{36}} = \dfrac{7}{6}$
