Surds Worksheet

1) Which of the following are not surds?

$\sqrt{200}$, $\sqrt{2500}$, $\sqrt{1000}$, $\sqrt{121}$, $\sqrt{169}$, $\sqrt{5}$, $\sqrt{196}$, $\sqrt[3]{33}$, **(2 marks)**

2) Simplify the following and express each as a single surd where possible

a) $\sqrt{98}$

b) $\dfrac{\sqrt{60}}{2\sqrt{15}}$

c) $\sqrt{75}-\sqrt{12}$

d) $\sqrt{80}-3\sqrt{245}+2\sqrt{50}$

e) $\left(\sqrt{5}-6\sqrt{2}\right)\left(3\sqrt{5}-\sqrt{3}\right)$ **(13 marks)**

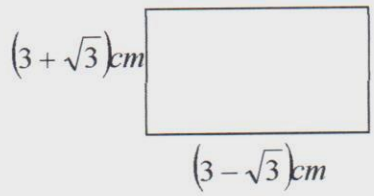
3) Rationalise

a) $\dfrac{7}{\sqrt{18}}$

b) $\dfrac{15}{3\sqrt{2}}$

c) $\dfrac{7-2\sqrt{3}}{4\sqrt{2}+\sqrt{3}}$ **(7 marks)**

4) Calculate the exact **area** and **perimeter** of the rectangle



(5 marks)

5) Evaluate x^2+4x+4 for $x=2+\sqrt{3}$, leaving your answer with rational denominator.

(6 marks)

6) Evaluate $\dfrac{2}{\sqrt{3}+2}+\dfrac{\sqrt{5}}{\sqrt{3}-2}$ leaving your answer with rational denominator. **(7 marks)**

Exercises 2.5 Arithmetic with Surds

1. (a) $\sqrt{2} \times \sqrt{2}$
   (b) $(\sqrt{5})^2$
   (c) $\sqrt{3} \times \sqrt{2}$
   (d) $6\sqrt{3} + 2\sqrt{3}$
   (e) $2(3 - \sqrt{7})$
   (f) $(2 + \sqrt{2}) - (3 + 2\sqrt{2})$
   (g) $3\sqrt{3} - 2(\sqrt{3} + 2)$
   (h) $\sqrt{8}$
   (i) $\sqrt{a^2}$
   (j) $\sqrt{49b^4}$
   (k) $\frac{1}{p}\sqrt{\frac{p^4}{16}}$
   (l) $5\sqrt{\frac{25}{4}}$

2. Simplify:

   (a) $5\sqrt{12} + \sqrt{27}$
   (b) $3\sqrt{20} - 3\sqrt{80} - 2\sqrt{45}$
   (c) $\sqrt{15} \times \sqrt{3}$
   (d) $2\sqrt{20} \times \frac{\sqrt{45}}{3}$
   (e) $(2 + \sqrt{3})(2 - \sqrt{3})$
   (f) $(3\sqrt{2} + 2\sqrt{3})^2$
   (g) $(3\sqrt{5} - 2)(\sqrt{5} + 3)$
   (h) $(2\sqrt{5} - \sqrt{3})(3\sqrt{3} + \sqrt{5})$
   (i) $\frac{2}{\sqrt{3}}$
   (j) $\frac{2}{\sqrt{5}+1}$
   (k) $\frac{\sqrt{3}+1}{\sqrt{3}-1}$
   (l) $\frac{5}{\sqrt{2}+\sqrt{8}} - \frac{1}{4}$
   (m) $\frac{2}{\sqrt{3}+1} + \frac{4}{\sqrt{3}-2}$
   (n) $\frac{1}{\sqrt{2}+3} - \frac{3}{\sqrt{2}-1}$

3. (a) Find the value of $x^2 + 4x + 4$ when $x = 2 + \sqrt{3}$.
   (b) Find the value of $2x^2 - 3xy$ when $x = \sqrt{2} + 3$ and $y = \sqrt{2} - 2$.
   (c) Given $\sqrt{2} = 1.41$ (to 2 decimal places), simplify $\frac{1}{\sqrt{2}}$ without a calculator. (Rationalize the denominator.)
   (d) Given $\sqrt{3} = 1.73$ (to 2 decimal places), simplify $\frac{3}{2+\sqrt{3}}$ without a calculator.
   (e) Find the area of a circle of radius $2\sqrt{7}$ cm (correct to 2 decimal places).
   (f) Find the perimeter of a rectangle of length $(3 + \sqrt{2})$ and breadth $(\sqrt{2} - 1)$ cm.