Surds

1. Simplify:
   (a) $\sqrt{12}$ (b) $\sqrt{18}$ (c) $\sqrt{20}$
   (d) $\sqrt{50}$ (e) $\sqrt{48}$ (f) $\sqrt{72}$
   (g) $3\sqrt{24}$ (h) $5\sqrt{27}$

2. Simplify:
   (a) $2\sqrt{12}+5\sqrt{75}-\sqrt{27}$
   (b) $\sqrt{8}-6\sqrt{18}+3\sqrt{72}-5\sqrt{50}$
   (c) $2\sqrt{45}-3\sqrt{20}+\sqrt{125}$

3. Write each of the following surds in the form $k\sqrt{2}$, where k is an integer to be found.
   (a) $\sqrt{18}$ (b) $\sqrt{50}$ (c) $3\sqrt{72}$

4. Simplify:
   (a) $(5+\sqrt{2})(2-\sqrt{2})$ (b) $(3-\sqrt{5})(2-\sqrt{5})$
   (c) $4(2-\sqrt{3})$ (d) $2(7+\sqrt{3})-4(1-\sqrt{3})$
   (e) $(3+2\sqrt{5})(2+4\sqrt{5})$ (f) $(1-3\sqrt{2})(1+5\sqrt{2})$

5. Simplify and write each of the following in the form $a+b\sqrt{c}$ where a, b and c are integers to be found.
   (a) $(3+2\sqrt{7})(1-\sqrt{7})$ (b) $(2\sqrt{3}-5)(3\sqrt{3}-2)$
   (c) $(3+\sqrt{5})^2$ (d) $(5-2\sqrt{3})^2$

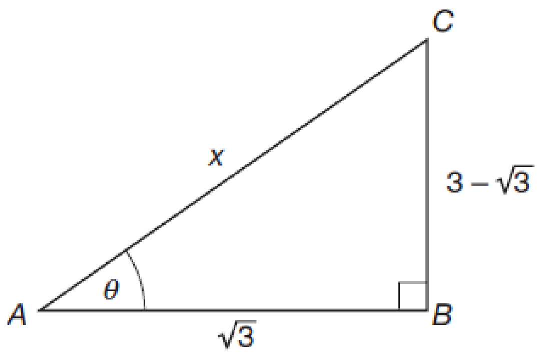
6. Rationalize the denominators:
   (a) $\frac{2}{\sqrt{5}}$ (b) $\frac{3}{\sqrt{7}}$ (c) $\frac{\sqrt{2}}{5\sqrt{3}}$
   (d) $\frac{\sqrt{3}}{4\sqrt{2}}$ (e) $\frac{2}{5+\sqrt{3}}$ (f) $\frac{3}{4-\sqrt{2}}$
   (g) $\frac{2+\sqrt{3}}{4-\sqrt{3}}$ (h) $\frac{2\sqrt{5}-3}{4\sqrt{5}+3}$

7. Simplify,

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

   giving your answer in the form of $a+b\sqrt{3}$ where a and b are integers.

8.



NOT TO SCALE

In the diagram angle ABC is a right-angle, $AB = \sqrt{3}$ cm, $BC = 3 - \sqrt{3}$ cm and $AC = x$ cm. Angle $BAC = \theta$.

Giving your answers in the form $a + b\sqrt{3}$, where a and b are integers,

find

(a) $\tan\theta$,

(b) x^2.

9.

(a) Express $\dfrac{6}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are positive integers.

The diagram shows a right-angled isosceles triangle.

The length of each of its equal sides is $\dfrac{6}{\sqrt{2}}$ cm.

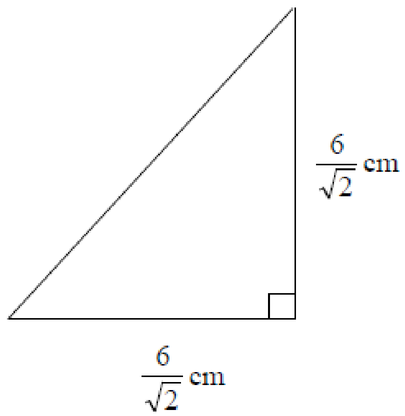


Diagram **NOT** accurately drawn

(b) Find the area of the triangle.
Give your answer as an integer.