

IGCSE HIGHER HOMEWORK Week 10

1, Simplify

a, $\sqrt{2} + \sqrt{2}$ b, $\sqrt{3} + 2\sqrt{3}$ c, $5\sqrt{2} + 7\sqrt{2}$ d, $11\sqrt{5} - 2\sqrt{5}$
 e, $\sqrt{3} + \sqrt{3} + \sqrt{3}$ f, $18\sqrt{19} - 12\sqrt{19}$ g, $5\sqrt{3} + 2\sqrt{7} + 4\sqrt{3} + 7\sqrt{7}$
 h, $\sqrt{3} \times \sqrt{3}$ i, $\sqrt{5} \times \sqrt{5}$ j, $2\sqrt{3} \times \sqrt{3}$ k, $3\sqrt{5} \times \sqrt{5}$
 l, $(\sqrt{3})^2$ m, $2\sqrt{3} \times 5\sqrt{3}$ n, $(2\sqrt{3})^2$ o, $(3\sqrt{7})^2$
 p, $(\sqrt{2})^3$ q, $3\sqrt{2} \times 2\sqrt{2} \times 5\sqrt{2}$ r, $5\sqrt{2} \div \sqrt{2}$ s, $3\sqrt{5} \div \sqrt{5}$
 t, $\sqrt{3} \times \sqrt{2}$ u, $\sqrt{11} \times \sqrt{5}$ v, $(\sqrt{3})^4$ w, $8\sqrt{2} \div 2\sqrt{2}$

2, Simplify

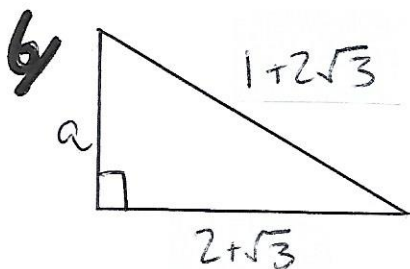
a, $\sqrt{12}$ b, $\sqrt{20}$ c, $\sqrt{48}$ d, $\sqrt{32}$ e, $\sqrt{45}$
 f, $\sqrt{75}$ g, $\sqrt{12} + \sqrt{3}$ h, $\sqrt{20} + 3\sqrt{5}$ i, $2\sqrt{18} + 3\sqrt{2}$
 j, $\sqrt{\frac{1}{9}}$ k, $\sqrt{\frac{4}{25}}$ l, $\sqrt{\frac{49}{100}}$ m, $\sqrt{125}$ n, $\sqrt{20} + \sqrt{80}$

3 A rectangle has side lengths $\sqrt{3}$ & $\sqrt{12}$. Find exact values for the area, the perimeter and the length of the diagonal

4, Simplify

a, $(1+\sqrt{2})^2$ b, $(1+\sqrt{5})^2$ c, $(2+\sqrt{3})^2$ d, $(1-\sqrt{3})^2$
 e, $(1+2\sqrt{3})^2$ f, $(2+3\sqrt{2})^2$ g, $(2-2\sqrt{3})^2$ h, $(\sqrt{7} + \sqrt{3})^2$
 i, $(1+\sqrt{2})(1-\sqrt{2})$ j, $(2+\sqrt{3})(2-\sqrt{3})$ k, $(7+\sqrt{5})(7-\sqrt{5})$
 l, $(3+2\sqrt{2})(5-2\sqrt{7})$ m, $(5+3\sqrt{3})(4-2\sqrt{5})$

5 A rectangle has sides of lengths $(\sqrt{5}+1)$ & $(\sqrt{5}-1)$. Find exact values for perimeter, area and diagonal length.



A right angled triangle has the side lengths shown

a) Find the side length a

b) Find the area

express your answers as exact values

7, Express with Rational Denominators

$$a, \frac{1}{\sqrt{2}}$$

$$b, \frac{1}{\sqrt{5}}$$

$$c, \frac{1}{\sqrt{11}}$$

$$d, \frac{3}{\sqrt{3}}$$

$$e, \frac{2}{\sqrt{2}}$$

$$f, \frac{6}{\sqrt{8}}$$

$$g, \frac{8}{\sqrt{6}}$$

$$h, \frac{1+\sqrt{3}}{\sqrt{3}}$$

$$i, \frac{1-\sqrt{5}}{\sqrt{5}}$$

$$j, \frac{4-\sqrt{2}}{\sqrt{2}}$$

$$k, \frac{\sqrt{2}}{\sqrt{6}}$$

$$l, \frac{\sqrt{8}}{\sqrt{20}}$$

$$m, \frac{3+2\sqrt{3}}{\sqrt{3}}$$

Multiply $\frac{1}{1+\sqrt{2}}$ by $\frac{(1-\sqrt{2})}{(1-\sqrt{2})}$ see what happens

Now express these with rational denominators

$$n, \frac{1}{1+\sqrt{3}}$$

$$o, \frac{1}{1+\sqrt{5}}$$

$$p, \frac{1}{1-\sqrt{7}}$$

$$q, \frac{1-\sqrt{3}}{3+\sqrt{3}}$$

8 Write $(3-\sqrt{3})^2$ in the form $a+b\sqrt{3}$ where a & b are integers

9 Expand $(3+\sqrt{2})(1-\sqrt{2})$ give your answer in the form $a+b\sqrt{2}$ where a & b are integers

10 Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{3}$ where k is an integer

11 Show that $\frac{\sqrt{3} + \sqrt{27}}{\sqrt{2}}$ can be expressed in the form \sqrt{k} where k is an integer

12 Show that $(6-\sqrt{8})^2 = 44-24\sqrt{2}$ show each stage of your working

13 Rationalise the denominators

$$a, \frac{1}{\sqrt{a}}$$

$$b, \frac{c}{\sqrt{c}}$$

$$c, \frac{2}{\sqrt{p}}$$

$$d, \frac{5}{\sqrt{5a}}$$

14 Expand & Simplify

$$a, (a+\sqrt{b})(a-\sqrt{b})$$

$$b, (m-\sqrt{n})^2$$

$$c, (p+2\sqrt{k})^2$$

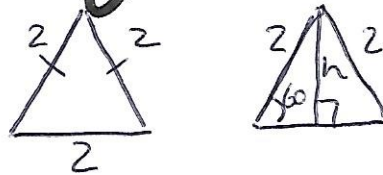
15 Given $(2+\sqrt{a})(3+\sqrt{a}) = 11+k\sqrt{a}$ where a & k are positive integers. Find the value of a & k

16, Rationalise The denominator of $\frac{5a - \sqrt{a}}{\sqrt{a}}$
given that a is a prime number

17, Show that $(5 - \sqrt{8})(7 + \sqrt{2}) = 31 - 9\sqrt{2}$

show each stage of your working

18, Find the exact height of an equilateral triangle
with side length 2 units



Hence find exact values of $\cos 60$ & $\sin 60$

19, Show that $\frac{14}{\sqrt{245}} = \frac{2\sqrt{5}}{5}$

show each stage of your working