Perth Academy National 5 Expressions and Formulae Homework 12

1. (a) Express $x^2+6x+11$ in the form $x+a\ ^2+b.$

   (b) Express $x^2-8x+19$ in the form $x-a\ ^2+b.$

   (c) Express x^2+4x+3 in the form $x+a\ ^2+b.$

   (d) Express $x^2-10x+39$ in the form $x-a\ ^2+b.$

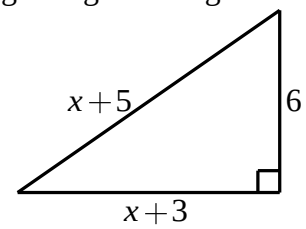
2. Solve each of these equations:

   (a) $3(x+1)+2(x+3)=19$ (b) $4x-(x-1)=19-3x$

3. Simplify each of these expressions:

   (a) $(a+2)^2+(a-2)^2$ (b) $x^2+7x+9-x(x+2)$ (c) $(4x)^2-(3x)^2$

4. Find the value of x in the right-angled triangle sketched below.



5. Multiply out and simplify:

   (a) $2x-3\ ^2$ (b) $3x-1\ \ x-3\ -2x\ \ 2x-3$

   (c) $2x+3\ ^2-\ x-3\ ^2$ (d) $x+3\ \ x^2+2x+3$

6. Solve each of these inequalities.

   (a) $3\ \ x-5\ \leq 36$ (b) $5x-1>2x+14$ (c) $10-x\geq 2x+4$

7. (a) Expand and simplify $x+1\ ^2$

   (b) By writing $x+1\ ^3=\ x+1\ \ x+1\ ^2$, expand and simplify $x+1\ ^3$.

8. Simplify

   (a) $\sqrt{18}+5\sqrt{2}$ (b) $\sqrt{5}\left(2\sqrt{5}-\frac{1}{\sqrt{5}}\right)$ (c) $\sqrt{3}-1\ \ \sqrt{3}+1$

9. Simplify each of the following.

(a) $\left(\sqrt{5}-\sqrt{2}\right)^2$ (b) $\sqrt{7}\left(\sqrt{7}+\sqrt{2}\right)$ (c) $\left(6-\sqrt{2}\right)\left(6+\sqrt{2}\right)$

(d) $\left(1+\sqrt{2}\right)^2$ (e) $\sqrt{50}+\sqrt{98}+\sqrt{72}-\sqrt{32}+\sqrt{8}$ (f) $\left(\sqrt{2}\right)^3$

(g) $\left(2\sqrt{3}\right)^4$ (h) $\sqrt{125}+\sqrt{45}-\sqrt{20}-\sqrt{80}$ (i) $\left(\sqrt{3}+\sqrt{2}\right)^2$

10. An extract from a camping holiday brochure is shown below.

Season	**For 14 nights**					**Over 14 nights**
	Two adults	Each extra adult	Each young adult aged 14 to 17	Each child aged 10 to 13	Each child aged 0 to 9	Each extra night per family
low	£399	£74	£40	Free	Free	£19
mid	£555	£85	£50	Free	Free	£29
high	£699	£95	£60	£46	Free	£39

(a) Find the cost of a holiday for 2 adults and a child aged 8, for 17 nights during mid-season.

(b) Write down a formula to find the cost $£C$, of a holiday in mid-season for 2 adults and a child aged 8 lasting t nights, where $t > 14$.

11. Evaluate each of the following.

(a) 2^5 (b) 3^{-2} (c) $9^{\frac{1}{2}}$ (d) 3^{-3}

(e) 5^0 (f) $8^{\frac{2}{3}}$ (g) $9^{\frac{3}{2}}$ (h) 7^{-1}

12. Simplify each of the following.

(a) $a^4 \times a^{-3} \times a^{-1}$ (b) $\left(x^{\frac{1}{2}}\right)^6$ (c) $\dfrac{y^3 \times y^{-2}}{y^{-3}}$ (d) $\left(g^{-2}\right)^{-4}$

(e) $\left(p^2 q^4\right)^{\frac{1}{2}}$ (f) $2c^2 \times 3c^{-3}$ (g) $10^{\frac{1}{2}} \times 10^{-\frac{2}{3}} \times 10^{\frac{1}{6}}$