1. Solve these simultaneous linear equations:
(a) $3 x+2 y=1$
$4 x-y=5$
(b) $4 p+3 q=2$
$7 p+2 q=-3$
2. A group of 25 people, adults and children, visited the R.S.S. Discovery at "Discovery Point". Charges for entry were $£ 5$ for an adult and $£ 2$ for a child.
The total entry charge was $£ 95$.
How many adults, and how many children were in the group? Do not use "trial and error".
3. A council decides to plant rowan and maple trees in a park.

The trees are to be planted with a density of 720 trees per hectare.
The council spends $£ 1500$ on the trees and decides to plant an area of 0.25 hectares.
Rowan trees cost $£ 7.50$ each and maple trees cost $£ 9$ each.
Given that the council buys $r$ rowan trees and $m$ maple trees,
(a) Explain why $m+r=180$.
(b) Find another equation connecting $m$ and $r$.
(c) Find the number of maple trees and the number of rowan trees bought by the council.
4. Seats on flights from London to Edinburgh are sold at two prices, $£ 30$ and $£ 50$.

On one flight a total of 130 seats was sold.
Let $x$ be the number of seats sold at $£ 30$ and $y$ be the number sold at $£ 50$.
(a) Write down an equation in $x$ and $y$ which satisfies the above condition.

The sale of the seats on this flight totalled $£ 6000$.
(b) Write down a second equation in $x$ and $y$ which satisfies this condition.
(c) How many seats were sold at each price?
5. (a) Express $a^{1 / 2} a^{-3 / 2}+a^{-1 / 2}$ without brackets in its simplest form.
(b) Express $\frac{1}{x-2}-\frac{1}{x x+2}$ as a single fraction in its simplest form.
(c) Simplify $\frac{x^{2}-4}{3 x+6}, x \neq-2$.
6. A manufacturer claims that his breakfast cereal contains at least $25 \%$ fruit. A 750 g packet of the cereal is checked and found to contain 195 g of fruit. What actual percentage of the cereal is fruit?
7. Solve each of the following inequalities:
(a) $5 x+3 \leq 2 x+27$
(b) $10 z-5>9 z-4$
(c) $2 x+7 \leq 5 x-14$
8. Solve each of these equations:
(a) $\frac{x}{2}=4$
(b) $\frac{2 x}{3}=12$
(c) $\quad \frac{x-1}{2}=7$
(d) $\quad \frac{y}{5}+1=7$
(e) $\frac{t}{3}=\frac{1}{4}$
(f) $\frac{a-1}{4}=\frac{1}{2}$
9. The 4th term of each number pattern below is the mean of the previous three terms.
(a) If the first three terms are 1, 6 and 8, calculate the 4th term.
(b) When the first three terms are $x, x+7$ and $x+11$, calculate the fourth term.
(c) When the first, second and fourth terms are $-2 x, x+5$ and $2 x+4$, calculate the 3rd term.
10. (a) Express $x^{2}-6 x+10$ in the form $x-a^{2}+b$.
(b) Express $x^{2}+x+1$ in the form $x+a^{2}+b$.
(c) Express $x^{2}+4 x+1$ in the form $x-a^{2}+b$. Be careful with signs here.
11. In the diagram ABCD and APQR are CONGRUENT rectangles.

The side PQ passes through D and $\angle \mathrm{PDA}=x^{\circ}$.
Find an expression for $\angle \mathrm{DRQ}$ in terms of $x$.

12. A cylinder has radius $2 x \mathrm{~cm}$ and height $h \mathrm{~cm}$.

A sphere has radius $3 x \mathrm{~cm}$.
Given that the two solids have equal volumes, express $h$ in terms of $x$.
Use exact values and symbols. No decimals.
13. The $n^{\text {th }}$ triangular number, $T_{n \text {, }}$ is given by the formula $T_{n}=\frac{1}{2} n n+1$.
(a) Evaluate $T_{1}, T_{2}$ and $T_{3}$, drawing sketches to illustrate your answers.
(b) Evaluate $T_{20}$.
(c) Show that $T_{n+1}=\frac{1}{2} n^{2}+3 n+2$.
(d) Show that $T_{n}+T_{n+1}$ is a square number.

