1.   Change the subject of each of these formulae to the variable given:

    (a) $V = \pi a^2 b$ to b
    (b) $S = at + b$ to b
    (c) $X = ab + yb^2$ to y
    (d) $A = b^2 + 4t$ to t

2.   Simplify each of these expressions:

    (a) $\dfrac{x^2 + 3x}{x^2 - 9}$ (b) $\dfrac{2t^2 - 3t + 1}{6t^2 - 3t}$ (c) $(x-1)(x^2 - x - 1)$

3.   (a) $(x-3)^2 = 49$. Write down the **two** possible values of $(x-3)$.
         Hence find the **two** values of x which solve the equation $(x-3)^2 = 49$.
    (b)   Use the same approach to solve the equation $(x+5)^2 = 36$.

4.   Solve these inequalities:

    (a) $5x + 6 \le 3x + 24$ (b) $7t - 3 < 3t + 13$ (c) $2 - 3y < 2y - 13$
    (d) $5(2x+1) \ge 6 - x$ (e) $2(3n - 2) > -6$ (f) $6 - 2(5 - x) \le 0$

5.   Consecutive Natural Numbers can be summed using the following formula:
$$1 + 2 + 3 + 4 + \cdots\cdots\cdots + n = \frac{n(n+1)}{2}$$
    (a)   Use this formula to find the value of $1 + 2 + 3 + 4 + \cdots\cdots + 100$.
    (b)   Use this formula to find the value of $1 + 2 + 3 + 4 + \cdots\cdots + 50$.
    (c)   **Hence** find the value of $51 + 52 + 53 + 54 + \cdots\cdots + 100$
    (d)   Write down a formula for $1 + 2 + 3 + 4 + \cdots\cdots + 2m$

6.   Solve each of these equations:
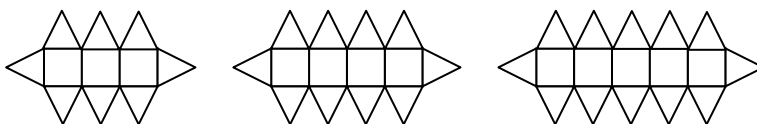
    (a) $3a - 5 = 2(1 - 2a)$ (b) $4 + 2(y - 3) = 18$
    (c) $7(2p + 3) - 3(8 - 2p) = 27$ (d) $(2x+3)(x+3) = (2x+1)(x+3)$

7.

The figures above are made of squares and triangles.

    (a)   Make a table to show the number of squares and triangles in each figure.
    (b)   Another figure has 24 squares. How many triangles does it have?
    (c)   How many triangles T, would be needed for S squares in this pattern?

8.   Expand and simplify

   (a) $(3x-2)(2x+5)$ (b) $(7-3y)^2$ (c) $(2x-1)(x-2)^2$

9.   The Queen of Spades always lies for the whole day or always tells the truth for the whole day.
      Which of these statements can she never say? Explain your answer.

   A.   "Yesterday, I told the truth."
   B.   "Yesterday, I lied."
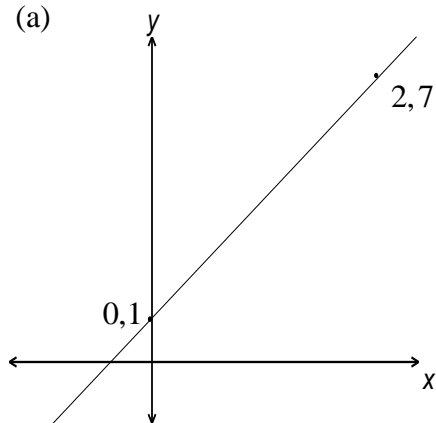   C.   "Today, I tell the truth."
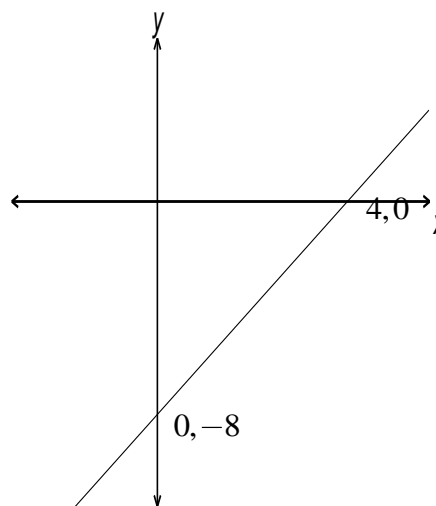   D.   "Today, I lie."
   E.   "Tomorrow, I shall tell the truth."

10.   The mean of three numbers x, y and z is x. What is the mean of y and z? as always, your
      answers must be explained.

11.   Find the equation of each of these straight lines (diagrams not to scale).

   (a)   (b)

12.   Simplify

   (a) $\dfrac{1}{x}-\dfrac{2}{x+3}$ (b) $\dfrac{x^3(x-y)^2}{x(x-y)^3}$ (c) $1-\dfrac{1}{n+1}$

13.   Solve each of these simultaneous linear equations

   (a) $2x-3y=1$ (b) $3x+4y=-6$
          $3x+2y=8$ $2x+3y=-5$