NCEA Level 2 Mathematics
Year 11 diagnostics

These questions are at the level required for NCEA Level 1 mathematics. At a bare minimum, students starting Y12 should be comfortable with those questions in part A. Students aiming for a merit or excellence in Level 2 should also revise the questions in part B.

Part A

A calculator isn't needed.

1. Write $\frac{3}{4} - \frac{1}{3}$ as a single fraction.
2. If $a = 5$ and $b = a - 3$, what is the value of $3a - b$?
3. What possible values of x make the equation $3x - 8 = -4x + 34$ true?
4. What possible values of y make the equation $x^2 - x = 20$ true?
5. Write $\dfrac{x+1}{x-1} + \dfrac{x+1}{x-2}$ as a single fraction.
6. Give the equation of the line through the two points $(0, 1)$ and $(2, 3)$.
7. The two shorter sides of a right-angled triangle measure 2 m and 1 m. What are the measures of the three internal angles of the triangle?
8. Calculate the mean value of the following data: $\{2, 3, 6, 7, 9\}$.

Part B

A calculator might be useful here.

1. Because of inflation, the price of all homes for sale in a new subdivision are to be increased by 5%. If the new price for each lot is to be \$450,000, what is the current price of a lot?

2. A rectangular plot of land has area $28\,\text{km}^2$. If one side length is three kilometres more than the other side length, what are the dimensions of the plot?

3. Consider the following party trick.

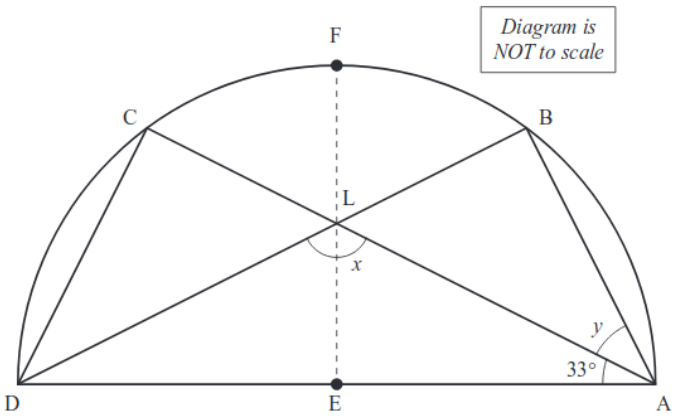
   Pick any number.
   Add 11.
   Divide by 2.
   Multiply by 6.
   Subtract 3 times your original number.

   The magician (perhaps too strong a word) hands you a sealed envelope containing your final number. Why are you not surprised to find she is correct?

4. A chemist is mixing one container of a 7% solution of a chemical and another container of a 4% solution to produce 5 litres of a 5% solution. Calculate the volume of each solution needed.

5. A flagpole is known to be 10 m high. At a certain time, the length of the shadow cast by the flagpole is 0.5 m. At what angle are light rays from the top of the flagpole hitting the ground?

6. The following construction is made from a semicircle and two triangles.



   The diameter of the semicircle is AD. The construction is symmetric about the line EF. Calculate the values of x and y.

7. Consider two lines. One passes through the points $(0, 3)$ and $(2, 5)$; the other passes through the points $(3, 4)$ and $(5, 6)$. Either find the point of intersection, or use precise mathematical reasoning to show that they do not intersect.