O Level E Maths Tutorial 6: Functions and Graphs

Syllabus :
• Cartesian coordinates in two dimensions
• graph of a set of ordered pairs as a representation of a relationship between two variables

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1. Given $y = x^2 - 5$. Complete this table:

x	-3	-2	-1	0	1	2	3
y							

With the help of these values, sketch the graph.

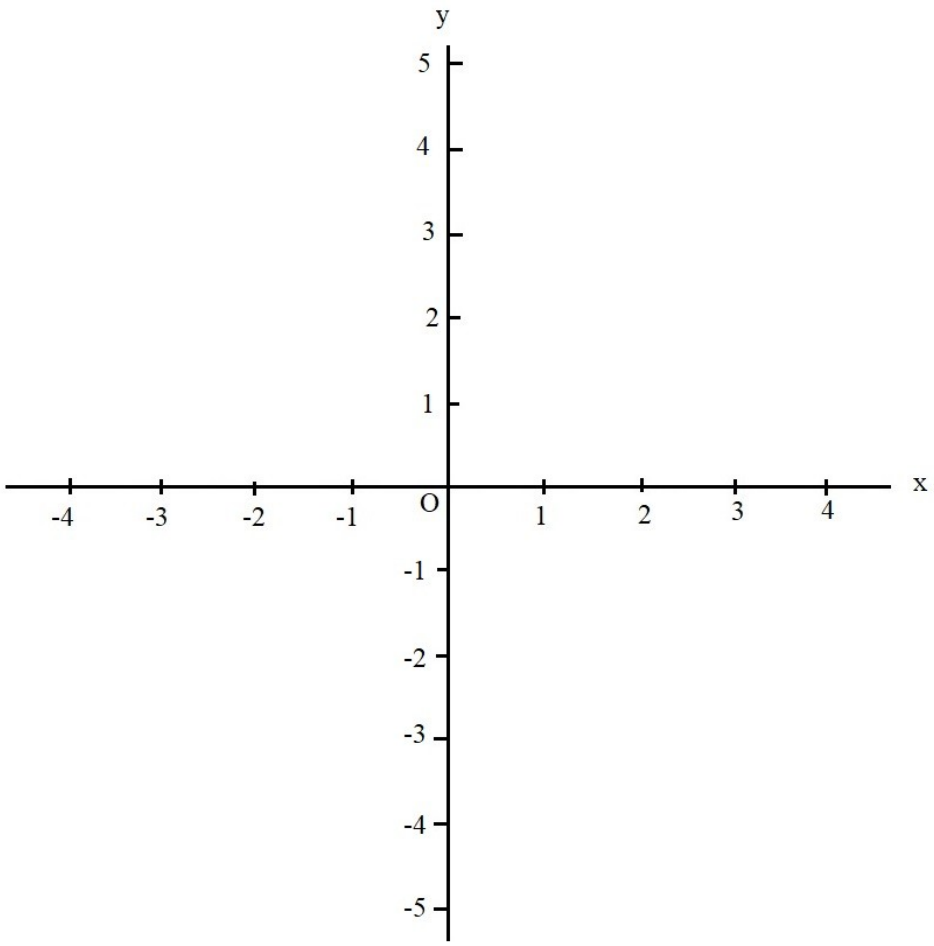

Figure 6-1

• linear functions ($y = ax + b$) and quadratic functions ($y = ax^2 + bx + c$)
• graphs of linear functions

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2. Tabulate the values of

$$y = 2x - 1$$

for $x = -4, -3, \ldots, 4$. Plot the points on Fig. 6-1 also.

Estimate and write down the coordinates of the point(s) of intersection with the graph of question 1.

• the gradient of a linear graph as the ratio of the vertical change to the horizontal change (positive and negative gradients)

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3. Find the values of

$$y = 2x - 1$$

for $x = -3, -2, \ldots, 3$.

Sketch the graph of this line on the same graph as Fig. 6-1.

• graphs of quadratic functions and their properties:
  - positive or negative coefficient of x^2
  - maximum and minimum points
  - symmetry

• sketching the graphs of quadratic functions given in the form:
  - $y = (x - p)^2 + q$
  - $y = -(x - p)^2 + q$
  - $y = (x - a)(x - b)$
  - $y = -(x - a)(x - b)$

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4. Sketch the following graphs.

(i) $y = (x - 2)^2 + 1$
(ii) $y = -(x - 2)^2 + 2$
(iii) $y = (x + 1)(x - 2)$

(iv) $y = -(x - 1)(x - 3)$

• graphs of power functions of the form $y = ax^n$, where $n = -2, -1, 0, 1, 2, 3$, and simple sums of not more than three of these

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5. Sketch the following graphs.

(i) $y = x$
(ii) $y = x^2$
(iii) $y = x^3$
(iv) $y = x^0$
(v) $y = x^{-1}$
(vi) $y = x^{-2}$

• graphs of exponential functions $y = ka^x$, where a is a positive integer

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6. Given $y = 2^x$. Complete this table:

x	-3	-2	-1	0	1	2	3
y							

With the help of these values, sketch a graph of $y = 2^x$.

• estimation of the gradient of a curve by drawing a tangent

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7. Refer to Figure 6-1. Draw a straight line touching the curve at $x = 2$. Use this line to estimate the gradient of the curve at that point.