

Subject n°18

FUNCTIONS

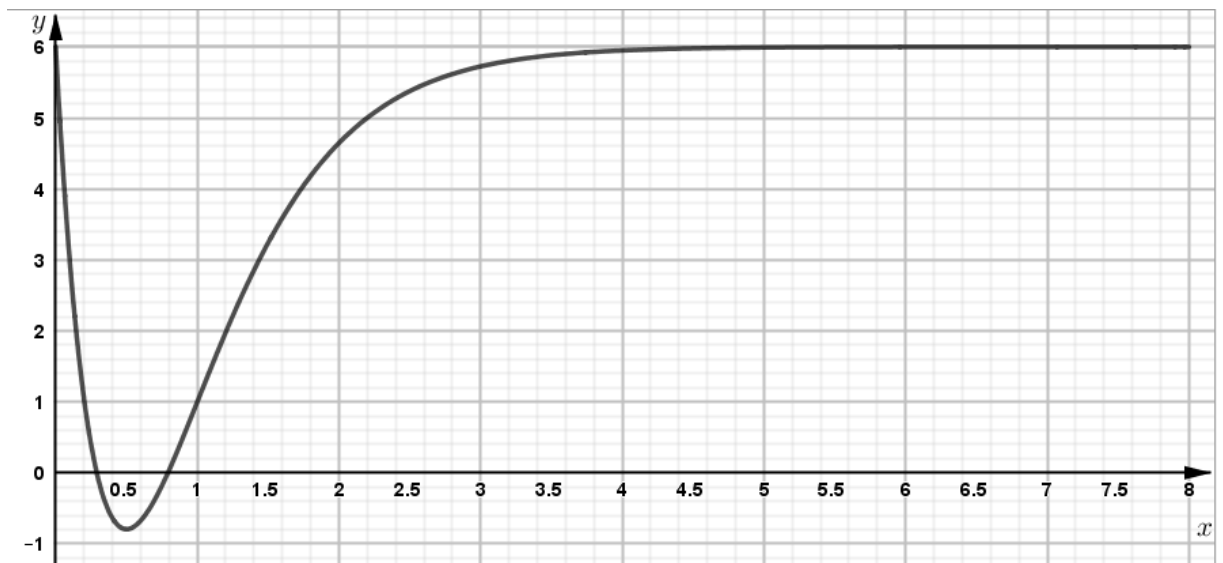
***Please, do not write on the exam paper
and do not forget to give it back at the end of the test.***

About the Thames depth

Near Tilbury, the depth of the Thames in the estuary is about 8 metres.

We assume that on a winter day in the Thames estuary the water temperature (in degrees Celsius) expressed according to the depth x (in metres) can be modelled by the following function: $f(x) = 6 - 275xe^{-2x-2}$

- 1) Using the formula above, justify all the aspects of the graph below representing the function f (variations, maximum, minimum, depths for which the temperature is below 0°).



- 2) Does a temperature under 0°C mean that the Thames will be frozen ?
- 3) According to BBC News Magazine between 1309 and 1814, the Thames froze at least 23 times and on five of these occasions the ice was thick enough to hold a fun fair. Do you think that such a thing could be repeated today?



Anonymous painting of the Frost Fairs on the frozen Thames, winter 1620-21
National Gallery