

# SHARP

## Worksheet 7: Functions and Graphs

### *(Parabolas, Hyperbolas and Exponential Graphs)*

#### Grade 11 Technical Maths

1. Give the standard formula for each of these graphs:

- |              |                      |
|--------------|----------------------|
| a) parabola  | b) exponential graph |
| c) hyperbola | d) straight line     |

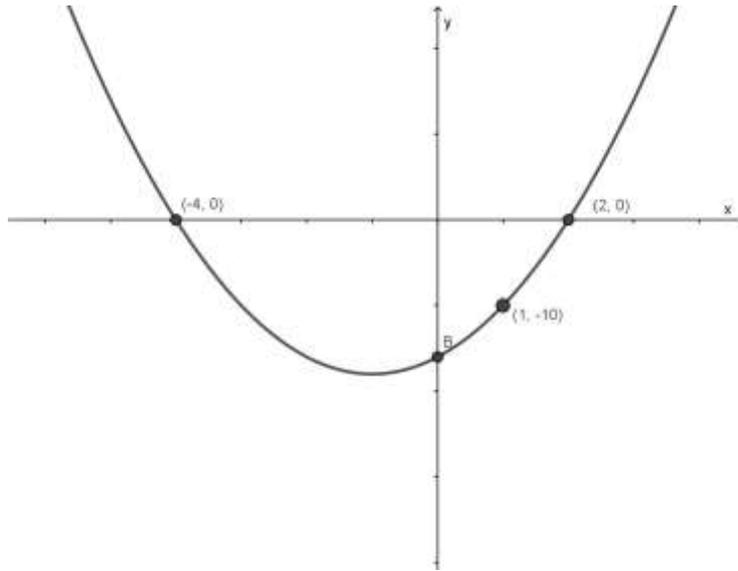
2. For each of the graphs given below find the following (if possible):

- |                     |  |
|---------------------|--|
| i) y-intercept      | ii) x-intercept(s)                             |
| iii) turning point  | iv) axes of symmetry                           |
| v) domain and range | vi) a table with points for $-3 \leq x \leq 3$ |
| vii) asymptotes     | viii) draw the graph                           |
- 
- |                              |                              |
|------------------------------|------------------------------|
| a) $a(x) = (x - 1)^2 + 5$    | b) $b(x) = -2(x - 2)^2 + 3$  |
| c) $c(x) = 2x^2 - 12x + 9$   | d) $d(x) = -x^2 + 7x - 6$    |
| e) $e(x) = \frac{-3}{x} + 4$ | f) $f(x) = \frac{5}{x} - 9$  |
| g) $g(x) = \frac{1}{x} + 2$  | h) $h(x) = \frac{-4}{x} - 3$ |
| i) $i(x) = 3.2^x + 4$        | j) $j(x) = -2.5^x - 1$       |

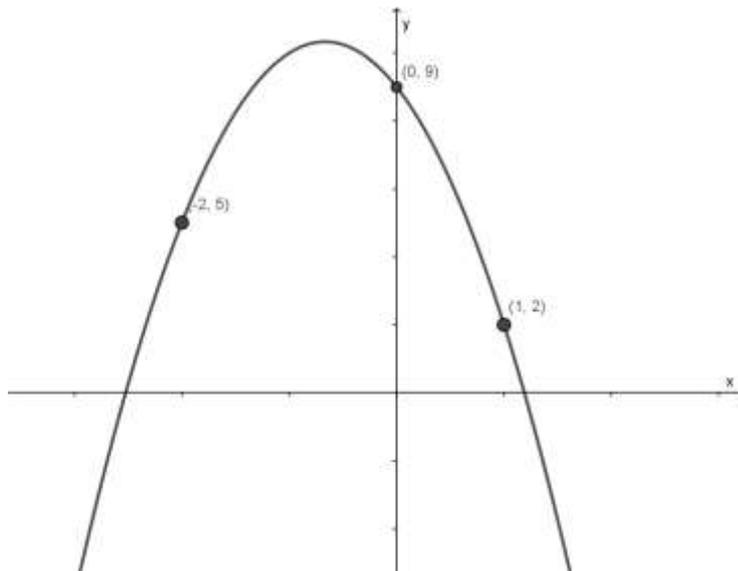
3. Find the standard equation for each of the graphs below.

- A parabola with turning point (1; 5) and intersecting the origin.
- A parabola with x-intercepts at  $x = 3$  and  $x = -4$  and y-intercept at  $y = 5$ .
- A hyperbola with an asymptote at  $y = 2$  and point (-1; 3) on the graph

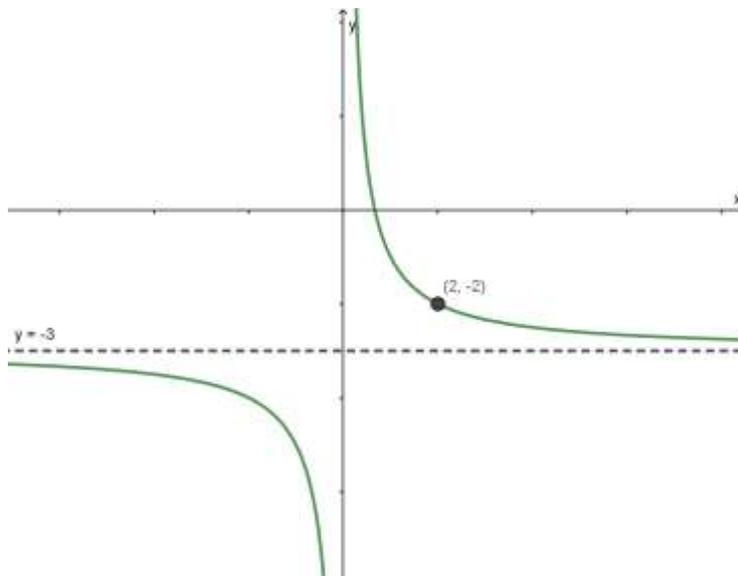
d) An exponential graph with the points (1; 13), (3; 685) and (4; 4801)



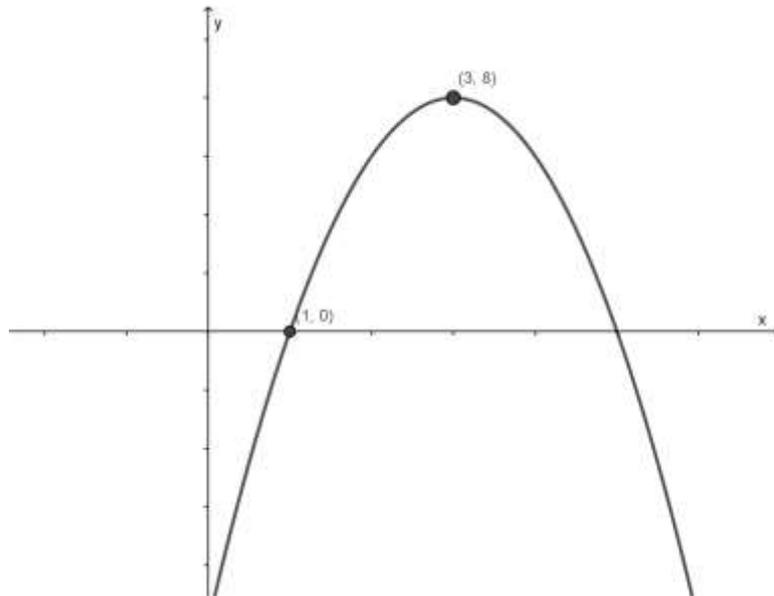
e)



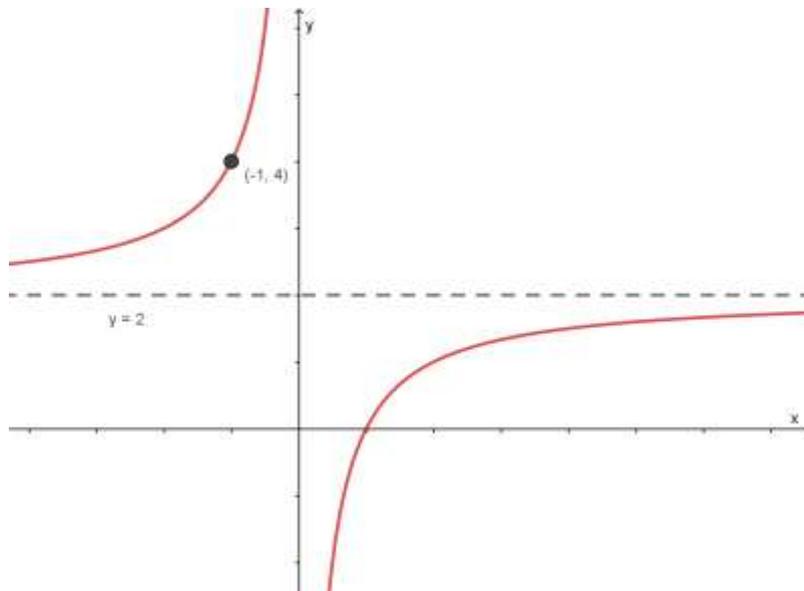
f)



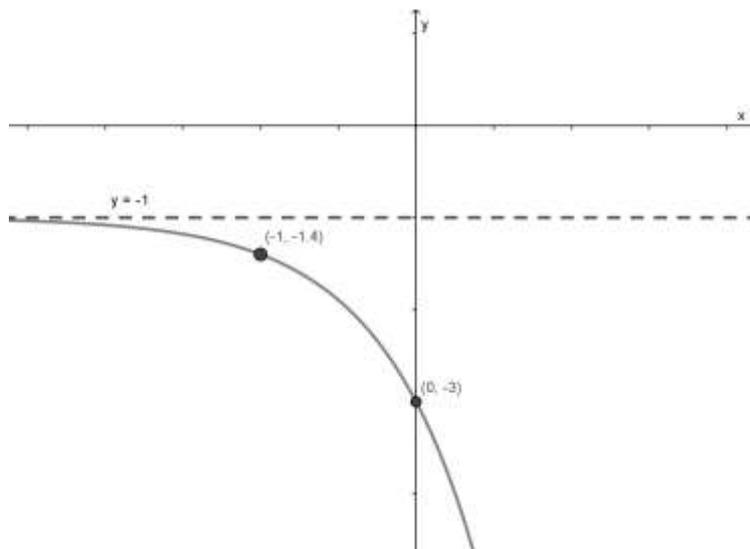
g)



h)

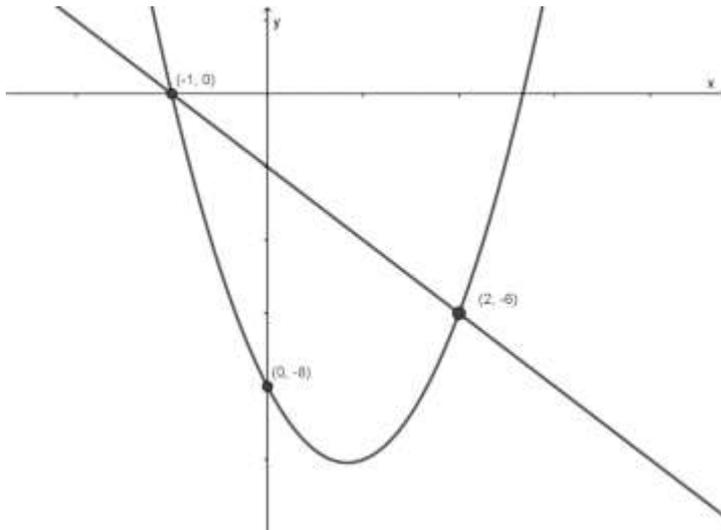


i)



j)

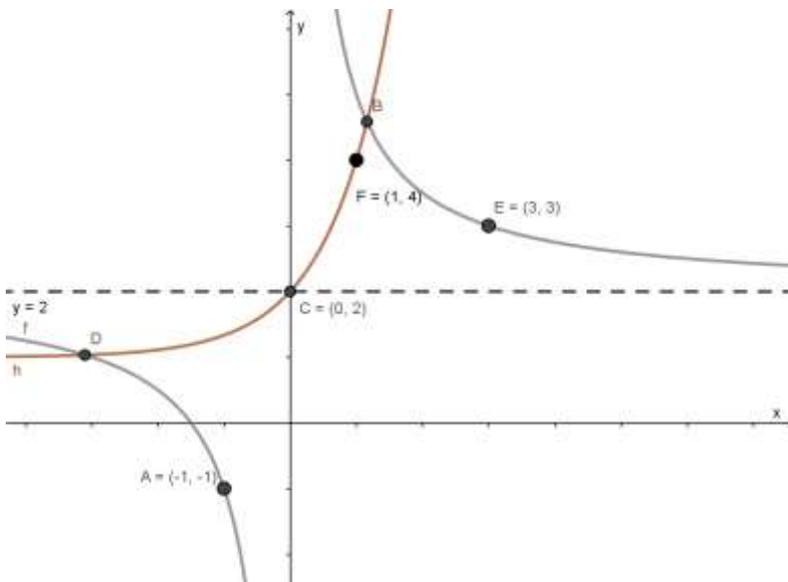
4. Examine the graphs below carefully before answering the questions that follow.



The parabola  $f(x) = ax^2 + bx + c$  has the x-intercept  $(-1; 0)$ , the y-intercept  $(0; -8)$  and intersects the straight line  $g(x) = mx + c$  at the point  $(2; -6)$ .

- Find the equations of the straight line and parabola.
  - Find the second x-intercept for the parabola.
  - What is the distance between the y-intercept of the straight line and the y-intercept of the parabola?
  - Find the turning point of the parabola.
- e) If a second straight line is drawn from the point  $(0; -8)$  and the point  $(2; -6)$ , determine the equation of this straight line,  $h(x)$ .

5. Examine the graphs below carefully before answering the questions that follow:



$$f(x) = \frac{a}{x} + q \text{ and } h(x) = b^x + q$$

B and D are the points where f and h intersect. A  $(-1; -1)$  is a point on f. C  $(0; 2)$  is the y-intercept of h, and E  $(3; 3)$  is a point on f. The asymptote is the line  $y = 2$ . A second point on the graph of h(x) is F  $(1; 4)$

- Determine the equations of f and h.
  - Determine the equations for the axes of symmetry of  $f(x)$ .
- c) What is the domain and range of  $f(x)$  and  $h(x)$ ?