

MINISTRY OF EDUCATION
CHRISTMAS TERM
SEPTEMBER 2020

GRADE 11

SUBJECT: MATHEMATICS

WEEK 5: LESSON 2

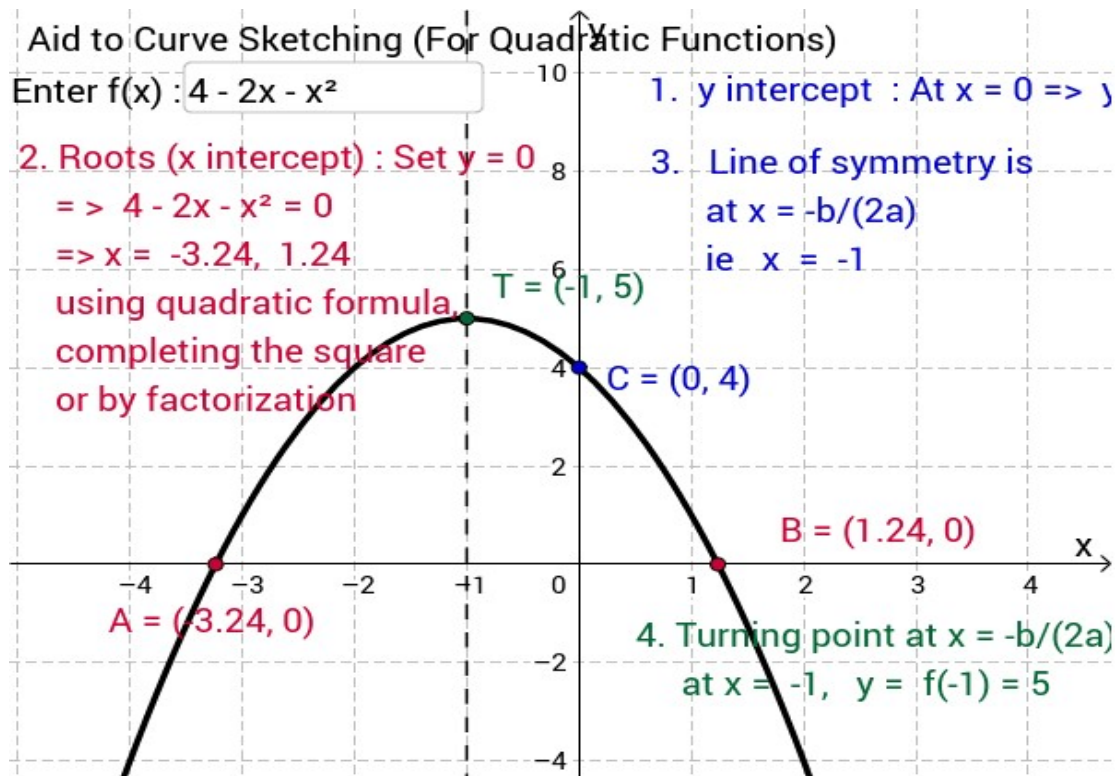
TOPIC: RELATIONS FUNCTIONS AND GRAPHS

SUB-TOPIC: quadratic functions, Axes of symmetry and roots of functions

OBJECTIVES:

1. Determine the axis of symmetry, maximum or minimum value of a quadratic function expressed in the form $a(x+h)^2+k$ and determine the roots.
3. Draw and interpret the graphs of non-linear functions.
function expressed in the form $a(x+h)^2+k$

Content:



Sketch the graph of the function $y = 2x^2 + x - 6$, stating the y -intercept and x -intercepts (if appropriate). Use the method of completing the square to find the coordinates of the vertex, and the line of symmetry.

y -intercept: $y = 2(0)^2 + 0 - 6$

So y -intercept is at $(0, -6)$

x -intercepts: $2x^2 + x - 6 = 0$

Solving for x gives intercepts at

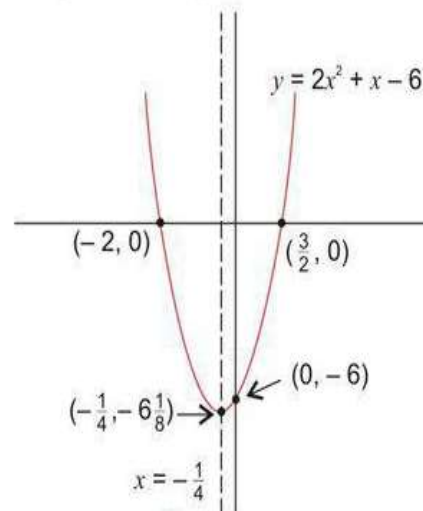
$(\frac{3}{2}, 0)$ and $(-2, 0)$

Vertex and symmetry:

$$2x^2 + x - 6 = 2(x^2 + \frac{1}{2}x - 3)$$

$$= 2\left\{\left(x + \frac{1}{4}\right)^2 - \frac{1}{16} - 3\right\} = 2\left(x + \frac{1}{4}\right)^2 - \frac{49}{8}$$

So vertex is at $(-\frac{1}{4}, -\frac{49}{8})$ and line of symmetry is $x = -\frac{1}{4}$



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Solution follow:

1. Sketch the graph for the equation $x^2 + 8x + 2 = 22$

Solution:

$$\begin{aligned}x^2 + 8x + 2 &= 22 \\x^2 + 8x + 2 - 2 &= 22 - 2 \\x^2 + 8x &= 20 \\x^2 + 8x + \left(\frac{8}{2}\right)^2 &= 20 + \left(\frac{8}{2}\right)^2 \\x^2 + 8x + 16 &= 20 + 16 \\x^2 + 8x + 16 &= 36 \\(x + 4)^2 &= 36 \\\sqrt{(x + 4)^2} &= \pm \sqrt{36} \\x + 4 &= \pm 6 \\x + 4 - 4 &= \pm 6 - 4 \\x &= \pm 6 - 4 \\x_1 = 6 - 4 &= 2 \\x_2 = -6 - 4 &= -10\end{aligned}$$

Reference:

https://www.google.com/search?q=solution+of+quadratic+graphs+by+completing+the+squares+worksheets+with+solution&tbm=isch&ved=2ahUKEwjYkpWO5-3rAhWicTABHSwBA9AQ2-cCegQIABAA&oq=solution+of+quadratic+graphs+by+completing+the+squares+worksheets+with+solution&gs_lcp=CgNpbWcQA1Cv8ARYypMFYLaZBWgAcAB4A4ABoAaIAYAukgELMi02LjIuMi4yLjKYAQCgAQQGqAQtn3Mtd2l6LWltZ8ABAQ&scient=img&ei=XRZiX5jwIqLjwbkPrIKMgA0&bih=657&biw=1366&rlz=1C1YQLS_enGY769GY769#imgrc=PPRCtkhpW21sRM