THE QUADRATIC FORMULA

## LEARNING GOALS

- Learn how to use the quadratic formula to find the roots of a quadratic equation.

DERIVING THE FORMULA

| Example $2 x^{2}+5 x+1=0$ | Quadratic Formula |
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EXAMPLE 1: REAL ROOTS
Use the quadratic formula to solve each quadratic equation. Where necessary, round to the nearest hundredth.

$$
2 x^{2}+9 x+6=0
$$

$$
4 x^{2}-12 x=-9
$$

EXAMPLE 2: USE THE QUADRATIC FORMULA TO SKETCH A PARABOLA
Find the x -intercepts, the vertex, and the equation of the axis of symmetry of the quadratic relation $y=-5 x^{2}+8 x-3$. Sketch the Parabola.


A parabola has equation $y=(x-2)^{2}+3$.
a) State the coordinates of the vertex, the equation of the axis of symmetry, and the direction of opening.
b) Determine the $x$-intercepts. Verify using the quadratic formula.
c) Sketch the parabola


EXAMPLE 4: PATH OF A BASKETBALL
The path of a basketball after it is thrown from a height of 1.5 m above the ground if given by the equation $h=-0.25 d^{2}+2 d+1.5$ where h is the height, in metres, and d is the horizontal distance in metres.
a) How far has the ball travelled horizontally, to the nearest tenth of a metre, when it lands on the ground?
b) Find the horizontal distance when the basketball is at a height of 4.5 m above the ground.

