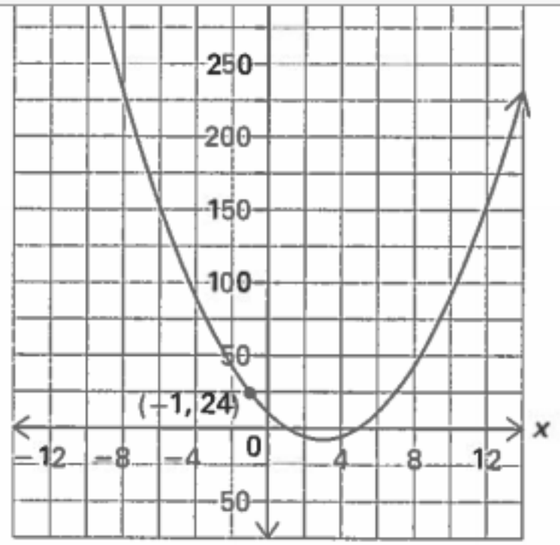
of the form
$y = ax^2 + bx + c$



June 5

Factored Form

A. Write the x values that correspond to $y = 0$. These values are called **zeros**.

$x =$ 1 and $x =$ 5

B. Use the zeros from part A to fill in the blanks.

$y = a(x -$ 1 $)(x -$ 5 $)$

TURN

C. The given point, (−1, 24), satisfies the quadratic equation. Substitute this point into your equation

C. The given point, (−1, 24), satisfies the quadratic equation. Substitute this point into your equation from part B. Remember to include the zeros. Then solve for *a*.

___ = *a*(___ − ___)(___ − ___)

___ = _____

___ = _____

___ = _____

D. Write the zeros and the value of *a* in the appropriate blanks. This is the factored form of the quadratic equation.

y = ___(*x* − ___)(*x* − ___)

Standard Form

E. Expand and simplify the equation in part D.

y = ___(*x* − ___)(*x* − ___)

y = ___(_____)

y = ___(_____)

Now multiply each term in the brackets by the value of *a*.

y = _____

This is the standard form of the quadratic function.

Hint

Pay attention to the signs of the terms when multiplying.

MATH TERM

maximum (or minimum): the *y* value at the vertex of a quadratic function

The standard form of a quadratic function is $h(t) = -5t^2 + 20t$. What are the zeros of the function? What is the **maximum** of the function?

A. Factor the quadratic function by finding the common factor of $-5t^2$ and $20t$.

$h(t) =$ ___(___ + ___)

B. Find the zeros of the function by setting each factor you wrote in part A to zero.

___ = 0 and (___ + ___) = 0

___ = ___ ___ = ___

C. The vertex of a parabola lies on the axis of symmetry. The axis of symmetry is halfway between the zeros. Write the axis of symmetry below.

$t =$ ___

D. Substitute the value of *t* from part C into the quadratic equation to find the maximum value.

$h($___$) = -5($___$)^2 + 20($___$)$

___ = ___

___ = ___

___ = ___

E. Write a conclusion. What are the zeros of the function? What is the maximum of the function?

___

___

PRACTISING

Text pages 139–142

6. i) Expand each function given in factored form.

ii) Draw an arrow to match each factored form with its standard form.

$y = (2x + 3)(x - 4)$

$=$ _____

$=$ _____

$y = (3x - 4)(x - 3)$

$=$ _____

$=$ _____

$y = (3 - 4x)(4 - x)$

$=$ _____

$=$ _____

$y = 4x^2 - 19x + 12$

$y = 2x^2 - 5x - 12$

$y = 3x^2 - 13x + 12$

Hint

The axis of symmetry is halfway between the zeros.

7. i) Find the zeros of each quadratic function. You may have to factor the equation first.

ii) State the axis of symmetry.

iii) Substitute the x value from part ii) into the equation to find the maximum or minimum.

a) $f(x) = (7 - x)(x + 2)$

Axis of symmetry: $x =$ ___

Zeros:

Maximum:

___ − ___ = 0 and ___ + ___ = 0

f(___) = (7 − ___)(___ + 2)

Either

7 − x = 0

7 = x

or −2

−2

x + 2 = 0

x = −2

b) $f(x) = (x + 5)(x - 9)$

Axis of symmetry: $x =$ ___

Zeros:

Minimum:

___ + ___ = 0 and ___ − ___ = 0

f(___) = (___ + 5)(___ − 9)

c) $f(x) = (2x + 3)(8 - x)$

Axis of symmetry: $x =$ ___

Zeros:

Maximum:

___ + ___ = 0 and ___ − ___ = 0

f(___) = (2___ + 3)(8 − ___)

d) $f(x) = x^2 + 7x + 10$

Axis of symmetry: $x =$ ___

Hint

The axis of symmetry is halfway between the zeros.

7. i) Find the zeros of each quadratic function. You may have to factor the equation first.

ii) State the axis of symmetry.

iii) Substitute the x value from part ii) into the equation to find the maximum or minimum.

a) $f(x) = (7 - x)(x + 2)$

Zeros:

___ − ___ = 0 and ___ + ___ = 0

Axis of symmetry: x = ___

Maximum:

f(___) = (7 − ___)(___ + 2)

b) $f(x) = (x + 5)(x - 9)$

Zeros:

___ + ___ = 0 and ___ − ___ = 0

Axis of symmetry: x = ___

Minimum:

f(___) = (___ + 5)(___ − 9)

c) $f(x) = (2x + 3)(8 - x)$

Zeros:

___ + ___ = 0 and ___ − ___ = 0

Axis of symmetry: x = ___

Maximum:

f(___) = (2___ + 3)(8 − ___)

d) $f(x) = x^2 + 7x + 10$

Axis of symmetry: x = ___