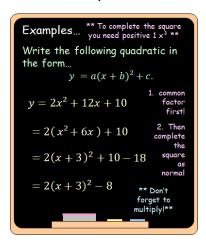
Outcome 1 - Completing the square with non unitary x^2

Bronze example



Bronze questions

Write the following quadratics in the form...

$$y = a(x+b)^2 + c.$$

$$y = 3x^2 + 12x + 7$$
 $y = 2x^2 + 16x + 19$

$$y = 5x^2 + 10x - 7$$
 $y = 4x^2 + 24x - 3$

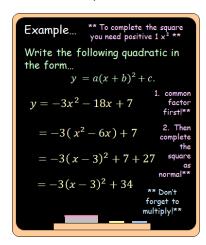
$$y = 2x^2 + 8x - 5$$
 $y = 3x^2 - 30x + 1$

$$y = 9x^2 - 54x + 8$$
 $y = 2x^2 - 4x + 5$

$$y = 8x^2 - 48x - 7$$
 $y = 2x^2 - 10x + 1$

Outcome 2 - Completing the square with non unitary, negative x^2

Silver example



Silver questions

Write the following quadratics in the form...

$$y = a(x+b)^2 + c.$$

$$y = -2x^2 + 8x + 7$$
 $y = -3x^2 - 12x + 5$

$$y = -4x^2 - 24x + 3$$
 $y = -5x^2 + 40x + 2$

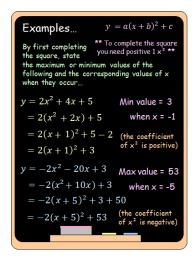
$$y = -7x^2 - 14x + 9$$
 $y = -9x^2 + 54x + 8$

$$y = -8x^2 - 16x + 2$$
 $y = -6x^2 - 36x + 1$

$$y = -2x^2 + 4x + 12$$
 $y = -10x^2 + 80x + 8$

Outcome 3 - Maximum and minimum values

Gold examples



Gold questions

By first completing the square, state the maximum or minimum values of the following and the corresponding values of \boldsymbol{x} when they occur...

$$3x^2 + 18x + 7$$

$$2 -4x^2 - 24x + 15$$

$$-2x^2 + 8x + 3$$

$$4 5x^2 + 10x - 6$$

$$5 8x^2 + 64x + 67$$

$$= -9x^2 - 18x - 5$$

For the following, state the maximum values and corresponding values of $x_{\rm ...}$

$$\frac{1}{2r^2 + 4r + 19}$$

$$\frac{10}{3x^2 - 30x - 5}$$

Bronze Answers

1
$$y = 3(x+2)^2 - 5$$

2.
$$v = 2(x + 4)^2 - 13$$

3.
$$y = 5(x + 1)^2 - 12$$

1.
$$y = 3(x + 2)^2 - 5$$
 2. $y = 2(x + 4)^2 - 13$
3. $y = 5(x + 1)^2 - 12$ 4. $y = 4(x + 6)^2 - 147$

5.
$$y = 2(x + 2)^2 - 13$$

5.
$$y = 2(x + 2)^2 - 13$$
 6. $y = 3(x - 5)^2 - 74$

7.
$$y = 9(x - 3)^2 - 73$$
 8. $y = 2(x - 1)^2 + 3$

$$9 \times - 8(x - 3)^2 - 70$$

9.
$$y = 8(x - 3)^2 - 79$$
 10. $y = 2(x - 5/2)^2 - 23/2$

Silver Answers

1.
$$y = -2(x - 2)^2 + 15$$

1.
$$y = -2(x-2)^2 + 15$$
 2. $y = -3(x+2)^2 + 17$

3.
$$y = -4(x + 3)^{2} + 3$$

3.
$$y = -4(x + 3)^2 + 39$$
 4. $y = -5(x - 4)^2 + 82$

5.
$$y = -7(x + 1)^2 + 16$$

5.
$$y = -7(x + 1)^2 + 16$$
 6. $y = -9(x - 3)^2 + 89$

7.
$$y = -8(x + 1)^2 + 10$$

7.
$$y = -8(x + 1)^2 + 10$$
 8. $y = -6(x + 3)^2 + 55$

9.
$$y = -2(x - 1)^2 + 14$$

9.
$$y = -2(x - 1)^2 + 14$$
 10. $y = -10(x - 4)^2 + 168$

Gold Answers

1. Min = -20 when
$$x = -3$$
 2. Max = -21 when $x = -3$

3. Max = 11 when
$$x = 2$$
 4. Min = -11 when $x = -1$

5. Min = -61 when
$$x = -4$$
 6. Max = 4 when $x = -1$

7. Max =
$$\frac{1}{17}$$
 when x = -1 8. Max = $-\frac{1}{8}$ when x = 5