

Completing the square — Up to 12

Name: _____

Date: _____

Write each expression as $(x + p)^2 + q$.

1 $x^2 - 20x + 104$

$$-20 \div 2 = -10$$

$$(x - 10)^2 = x^2 - 20x + 100$$

$$= (x - 10)^2 + 4$$

2 $x^2 + 20x + 80$

3 $x^2 - 18x + 96$

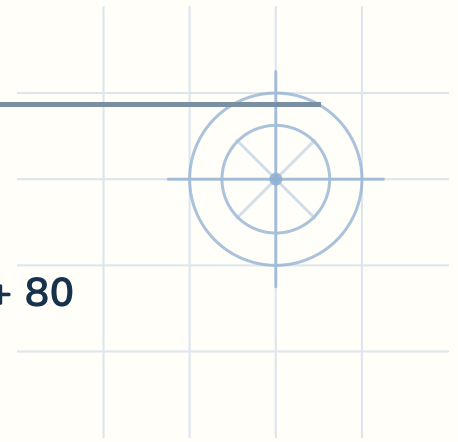
4 $x^2 - 12x + 44$

5 $x^2 + 6x + 11$

6 $x^2 + 20x + 91$

7 $x^2 + 8x + 22$

8 $x^2 - 22x + 122$

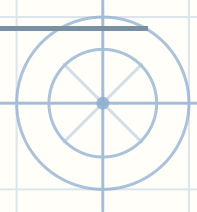


Completing the square — Up to 12

Name: _____

Date: _____

Write each expression as $(x + p)^2 + q$. Some of these need halves and quarters.



1 $x^2 - 19x + 7$

$$-19 \div 2 = -\frac{19}{2}$$

$$\left(x - \frac{19}{2}\right)^2 = x^2 - 19x + \frac{361}{4}$$

$$= \left(x - \frac{19}{2}\right)^2 - \frac{333}{4}$$

2 $x^2 + 3x - 9$

3 $x^2 - 9x - 4$

4 $x^2 + 19x - 11$

5 $x^2 - 5x - 5$

6 $x^2 + 23x - 2$

7 $x^2 - 3x - 2$

8 $x^2 + 23x + 11$



Quadratics with complex solutions — Pure imaginary roots

Name: _____

Date: _____

Solve each equation. Every answer is imaginary.

1 $x^2 + 25 = 0$

$$x^2 = -25$$

$$x = \pm 5i$$

2 $x^2 + 9 = 0$

3 $x^2 + 36 = 0$

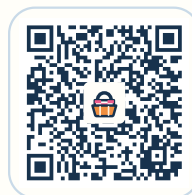
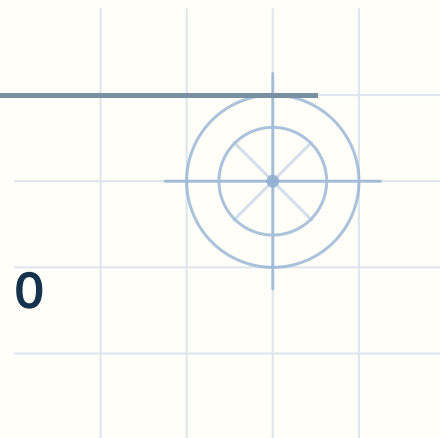
4 $x^2 + 1 = 0$

5 $x^2 + 49 = 0$

6 $x^2 + 64 = 0$

7 $x^2 + 4 = 0$

8 $x^2 + 16 = 0$



Quadratics with complex solutions — Complex roots

Name: _____

Date: _____

Solve each equation. Every answer is a complex number.

1 $x^2 - 8x + 32 = 0$

$$b^2 - 4ac = -64$$

$$x = (8 \pm \sqrt{-64}) \div 2$$

$$x = (8 \pm 8i) \div 2$$

$$x = 4 \pm 4i$$

2 $x^2 - 6x + 25 = 0$

3 $x^2 + 8x + 25 = 0$

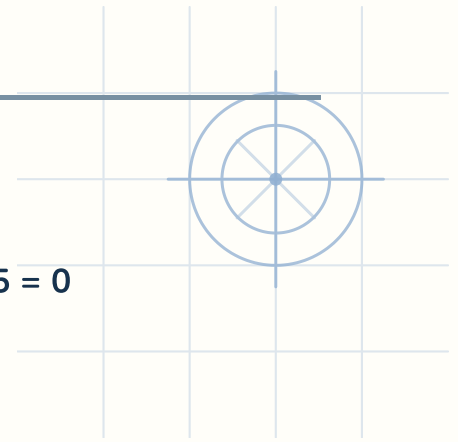
4 $x^2 + 4x + 13 = 0$

5 $x^2 + 10x + 26 = 0$

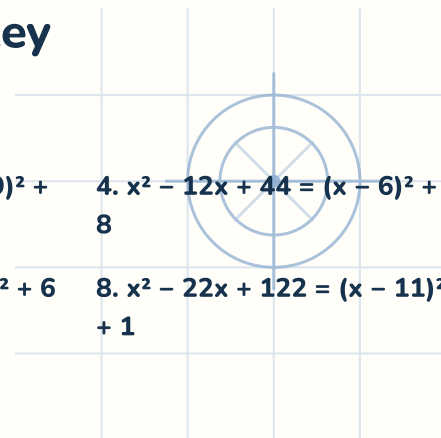
6 $x^2 + 10x + 89 = 0$

7 $x^2 - 10x + 61 = 0$

8 $x^2 - 2x + 50 = 0$



Power Pack · Completing the square — Answer key



Completing the square

1. $x^2 - 20x + 104 = (x - 10)^2 + 4$

2. $x^2 + 20x + 80 = (x + 10)^2 - 20$

3. $x^2 - 18x + 96 = (x - 9)^2 + 15$

4. $x^2 - 12x + 44 = (x - 6)^2 + 8$

5. $x^2 + 6x + 11 = (x + 3)^2 + 2$

6. $x^2 + 20x + 91 = (x + 10)^2 - 9$

7. $x^2 + 8x + 22 = (x + 4)^2 + 6$

8. $x^2 - 22x + 122 = (x - 11)^2 + 1$

Halves and quarters

1. $x^2 - 19x + 7 = (x - 19/2)^2 - 333/4$

2. $x^2 + 3x - 9 = (x + 3/2)^2 - 45/4$

3. $x^2 - 9x - 4 = (x - 9/2)^2 - 97/4$

4. $x^2 + 19x - 11 = (x + 19/2)^2 - 405/4$

5. $x^2 - 5x - 5 = (x - 5/2)^2 - 45/4$

6. $x^2 + 23x - 2 = (x + 23/2)^2 - 537/4$

7. $x^2 - 3x - 2 = (x - 3/2)^2 - 17/4$

8. $x^2 + 23x + 11 = (x + 23/2)^2 - 485/4$

Pure imaginary roots

1. $x^2 + 25 = 0 \rightarrow x = \pm 5i$

2. $x^2 + 9 = 0 \rightarrow x = \pm 3i$

3. $x^2 + 36 = 0 \rightarrow x = \pm 6i$

4. $x^2 + 1 = 0 \rightarrow x = \pm i$

5. $x^2 + 49 = 0 \rightarrow x = \pm 7i$

6. $x^2 + 64 = 0 \rightarrow x = \pm 8i$

7. $x^2 + 4 = 0 \rightarrow x = \pm 2i$

8. $x^2 + 16 = 0 \rightarrow x = \pm 4i$

Complex pairs

1. $x^2 - 8x + 32 = 0 \rightarrow x = 4 \pm 4i$

2. $x^2 - 6x + 25 = 0 \rightarrow x = 3 \pm 4i$

3. $x^2 + 8x + 25 = 0 \rightarrow x = -4 \pm 3i$

4. $x^2 + 4x + 13 = 0 \rightarrow x = -2 \pm 3i$

5. $x^2 + 10x + 26 = 0 \rightarrow x = -5 \pm i$

6. $x^2 + 10x + 89 = 0 \rightarrow x = -5 \pm 8i$

7. $x^2 - 10x + 61 = 0 \rightarrow x = 5 \pm 6i$

8. $x^2 - 2x + 50 = 0 \rightarrow x = 1 \pm 7i$