

Worksheet

08/09/2020

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Problem quickname: 2057

1)

Solve the equation. In order to do this, complete the square.

Quick:
2057

a) $4x^2 + 56x + 45 = -87$, Answer: $L = \{-11, -3\}$

b) $3x^2 + 54x + 27 = 84$, Answer: $L = \{-19, 1\}$

c) $3x^2 - 18x - 19 = -34$, Answer: $L = \{1, 5\}$

d) $4x^2 + 56x - 16 = 112$, Answer: $L = \{-16, 2\}$

e) $3x^2 + 18x + 20 = 5$, Answer: $L = \{-5, -1\}$

f) $3x^2 - 18x - 48 = -27$, Answer: $L = \{-1, 7\}$

2)

Solve the equation.

Quick:
2057

a) Equation:

$$4x^2 - 24x = 64$$

Convert to monic:

$$x^2 - 6x = 16$$

Complete the square:

$$x^2 - 6x + 9 = 16 + 9, \text{ as } 6 = 2 \cdot 3, 3^2 = 9$$

Combine like terms on the right:

$$x^2 - 6x + 9 = 25$$

Form square:

$$(x - 3)^2 = 25$$

Extract root:

$$x - 3 = \pm 5$$

Answer:

$$L = \{-2, 8\}$$

b) Equation:

$$3x^2 + 24x + 2 = 146$$

Move number 2 to the right:

$$3x^2 + 24x = 144$$

Convert to monic:

$$x^2 + 8x = 48$$

Complete the square:

$$x^2 + 8x + 16 = 48 + 16, \text{ as } 8 = 2 \cdot 4, 4^2 = 16$$

Combine like terms on the right:

$$x^2 + 8x + 16 = 64$$

Form square:

$$(x + 4)^2 = 64$$

Extract root:

$$x + 4 = \pm 8$$

Answer:

$$L = \{-12, 4\}$$

- c) Equation: $x^2 + 12x + 42 = 31$
 Move number 42 to the right: $x^2 + 12x = -11$
 Complete the square: $x^2 + 12x + 36 = -11 + 36$, as $12 = 2 \cdot 6, 6^2 = 36$
 Combine like terms on the right: $x^2 + 12x + 36 = 25$
 Form square: $(x + 6)^2 = 25$
 Extract root: $x + 6 = \pm 5$
 Answer: $L = \{-11, -1\}$
- d) Equation: $4x^2 + 24x - 45 = 63$
 Move number -45 to the right: $4x^2 + 24x = 108$
 Convert to monic: $x^2 + 6x = 27$
 Complete the square: $x^2 + 6x + 9 = 27 + 9$, as $6 = 2 \cdot 3, 3^2 = 9$
 Combine like terms on the right: $x^2 + 6x + 9 = 36$
 Form square: $(x + 3)^2 = 36$
 Extract root: $x + 3 = \pm 6$
 Answer: $L = \{-9, 3\}$
- e) Equation: $3x^2 + 30x - 5 = 28$
 Move number -5 to the right: $3x^2 + 30x = 33$
 Convert to monic: $x^2 + 10x = 11$
 Complete the square: $x^2 + 10x + 25 = 11 + 25$, as $10 = 2 \cdot 5, 5^2 = 25$
 Combine like terms on the right: $x^2 + 10x + 25 = 36$
 Form square: $(x + 5)^2 = 36$
 Extract root: $x + 5 = \pm 6$
 Answer: $L = \{-11, 1\}$
- f) Equation: $3x^2 + 48x + 36 = -81$
 Move number 36 to the right: $3x^2 + 48x = -117$
 Convert to monic: $x^2 + 16x = -39$
 Complete the square: $x^2 + 16x + 64 = -39 + 64$, as $16 = 2 \cdot 8, 8^2 = 64$
 Combine like terms on the right: $x^2 + 16x + 64 = 25$
 Form square: $(x + 8)^2 = 25$
 Extract root: $x + 8 = \pm 5$
 Answer: $L = \{-13, -3\}$

3)

Solve the equation. In order to do this, complete the square.

Quick:
2057

- a) Equation: $x^2 + 12x = -27$
 Complete the square: $x^2 + 12x + 36 = -27 + 36$, as $12 = 2 \cdot 6, 6^2 = 36$
 Combine like terms on the right: $x^2 + 12x + 36 = 9$
 Form square: $(x + 6)^2 = 9$
 Extract root: $x + 6 = \pm 3$
 Answer: $L = \{-9, -3\}$

- b) Equation: $3x^2 - 54x = 57$
 Convert to monic: $x^2 - 18x = 19$
 Complete the square: $x^2 - 18x + 81 = 19 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
 Combine like terms on the right: $x^2 - 18x + 81 = 100$
 Form square: $(x - 9)^2 = 100$
 Extract root: $x - 9 = \pm 10$
 Answer: $L = \{-1, 19\}$
- c) Equation: $4x^2 + 24x = 160$
 Convert to monic: $x^2 + 6x = 40$
 Complete the square: $x^2 + 6x + 9 = 40 + 9$, as $6 = 2 \cdot 3, 3^2 = 9$
 Combine like terms on the right: $x^2 + 6x + 9 = 49$
 Form square: $(x + 3)^2 = 49$
 Extract root: $x + 3 = \pm 7$
 Answer: $L = \{-10, 4\}$
- d) Equation: $x^2 + 14x = -40$
 Complete the square: $x^2 + 14x + 49 = -40 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
 Combine like terms on the right: $x^2 + 14x + 49 = 9$
 Form square: $(x + 7)^2 = 9$
 Extract root: $x + 7 = \pm 3$
 Answer: $L = \{-10, -4\}$

4)

Quick:
2057

Solve the equation. In order to do this, complete the square.

- a) Equation: $3x^2 - 36x + 11 = -85$
 Move number 11 to the right: $3x^2 - 36x = -96$
 Convert to monic: $x^2 - 12x = -32$
 Complete the square: $x^2 - 12x + 36 = -32 + 36$, as $12 = 2 \cdot 6, 6^2 = 36$
 Combine like terms on the right: $x^2 - 12x + 36 = 4$
 Form square: $(x - 6)^2 = 4$
 Extract root: $x - 6 = \pm 2$
 Answer: $L = \{4, 8\}$
- b) Equation: $3x^2 - 60x + 25 = -227$
 Move number 25 to the right: $3x^2 - 60x = -252$
 Convert to monic: $x^2 - 20x = -84$
 Complete the square: $x^2 - 20x + 100 = -84 + 100$, as $20 = 2 \cdot 10, 10^2 = 100$
 Combine like terms on the right: $x^2 - 20x + 100 = 16$
 Form square: $(x - 10)^2 = 16$
 Extract root: $x - 10 = \pm 4$
 Answer: $L = \{6, 14\}$

- c) Equation: $4x^2 - 24x - 36 = 184$
 Move number -36 to the right: $4x^2 - 24x = 220$
 Convert to monic: $x^2 - 6x = 55$
 Complete the square: $x^2 - 6x + 9 = 55 + 9$, as $6 = 2 \cdot 3$, $3^2 = 9$
 Combine like terms on the right: $x^2 - 6x + 9 = 64$
 Form square: $(x - 3)^2 = 64$
 Extract root: $x - 3 = \pm 8$
 Answer: $L = \{-5, 11\}$
- d) Equation: $3x^2 - 36x - 8 = -68$
 Move number -8 to the right: $3x^2 - 36x = -60$
 Convert to monic: $x^2 - 12x = -20$
 Complete the square: $x^2 - 12x + 36 = -20 + 36$, as $12 = 2 \cdot 6$, $6^2 = 36$
 Combine like terms on the right: $x^2 - 12x + 36 = 16$
 Form square: $(x - 6)^2 = 16$
 Extract root: $x - 6 = \pm 4$
 Answer: $L = \{2, 10\}$
- e) Equation: $3x^2 - 30x - 7 = -70$
 Move number -7 to the right: $3x^2 - 30x = -63$
 Convert to monic: $x^2 - 10x = -21$
 Complete the square: $x^2 - 10x + 25 = -21 + 25$, as $10 = 2 \cdot 5$, $5^2 = 25$
 Combine like terms on the right: $x^2 - 10x + 25 = 4$
 Form square: $(x - 5)^2 = 4$
 Extract root: $x - 5 = \pm 2$
 Answer: $L = \{3, 7\}$
- f) Equation: $3x^2 - 30x - 22 = 146$
 Move number -22 to the right: $3x^2 - 30x = 168$
 Convert to monic: $x^2 - 10x = 56$
 Complete the square: $x^2 - 10x + 25 = 56 + 25$, as $10 = 2 \cdot 5$, $5^2 = 25$
 Combine like terms on the right: $x^2 - 10x + 25 = 81$
 Form square: $(x - 5)^2 = 81$
 Extract root: $x - 5 = \pm 9$
 Answer: $L = \{-4, 14\}$

Good Luck!