

Worksheet

08/09/2020

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Problem quickname: 2057

1)Quick:
2057

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

- a) Equation: $2x^2 + 36x = -34$
 Convert to monic: $x^2 + 18x = -17$
 Complete the square: $x^2 + 18x + 81 = -17 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
 Combine like terms on the right: $x^2 + 18x + 81 = 64$
 Form square: $(x + 9)^2 = 64$
 Extract root: $x + 9 = \pm 8$
 Answer: $L = \{-17, -1\}$
- b) Equation: $3x^2 + 18x = 165$
 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: $L = \{-11, 5\}$
- c) Equation: $3x^2 + 24x = 195$
 Convert to monic: $x^2 + 8x = 65$
 Complete the square: $x^2 + 8x + 16 = 65 + 16$, as $8 = 2 \cdot 4, 4^2 = 16$
 Combine like terms on the right: $x^2 + 8x + 16 = 81$
 Form square: $(x + 4)^2 = 81$
 Extract root: $x + 4 = \pm 9$
 Answer: $L = \{-13, 5\}$
- d) Equation: $3x^2 - 48x = 108$
 Convert to monic: $x^2 - 16x = 36$
 Complete the square: $x^2 - 16x + 64 = 36 + 64$, as $16 = 2 \cdot 8, 8^2 = 64$
 Combine like terms on the right: $x^2 - 16x + 64 = 100$
 Form square: $(x - 8)^2 = 100$
 Extract root: $x - 8 = \pm 10$
 Answer: $L = \{-2, 18\}$

2)

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

- a) Equation: $2x^2 - 16x + 40 = 80$
 Move number 40 to the right: $2x^2 - 16x = 40$
 Convert to monic: $x^2 - 8x = 20$
 Complete the square: $x^2 - 8x + 16 = 20 + 16$, as $8 = 2 \cdot 4$, $4^2 = 16$
 Combine like terms on the right: $x^2 - 8x + 16 = 36$
 Form square: $(x - 4)^2 = 36$
 Extract root: $x - 4 = \pm 6$
 Answer: $L = \{-2, 10\}$
- b) Equation: $4x^2 - 40x - 33 = -33$
 Move number -33 to the right: $4x^2 - 40x = 0$
 Convert to monic: $x^2 - 10x = 0$
 Complete the square: $x^2 - 10x + 25 = 0 + 25$, as $10 = 2 \cdot 5$, $5^2 = 25$
 Combine like terms on the right: $x^2 - 10x + 25 = 25$
 Form square: $(x - 5)^2 = 25$
 Extract root: $x - 5 = \pm 5$
 Answer: $L = \{0, 10\}$
- c) Equation: $4x^2 + 56x = -180$
 Convert to monic: $x^2 + 14x = -45$
 Complete the square: $x^2 + 14x + 49 = -45 + 49$, as $14 = 2 \cdot 7$, $7^2 = 49$
 Combine like terms on the right: $x^2 + 14x + 49 = 4$
 Form square: $(x + 7)^2 = 4$
 Extract root: $x + 7 = \pm 2$
 Answer: $L = \{-9, -5\}$
- d) Equation: $2x^2 + 16x - 32 = -32$
 Move number -32 to the right: $2x^2 + 16x = 0$
 Convert to monic: $x^2 + 8x = 0$
 Complete the square: $x^2 + 8x + 16 = 0 + 16$, as $8 = 2 \cdot 4$, $4^2 = 16$
 Combine like terms on the right: $x^2 + 8x + 16 = 16$
 Form square: $(x + 4)^2 = 16$
 Extract root: $x + 4 = \pm 4$
 Answer: $L = \{-8, 0\}$
- e) Equation: $x^2 + 16x + 13 = 30$
 Move number 13 to the right: $x^2 + 16x = 17$
 Complete the square: $x^2 + 16x + 64 = 17 + 64$, as $16 = 2 \cdot 8$, $8^2 = 64$
 Combine like terms on the right: $x^2 + 16x + 64 = 81$
 Form square: $(x + 8)^2 = 81$
 Extract root: $x + 8 = \pm 9$
 Answer: $L = \{-17, 1\}$

f) Equation: $4x^2 + 72x - 14 = -238$
 Move number -14 to the right: $4x^2 + 72x = -224$
 Convert to monic: $x^2 + 18x = -56$
 Complete the square: $x^2 + 18x + 81 = -56 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
 Combine like terms on the right: $x^2 + 18x + 81 = 25$
 Form square: $(x + 9)^2 = 25$
 Extract root: $x + 9 = \pm 5$
 Answer: $L = \{-14, -4\}$

3)

Quick:
2057

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

a) Equation: $x^2 + 10x = 39$
 Complete the square: $x^2 + 10x + 25 = 39 + 25$, as $10 = 2 \cdot 5, 5^2 = 25$
 Combine like terms on the right: $x^2 + 10x + 25 = 64$
 Form square: $(x + 5)^2 = 64$
 Extract root: $x + 5 = \pm 8$
 Answer: $L = \{-13, 3\}$

b) Equation: $x^2 + 16x = -15$
 Complete the square: $x^2 + 16x + 64 = -15 + 64$, as $16 = 2 \cdot 8, 8^2 = 64$
 Combine like terms on the right: $x^2 + 16x + 64 = 49$
 Form square: $(x + 8)^2 = 49$
 Extract root: $x + 8 = \pm 7$
 Answer: $L = \{-15, -1\}$

c) Equation: $x^2 - 14x = 0$
 Complete the square: $x^2 - 14x + 49 = 0 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
 Combine like terms on the right: $x^2 - 14x + 49 = 49$
 Form square: $(x - 7)^2 = 49$
 Extract root: $x - 7 = \pm 7$
 Answer: $L = \{0, 14\}$

d) Equation: $x^2 - 14x = -45$
 Complete the square: $x^2 - 14x + 49 = -45 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
 Combine like terms on the right: $x^2 - 14x + 49 = 4$
 Form square: $(x - 7)^2 = 4$
 Extract root: $x - 7 = \pm 2$
 Answer: $L = \{5, 9\}$

e) Equation: $x^2 + 18x = -72$
 Complete the square: $x^2 + 18x + 81 = -72 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
 Combine like terms on the right: $x^2 + 18x + 81 = 9$
 Form square: $(x + 9)^2 = 9$
 Extract root: $x + 9 = \pm 3$
 Answer: $L = \{-12, -6\}$

f) Equation: $x^2 - 16x = 0$
 Complete the square: $x^2 - 16x + 64 = 0 + 64$, as $16 = 2 \cdot 8, 8^2 = 64$
 Combine like terms on the right: $x^2 - 16x + 64 = 64$
 Form square: $(x - 8)^2 = 64$
 Extract root: $x - 8 = \pm 8$
 Answer: $L = \{0, 16\}$

4)

Quick:
2057

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

a) Equation: $4x^2 - 24x - 50 = -70$
 Move number -50 to the right: $4x^2 - 24x = -20$
 Convert to monic: $x^2 - 6x = -5$
 Complete the square: $x^2 - 6x + 9 = -5 + 9$, as $6 = 2 \cdot 3, 3^2 = 9$
 Combine like terms on the right: $x^2 - 6x + 9 = 4$
 Form square: $(x - 3)^2 = 4$
 Extract root: $x - 3 = \pm 2$
 Answer: $L = \{1, 5\}$

b) Equation: $4x^2 - 56x - 8 = -140$
 Move number -8 to the right: $4x^2 - 56x = -132$
 Convert to monic: $x^2 - 14x = -33$
 Complete the square: $x^2 - 14x + 49 = -33 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
 Combine like terms on the right: $x^2 - 14x + 49 = 16$
 Form square: $(x - 7)^2 = 16$
 Extract root: $x - 7 = \pm 4$
 Answer: $L = \{3, 11\}$

c) Equation: $3x^2 - 30x + 18 = 18$
 Move number 18 to the right: $3x^2 - 30x = 0$
 Convert to monic: $x^2 - 10x = 0$
 Complete the square: $x^2 - 10x + 25 = 0 + 25$, as $10 = 2 \cdot 5, 5^2 = 25$
 Combine like terms on the right: $x^2 - 10x + 25 = 25$
 Form square: $(x - 5)^2 = 25$
 Extract root: $x - 5 = \pm 5$
 Answer: $L = \{0, 10\}$

d) Equation: $3x^2 - 24x + 46 = 145$
 Move number 46 to the right: $3x^2 - 24x = 99$
 Convert to monic: $x^2 - 8x = 33$
 Complete the square: $x^2 - 8x + 16 = 33 + 16$, as $8 = 2 \cdot 4, 4^2 = 16$
 Combine like terms on the right: $x^2 - 8x + 16 = 49$
 Form square: $(x - 4)^2 = 49$
 Extract root: $x - 4 = \pm 7$
 Answer: $L = \{-3, 11\}$

- e) Equation: $2x^2 - 36x - 34 = -34$
 Move number -34 to the right: $2x^2 - 36x = 0$
 Convert to monic: $x^2 - 18x = 0$
 Complete the square: $x^2 - 18x + 81 = 0 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
 Combine like terms on the right: $x^2 - 18x + 81 = 81$
 Form square: $(x - 9)^2 = 81$
 Extract root: $x - 9 = \pm 9$
 Answer: $L = \{0, 18\}$
- f) Equation: $2x^2 + 32x - 18 = -128$
 Move number -18 to the right: $2x^2 + 32x = -110$
 Convert to monic: $x^2 + 16x = -55$
 Complete the square: $x^2 + 16x + 64 = -55 + 64$, as $16 = 2 \cdot 8, 8^2 = 64$
 Combine like terms on the right: $x^2 + 16x + 64 = 9$
 Form square: $(x + 8)^2 = 9$
 Extract root: $x + 8 = \pm 3$
 Answer: $L = \{-11, -5\}$

Good Luck!