Worksheet

08/09/2020

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Problem quickname: 2057

1)

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

a) Equation: $\quad$ $x^2 + 12x = 64$
    Complete the square: $\quad$ $x^2 + 12x + 36 = 64 + 36$, as $12 = 2 \cdot 6, 6^2 = 36$
    Combine like terms on the right: $\quad$ $x^2 + 12x + 36 = 100$
    Form square: $\quad$ $(x + 6)^2 = 100$
    Extract root: $\quad$ $x + 6 = \pm 10$
    Answer: $\quad$ $L = \{-16,4\}$

b) Equation: $\quad$ $x^2 - 8x = -7$
    Complete the square: $\quad$ $x^2 - 8x + 16 = -7 + 16$, as $8 = 2 \cdot 4, 4^2 = 16$
    Combine like terms on the right: $\quad$ $x^2 - 8x + 16 = 9$
    Form square: $\quad$ $(x - 4)^2 = 9$
    Extract root: $\quad$ $x - 4 = \pm 3$
    Answer: $\quad$ $L = \{1,7\}$

c) Equation: $\quad$ $x^2 + 6x = 0$
    Complete the square: $\quad$ $x^2 + 6x + 9 = 0 + 9$, as $6 = 2 \cdot 3, 3^2 = 9$
    Combine like terms on the right: $\quad$ $x^2 + 6x + 9 = 9$
    Form square: $\quad$ $(x + 3)^2 = 9$
    Extract root: $\quad$ $x + 3 = \pm 3$
    Answer: $\quad$ $L = \{-6,0\}$

d) Equation: $\quad$ $x^2 + 10x = 56$
    Complete the square: $\quad$ $x^2 + 10x + 25 = 56 + 25$, as $10 = 2 \cdot 5, 5^2 = 25$
    Combine like terms on the right: $\quad$ $x^2 + 10x + 25 = 81$
    Form square: $\quad$ $(x + 5)^2 = 81$
    Extract root: $\quad$ $x + 5 = \pm 9$
    Answer: $\quad$ $L = \{-14,4\}$

e) Equation: $\quad$ $x^2 - 10x = 24$
    Complete the square: $\quad$ $x^2 - 10x + 25 = 24 + 25$, as $10 = 2 \cdot 5, 5^2 = 25$
    Combine like terms on the right: $\quad$ $x^2 - 10x + 25 = 49$
    Form square: $\quad$ $(x - 5)^2 = 49$
    Extract root: $\quad$ $x - 5 = \pm 7$
    Answer: $\quad$ $L = \{-2,12\}$

f) Equation: $x^2 - 10x = 24$
   Complete the square: $x^2 - 10x + 25 = 24 + 25$, as $10 = 2 \cdot 5, 5^2 = 25$
   Combine like terms on the right: $x^2 - 10x + 25 = 49$
   Form square: $(x - 5)^2 = 49$
   Extract root: $x - 5 = \pm 7$
   Answer: $L = \{-2, 12\}$

<u>2)</u>

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

a) Equation: $3x^2 + 18x - 38 = 43$
   Move number -38 to the right: $3x^2 + 18x = 81$
   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: $L = \{-9, 3\}$

b) Equation: $2x^2 - 32x + 13 = -97$
   Move number 13 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: $L = \{5, 11\}$

c) Equation: $3x^2 - 42x - 24 = 21$
   Move number -24 to the right: $3x^2 - 42x = 45$
   Convert to monic: $x^2 - 14x = 15$
   Complete the square: $x^2 - 14x + 49 = 15 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
   Combine like terms on the right: $x^2 - 14x + 49 = 64$
   Form square: $(x - 7)^2 = 64$
   Extract root: $x - 7 = \pm 8$
   Answer: $L = \{-1, 15\}$

d) Equation: $\qquad$ $2x^2 + 36x + 45 = -45$
   Move number 45 to the right: $\qquad$ $2x^2 + 36x = -90$
   Convert to monic: $\qquad$ $x^2 + 18x = -45$
   Complete the square: $\qquad$ $x^2 + 18x + 81 = -45 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
   Combine like terms on the right: $\quad x^2 + 18x + 81 = 36$
   Form square: $\qquad$ $(x+9)^2 = 36$
   Extract root: $\qquad$ $x + 9 = \pm 6$
   Answer: $\qquad$ $L = \{-15, -3\}$

e) Equation: $\qquad$ $2x^2 - 8x + 5 = 125$
   Move number 5 to the right: $\qquad$ $2x^2 - 8x = 120$
   Convert to monic: $\qquad$ $x^2 - 4x = 60$
   Complete the square: $\qquad$ $x^2 - 4x + 4 = 60 + 4$, as $4 = 2 \cdot 2, 2^2 = 4$
   Combine like terms on the right: $\quad x^2 - 4x + 4 = 64$
   Form square: $\qquad$ $(x-2)^2 = 64$
   Extract root: $\qquad$ $x - 2 = \pm 8$
   Answer: $\qquad$ $L = \{-6, 10\}$

f) Equation: $\qquad$ $4x^2 - 80x + 16 = -348$
   Move number 16 to the right: $\qquad$ $4x^2 - 80x = -364$
   Convert to monic: $\qquad$ $x^2 - 20x = -91$
   Complete the square: $\qquad$ $x^2 - 20x + 100 = -91 + 100$, as $20 = 2 \cdot 10, 10^2 = 100$
   Combine like terms on the right: $\quad x^2 - 20x + 100 = 9$
   Form square: $\qquad$ $(x-10)^2 = 9$
   Extract root: $\qquad$ $x - 10 = \pm 3$
   Answer: $\qquad$ $L = \{7, 13\}$

3)

Quick: 2057

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

a) $3x^2 - 42x - 19 = 77$, Answer: $L = \{-2, 16\}$
b) $3x^2 + 36x - 5 = -86$, Answer: $L = \{-9, -3\}$
c) $3x^2 + 60x - 45 = -198$, Answer: $L = \{-17, -3\}$
d) $3x^2 - 30x - 45 = -108$, Answer: $L = \{3, 7\}$
e) $2x^2 + 24x + 42 = 2$, Answer: $L = \{-10, -2\}$
f) $x^2 + 12x - 38 = -10$, Answer: $L = \{-14, 2\}$

<u>4)</u>

Solve the equation.

a) Equation: $2x^2 - 36x - 33 = -163$
Move number -33 to the right: $2x^2 - 36x = -130$
Convert to monic: $x^2 - 18x = -65$
Complete the square: $x^2 - 18x + 81 = -65 + 81$, as $18 = 2 \cdot 9, 9^2 = 81$
Combine like terms on the right: $x^2 - 18x + 81 = 16$
Form square: $(x - 9)^2 = 16$
Extract root: $x - 9 = \pm 4$
Answer: $L = \{5, 13\}$

b) Equation: $x^2 - 14x - 8 = 7$
Move number -8 to the right: $x^2 - 14x = 15$
Complete the square: $x^2 - 14x + 49 = 15 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
Combine like terms on the right: $x^2 - 14x + 49 = 64$
Form square: $(x - 7)^2 = 64$
Extract root: $x - 7 = \pm 8$
Answer: $L = \{-1, 15\}$

c) Equation: $3x^2 + 42x - 50 = -89$
Move number -50 to the right: $3x^2 + 42x = -39$
Convert to monic: $x^2 + 14x = -13$
Complete the square: $x^2 + 14x + 49 = -13 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
Combine like terms on the right: $x^2 + 14x + 49 = 36$
Form square: $(x + 7)^2 = 36$
Extract root: $x + 7 = \pm 6$
Answer: $L = \{-13, -1\}$

d) Equation: $3x^2 + 42x - 39 = 6$
Move number -39 to the right: $3x^2 + 42x = 45$
Convert to monic: $x^2 + 14x = 15$
Complete the square: $x^2 + 14x + 49 = 15 + 49$, as $14 = 2 \cdot 7, 7^2 = 49$
Combine like terms on the right: $x^2 + 14x + 49 = 64$
Form square: $(x + 7)^2 = 64$
Extract root: $x + 7 = \pm 8$
Answer: $L = \{-15, 1\}$

e) Equation: $2x^2 + 12x - 35 = 75$
Move number -35 to the right: $2x^2 + 12x = 110$
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: $L = \{-11, 5\}$

f) Equation: $\qquad$ $x^2 - 12x + 11 = -21$

Move number 11 to the right: $\qquad$ $x^2 - 12x = -32$

Complete the square: $\qquad$ $x^2 - 12x + 36 = -32 + 36$, as $12 = 2 \cdot 6, 6^2 = 36$

Combine like terms on the right: $\qquad$ $x^2 - 12x + 36 = 4$

Form square: $\qquad$ $(x - 6)^2 = 4$

Extract root: $\qquad$ $x - 6 = \pm 2$

Answer: $\qquad$ $L = \{4, 8\}$

Good Luck!