SN _____   ID _____ NAME _____

Show all necessary steps for full marks.

Question 1: (5 points): (Textbook 1.1 exercise 19): Solve $\dfrac{1}{14}(3x-2)=\dfrac{x+10}{10}$

Solution: $\dfrac{1}{2(7)}(3x-2)=\dfrac{x+10}{2(5)}$ $\Rightarrow$ $LCD = 2(7)(5)$

Multiply both sides of the equation by $LCD = 2(7)(5)$:

$$2(7)(5)\dfrac{1}{2(7)}(3x-2)=2(7)(5)\dfrac{x+10}{2(5)}$$

$$(5)(3x-2)=(7)(x+10)$$

$$15x-10=7x+70$$

$$8x = 80$$

$$x = 10$$

Solution set: $\{10\}$

Question 2: (5 points): (1.2 Exercise 12, page 4):   The length of a rectangular label is 2.5 cm less than twice the width. The perimeter is 40.6 cm. Find the width.

Solution:

12. Let w = the width of the rectangle.
Then $2w - 2.5$ = the length of the rectangle.
Use the formula for the perimeter of a rectangle.

$$P = 2l + 2w$$

$$40.6 = 2(2w - 2.5) + 2w$$

$$40.6 = 4w - 5 + 2w$$

$$40.6 = 6w - 5 \Rightarrow 45.6 = 6w \Rightarrow 7.6 = w$$

The width is 7.6 cm.

Q 3: (5 points) (1.4 Exercise 47):

Solve the equation by **completing** the square. $-4x^2 + 8x = 7$

Solution:

47. $-4x^2 + 8x = 7$

$$x^2 - 2x = -\tfrac{7}{4}$$

$$x^2 - 2x + 1 = -\tfrac{7}{4} + 1 \qquad \text{Note:}$$

$$\left[\tfrac{1}{2}\cdot(-2)\right]^2 = (-1)^2 = 1$$

$$(x-1)^2 = \tfrac{-3}{4}$$

$$x - 1 = \pm\sqrt{\tfrac{-3}{4}} = \pm\tfrac{i\sqrt{3}}{2}$$

$$x = 1 \pm \tfrac{\sqrt{3}}{2}i$$

Solution set: $\left\{1 \pm \tfrac{\sqrt{3}}{2}i\right\}$

Question 4: **(5 points): (1.6 Example 9):** Solve $12x^4 - 11x^2 + 2 = 0$.

Solution: $12x^4 - 11x^2 + 2 = 0$

$$\begin{matrix} 3x^2 & -2 \\ 4x^2 & -1 \end{matrix} \implies (3x^2 - 2)(4x^2 - 1) = 0$$

$$3x^2 - 2 = 0 \implies x^2 = \frac{2}{3} \implies x = \pm\sqrt{\frac{2}{3}} = \pm\frac{\sqrt{6}}{3}$$

$$4x^2 - 1 = 0 \implies x^2 = \frac{1}{4} \implies x = \pm\sqrt{\frac{1}{4}} = \pm\frac{1}{2}$$

$$SS = \left\{ \pm\frac{\sqrt{6}}{3}, \pm\frac{1}{2} \right\}$$

Another Method:

EXAMPLE 9 **Solving an Equation Quadratic in Form**

Solve $12x^4 - 11x^2 + 2 = 0$.

SOLUTION

$$12x^4 - 11x^2 + 2 = 0$$

$$12(x^2)^2 - 11x^2 + 2 = 0 \qquad x^4 = (x^2)^2$$

$$12u^2 - 11u + 2 = 0 \qquad \text{Let } u = x^2. \text{ Then } u^2 = x^4.$$

$$(3u - 2)(4u - 1) = 0 \qquad \text{Solve the quadratic equation.}$$

$3u - 2 = 0$	or $\quad 4u - 1 = 0$	Zero-factor property
$u = \dfrac{2}{3}$	or $\qquad u = \dfrac{1}{4}$	Solve each equation.
$x^2 = \dfrac{2}{3}$	or $\qquad x^2 = \dfrac{1}{4}$	Replace u with x^2.
$x = \pm\sqrt{\dfrac{2}{3}}$	or $\qquad x = \pm\sqrt{\dfrac{1}{4}}$	Square root property (Section 1.4)
$x = \dfrac{\pm\sqrt{2}}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}}$	or $\qquad x = \pm\dfrac{1}{2}$	Simplify radicals. (Section R.7)
$x = \pm\dfrac{\sqrt{6}}{3}$		

Check that the solution set is $\left\{ \pm\frac{\sqrt{6}}{3}, \pm\frac{1}{2} \right\}$.