Answer Key to the Chapter 6 Practice Test
Factor completely.

1. $x^2+5x-84$

This is a basic trinomial with a leading x^2. (Section 6.2)
*You need two numbers that multiply to be 84 and **subtract** to be 5.*
Those numbers are 7 & 12.
For 7 and 12 to combine to be a positive 5, the 7 must be negative and the 12 must be positive.
Answer: $(x-7)(x+12)$

2. $4x^2-13x+10$

This is a trinomial whose leading term has a coefficient, so use trial & error. (Section 6.3)
$4x^2 = x\cdot 4x, 2x\cdot 2x$
$10 = 1\cdot 10, 2\cdot 5$
Now mix and match until you find the combination that gives you middle terms that add to be $-13x$.
Remember to skip any combinations that have a common factor in the same set of parentheses.
Answer: $(x-2)(4x-5)$

3. x^3-1000

This is a difference of cubes. (Section 6.4)
Remember to use "SOAP", as well as the "aa ab bb" idea.
$(x)^3-(10)^3$
$=(x-10)(x\cdot x+x\cdot 10+10\cdot 10)$
$=(x-10)(x^2+10x+100)$

4. $x^2-13x+40$

This is another basic trinomial with a leading x^2. (Section 6.2)
*You need two numbers that multiply to be 40 and **add** to be 13.*
Those numbers are 5 & 8.
For 5 and 8 to combine to be a negative 13, the two numbers must both be negative.
Answer: $(x-5)(x-8)$

5. $2x^2 - 10x - 28$

This is a basic trinomial that has a common factor. (Section 6.2)
After you factor out the common factor of 2, the trinomial in the parentheses is a basic x^2 *trinomial.*

$$2x^2 - 10x - 28$$
$$= 2\left(x^2 - 5x - 14\right)$$
$$= 2(x-7)(x+2)$$

Answer: $2(x-7)(x+2)$

6. $x^3 - 7x^2 + 3x - 21$

This polynomial has 4 terms, so factor by grouping. (Section 6.1)

$$x^3 - 7x^2 + 3x - 21$$
$$= x^2(x-7) + 3(x-7)$$
$$= (x-7)\left(x^2 + 3\right)$$

Answer: $(x-7)\left(x^2+3\right)$

7. $49x^2 - 36y^2$

This is a difference of squares. (Section 6.4)

$$49x^2 - 36y^2$$
$$= (7x)^2 - (6y)^2$$
$$= (7x+6y)(7x-6y)$$

Answer: $(7x+6y)(7x-6y)$

8. $m^2n^3 - m^5n^2 + m^3n$

This is a common factor problem. (Section 6.1)
Remember that we always factor out the smallest exponent.
Common Factor: m^2n
Answer: $m^2n\left(n^2 - m^3n + m\right)$

9. $x^2 + 8x + 12$

This is another basic trinomial with a leading x^2*. (Section 6.2)*
You need two numbers that multiply to be 12 and ***add*** *to be 8.*
Those numbers are 2 & 6.
For 2 and 6 to combine to be a positive 8, the two numbers must both be positive.
Answer: $(x+2)(x+6)$

Solve.

Remember the steps for solving a quadratic equation.
1) Simplify both sides of the equation, and collect all terms on one side equal to 0 on the other side.
2) Factor the polynomial.
3) Set each factor equal to 0.
4) Solve each new equation.

10. $x^2 - 81 = 0$

(Factoring: Difference of Squares, Section 6.4)

$x^2 - 81 = 0$

$(x+9)(x-9) = 0$

$x+9=0 \quad or \quad x-9=0$

$x=-9 \qquad x=9$

$\{-9, 9\}$

11. $x^2 + 6x - 40 = 0$

(Factoring: Basic Trinomial, Section 6.2)

$x^2 + 6x - 40 = 0$

$(x+10)(x-4) = 0$

$x+10=0 \quad or \quad x-4=0$

$x=-10 \qquad x=4$

$\{-10, 4\}$

12. $x^2 + 13x = 6x - 10$

Collect all terms on the left side first. Factoring: Basic Trinomial, Section 6.2

$x^2 + 13x = 6x - 10$

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

$(x+5)(x+2) = 0$

$x+5=0 \quad or \quad x+2=0$

$x=-5 \qquad x=-2$

$\{-5, -2\}$

13. $x^2 - 11x + 24 = 0$

(Factoring: Basic Trinomial, Section 6.2)

$x^2 - 11x + 24 = 0$

$(x-3)(x-8) = 0$

$x - 3 = 0 \quad or \quad x - 8 = 0$

$x = 3 \qquad\qquad x = 8$

$\{3, 8\}$

14. $(2x+7)(x-5) = 0$

This polynomial is already factored, so set each factor equal to 0 and solve.

$(2x+7)(x-5) = 0$

$2x + 7 = 0 \quad or \quad x - 5 = 0$

$2x = -7 \qquad\qquad x = 5$

$x = -\frac{7}{2}$

$\left\{-\frac{7}{2}, 5\right\}$

You must set up an equation and solve it to receive any points.

15. Two consecutive positive integers have a product of 182. Find the integers.

#1: x

#2: x+1

Equation: $x(x+1) = 182$

$x(x+1) = 182$

$x^2 + x = 182$

$x^2 + x - 182 = 0$

$(x+14)(x-13) = 0$

$x + 14 = 0 \quad or \quad x - 13 = 0$

$x = -14 \qquad\qquad x = 13$

Omit the negative solution: $x = -14$.

So, $x = 13$.

#1: x = 13

#2: x+1 = 13+1 = 14

The integers are 13 and 14.

16. Rosa is 11 years older than Dale. If the product of their ages is 126, how old is each person?

Rosa: $d+11$

Dale: d

Equation: $d(d+11)=126$

$d(d+11)=126$

$d^2+11d=126$

$d^2+11d-126=0$

$(d+18)(d-7)=0$

$d+18=0 \quad or \quad d-7=0$

$d=-18 \qquad d=7$

Omit the negative solution: $d=-18$.

So, $d=7$.

Rosa: $d+11=7+11=18$

Dale: $d=7$

Rosa is 18 years old and Dale is 7 years old.

17. The length of a rectangular rug is 3 feet more than its width. If the area of the rug is 40 square feet, find the length and width of the rug.

Length: $w+3$

Width: w

Equation: $w(w+3)=40$

$w(w+3)=40$

$w^2+3w=40$

$w^2+3w-40=0$

$(w+8)(w-5)=0$

$w+8=0 \quad or \quad w-5=0$

$w=-8 \qquad w=5$

Omit the negative solution: $w=-8$.

So, $w=5$.

Length: $w+3=5+3=8$

Width: $w=5$

The length is 8 feet and the width is 5 feet.