1. Factor: $x^2 + 14x + 40$

× = 40, + = 14 → 10 and 4

Answer: $(x + 10)(x + 4)$

2. Factor: $x^2 + 12x + 36$

× = 36, + = 12 → 6 and 6

Answer: $(x + 6)^2$

3. Factor: $x^2 + 15x + 56$

× = 56, + = 15 → 8 and 7

Answer: $(x + 8)(x + 7)$

4. Factor: $x^2 + 15x + 50$

× = 50, + = 15 → 10 and 5

Answer: $(x + 10)(x + 5)$

5. Factor: $x^2 + 10x + 16$

× = 16, + = 10 → 8 and 2

Answer: $(x + 8)(x + 2)$

6. Factor: $x^2 + 6x + 9$

× = 9, + = 6 → 3 and 3

Answer: $(x + 3)^2$

7. Factor: $x^2 + 18x + 81$

× = 81, + = 18 → 9 and 9

Answer: $(x + 9)^2$

8. Factor: $x^2 - x - 2$

× = −2, + = −1 → 1 and −2

Answer: $(x + 1)(x - 2)$

9. Factor: $x^2 + 4x - 21$

× = −21, + = 4 → 7 and −3

Answer: $(x + 7)(x - 3)$

10. Factor: $x^2 + 6x + 8$

× = 8, + = 6 → 4 and 2

Answer: $(x + 4)(x + 2)$

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11. Factor: $x^2 + 12x + 20$

$\times = 20$, $+ = 12 \rightarrow 10$ and 2

Answer: $(x + 10)(x + 2)$

12. Factor: $x^2 - 10x + 21$

$\times = 21$, $+ = -10 \rightarrow -3$ and -7

Answer: $(x - 3)(x - 7)$

13. Factor: $x^2 + 12x + 27$

$\times = 27$, $+ = 12 \rightarrow 9$ and 3

Answer: $(x + 9)(x + 3)$

14. Factor: $x^2 + 2x - 3$

$\times = -3$, $+ = 2 \rightarrow 3$ and -1

Answer: $(x + 3)(x - 1)$

15. Factor: $x^2 - 7x - 8$

$\times = -8$, $+ = -7 \rightarrow 1$ and -8

Answer: $(x + 1)(x - 8)$

16. Factor: $x^2 + 8x + 7$

$\times = 7$, $+ = 8 \rightarrow 7$ and 1

Answer: $(x + 7)(x + 1)$

17. Factor: $x^2 + 10x + 21$

$\times = 21$, $+ = 10 \rightarrow 7$ and 3

Answer: $(x + 7)(x + 3)$

18. Factor: $x^2 + 9x - 10$

$\times = -10$, $+ = 9 \rightarrow 10$ and -1

Answer: $(x + 10)(x - 1)$

19. Factor: $x^2 - 4x + 3$

$\times = 3$, $+ = -4 \rightarrow -1$ and -3

Answer: $(x - 1)(x - 3)$

20. Factor: $x^2 + 2x - 80$

$\times = -80$, $+ = 2 \rightarrow 10$ and -8

Answer: $(x + 10)(x - 8)$

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21. Factor completely: $3x^2 + 15x + 18$ ★ challenge

$3(x^2 + 5x + 6)$

Answer: $3(x + 3)(x + 2)$

22. Factor completely: $x^3 - x^2 - 20x$ ★ challenge

$x(x^2 - x - 20)$

Answer: $x(x - 5)(x + 4)$

23. Factor: $x^2 + 2x + 8$. If it does not factor, say so. ★ challenge

$\times = 8$, $+ = 2$: pairs $1 \cdot 8$, $2 \cdot 4$, $(-1)(-8)$, $(-2)(-4)$

Answer: does not factor

24. Find a value of k so that $x^2 + kx + 12$ factors as $(x + 2)(x + 6)$. ★ challenge

$(x + 2)(x + 6) = x^2 + 8x + 12$

Answer: $k = 8$

25. Factor completely: $x^2 - 4x - 32$, then find the zeros of $y = x^2 - 4x - 32$. ★ challenge

$(x - 8)(x + 4)$

Answer: $(x - 8)(x + 4)$; zeros $x = 8$ and $x = -4$

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