1. Find the prime factorization of 180.

2. Factor completely: $9x^6 + 27x^4$

3. Factor completely: $20x^9 - 25x^7 + 15x^5 - 40x^4$　　(GCF only)

4. Factor completely: $14x^7y^7 + 14x^4y^6 + 42x^2y^4$

5. Factor completely: $x^2 + 11x + 24$

6. Which of the following is a factor of $6x^2 - 7x - 5$?
   A) none of these
   B) $(2x - 1)$
   C) $(3x - 5)$
   D) $(2x + 5)$

7. Factor completely: $25u^4 + 30u^3 + 5u^2$

8. Factor completely: $x^2 - 23x + 60$

9. Factor completely: $m^2 + 2m - 80$

10. Which of the following is a factor of $8x^2 + 18x - 5$?
    A) none of these
    B) $(2x - 5)$
    C) $(2x + 1)$
    D) $(4x - 1)$

11. Factor completely: $12a^4 + 28a^3 + 8a^2$

12. Factor completely: $16r^2 - s^2$

13. Factor completely: $16r^2 - 49s^2$
    A) One of the factors is $(16r - 49s)$.
    B) One of the factors is $(4r + 7s)$.
    C) One of the factors is $(r - s)$.
    D) One of the factors is $(4r - s)$.

14. Factor completely: $x^2 - 15x + 56$

15. Factor completely: $x^2 - 49$

16. Factor completely: $20x^3 - 45x^7$

17. Factor completely: $x^2 - 13x + 42$

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

19. Factor completely: $x^2 - 9$

20. Factor completely: $25u^2 - 36x^2$

21. Factor completely: $4x^5 + 16x^3$

22. Factor completely: $x^2(x + 3) + 2(x + 3)$

23. Factor completely: $8x^3 - 12x^2 + 6x - 9$

24. Factor completely: $x^3 + 8x^2 - 3x - 24$

25. Factor completely: $x^3 + 8$

26. Factor completely: $27x^3 - 1$

27. Simplify: $\dfrac{4x + 32}{x^2 + 9x + 8}$

28. Simplify: $\dfrac{6t - 12}{2 - t}$

29. Multiply: $\dfrac{x^2 - 3x - 10}{x^2 + 4x + 4} \cdot \dfrac{x - 2}{x - 5}$

30. Divide: $\dfrac{t - 3}{t + 2} \div \dfrac{4t - 12}{t + 1}$

31. Solve: $(2x + 3)(x - 1) = 0$

32. Solve: $x^2 - 8x + 15 = 0$

33. Solve: $x(x - 5) = 14$

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1. $2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

2. $9x^4 \left(x^2 + 3 \right)$

3. $5x^4 \left(4x^5 - 5x^3 + 3x - 8 \right)$ GCF only

4. $14x^2 y^4 \left(x^5 y^3 + x^2 y^2 + 3 \right)$

5. $(x + 3)(x + 8)$

6.   C

7. $5u^2 (u + 1)(5u + 1)$

8. $(x - 3)(x - 20)$

9. $(m + 10)(m - 8)$

10.   D

11. $4a^2 (a + 2)(3a + 1)$

12. $(4r + s)(4r - s)$

13.   B

14. $(x - 7)(x - 8)$

15. $(x + 7)(x - 7)$

16. $5x^3 \left(2 + 3x^2 \right)\left(2 - 3x^2 \right)$

17. $(x - 7)(x - 6)$

18. $(2x - 5)(x - 2)$

19. $(x + 3)(x - 3)$

20. $(5u + 6x)(5u - 6x)$

21. $4x^3 \left(x^2 + 4 \right)$

22. $(x + 3)\left(x^2 + 2 \right)$

23. $(2x - 3)\left(4x^2 + 3 \right)$ Grouping

24. $(x + 8)\left(x^2 - 3 \right)$ Grouping

25. $(x + 2)\left(x^2 - 2x + 4 \right)$

26. $(3x - 1)\left(9x^2 + 3x + 1 \right)$

27. $\dfrac{4(x + 8)}{(x + 8)(x + 1)} = \dfrac{4}{x + 1}$

28. $\dfrac{6(t - 2)}{-1(-2 + t)} = -6$

29. $\dfrac{(x + 2)(x - 5)}{(x + 2)(x + 2)} \cdot \dfrac{(x - 2)}{(x - 5)} = \dfrac{x - 2}{x + 2}$

30. $\dfrac{t - 3}{t + 2} \cdot \dfrac{t + 1}{4(t - 3)} = \dfrac{t + 1}{4(t + 2)}$

31. $\left\{ -\dfrac{3}{2}, 1 \right\}$

32. $(x - 5)(x - 3) = 0$
      $x - 5 = 0 \quad x - 3 = 0$ \qquad \{3, 5\}
      $x = 5 \qquad\quad x = 3$

33. $x^2 - 5x - 14 = 0$
      $(x - 7)(x + 2) = 0$
      $x - 7 = 0 \quad x + 2 = 0$ \qquad \{-2, 7\}
      $x = 7 \qquad\quad x = -2$