Greatest Common Factor and GCF Factoring

Name: _____	Date: _____	Score: _____ / 24

Quick Review

The **Greatest Common Factor (GCF)** of two or more terms is the largest expression that divides each evenly. Find it by factoring out the largest common number coefficient and the smallest power of each shared variable. To **factor out the GCF**: pull it outside parentheses, leaving the original expression divided by the GCF inside. Always factor out the GCF first — every other factoring technique works better once the GCF is gone. Check by multiplying back: distributing the GCF should give you the original expression. **Common mistake**: leaving a common factor inside that should have been pulled out. After factoring, scan the inside one more time to be sure it has no more common factors.

PRACTICE

Factor out the GCF.

1. $4x + 8$ _____

2. $6x^2 + 9x$ _____

3. $10x^3 - 15x^2$ _____

4. $8x^2 + 12x + 4$ _____

5. $x^3 + x^2 + x$ _____

6. $14x^2y - 21xy^2$ _____

7. $6x^4 + 12x^3 - 18x^2$ _____

8. $3x + 6$ _____

9. $-2x^2 + 4x$ _____

10. $25x^2 - 15x$ _____

11. $x^5 - x^3$ _____

12. $6a^2b + 8ab^2$ _____

13. $9x^3 - 27x$ _____

14. $x^2 - x$ _____

15. $4x^3 + 2x^2 - 6x$ _____

16. $-3x^2 - 6x - 9$ _____

17. $5x^2 + 10x$ _____

18. $x^2y + xy^2$ _____

19. $16x^4 - 24x^3 + 8x^2$ _____

20. $35x^3 + 14x^2$ _____

Word Problems

21. A rectangular garden has area $6x^2 + 9x$ square feet. Factor the expression to find possible side lengths.

_____

22. A square garden has perimeter $12x + 20$ feet. Factor to find an expression for one side length.

_____

23. A designer writes the surface calculation for an open cylinder as $\pi r^2 + \pi rh$. Factor the expression to show the shared circular factor.

_____

24. A packaging model gives the volume expression $2x^3 - 4x^2$ cubic inches. Factor it to show the common bas

_____

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Answer Keys

1. $4(x+2)$
2. $3x(2x+3)$
3. $5x^2(2x-3)$
4. $4(2x^2+3x+1)$
5. $x(x^2+x+1)$
6. $7xy(2x-3y)$
7. $6x^2(x^2+2x-3)$
8. $3(x+2)$
9. $-2x(x-2)$
10. $5x(5x-3)$
11. $x^3(x^2-1)$
12. $2ab(3a+4b)$
13. $9x(x^2-3)$
14. $x(x-1)$
15. $2x(2x^2+x-3)$
16. $-3(x^2+2x+3)$
17. $5x(x+2)$
18. $xy(x+y)$
19. $8x^2(2x^2-3x+1)$
20. $7x^2(5x+2)$
21. $3x(2x+3)$
22. $4(3x+5)$; side $= 3x+5$
23. $\pi r(r+h)$
24. $2x^2(x-2)$

Step-by-Step Tutor Notes

1. Use the clue in the question first, then let the arithmetic finish the job. GCF $= 4$. So the answer is $4(x+2)$.
2. Focus on the main idea of the problem, then simplify carefully. GCF $= 3x$. So the answer is $3x(2x+3)$.
3. Focus on the main idea of the problem, then simplify carefully. GCF $= 5x^2$. So the answer is $5x^2(2x-3)$.
4. Use the clue in the question first, then let the arithmetic finish the job. GCF $= 4$. So the answer is $4(2x^2+3x+1)$.
5. Take it one clear step at a time and keep the original question in mind. Just x is the GCF. So the answer is $x(x^2+x+1)$.
6. Start with the definition the problem is testing, then apply it directly. GCF $= 7xy$. So the answer is $7xy(2x-3y)$.
7. This is a good place to slow down, check the notation, and simplify cleanly. GCF $= 6x^2$. So the answer is $6x^2(x^2+2x-3)$.
8. Take it one clear step at a time and keep the original question in mind. GCF $= 3$. So the answer is $3(x+2)$.
9. This is a good place to slow down, check the notation, and simplify cleanly. GCF $= -2x$ (pull out negative for cleanest form). So the answer is $-2x(x-2)$.
10. Take it one clear step at a time and keep the original question in mind. GCF $= 5x$. So the answer is $5x(5x-3)$.
11. Use the clue in the question first, then let the arithmetic finish the job. GCF $= x^3$. So the answer is $x^3(x^2-1)$.
12. Focus on the main idea of the problem, then simplify carefully. GCF $= 2ab$. So the answer is $2ab(3a+4b)$.
13. Use the clue in the question first, then let the arithmetic finish the job. GCF $= 9x$. So the answer is $9x(x^2-3)$.
14. Start with the definition the problem is testing, then apply it directly. GCF $= x$. So the answer is $x(x-1)$.
15. Focus on the main idea of the problem, then simplify carefully. GCF $= 2x$. So the answer is $2x(2x^2+x-3)$.
16. Focus on the main idea of the problem, then simplify carefully. Pull out -3. So the answer is $-3(x^2+2x+3)$.
17. Start with the definition the problem is testing, then apply it directly. GCF $= 5x$. So the answer is $5x(x+2)$.
18. Focus on the main idea of the problem, then simplify carefully. GCF $= xy$. So the answer is $xy(x+y)$.
19. Focus on the main idea of the problem, then simplify carefully. GCF $= 8x^2$. So the answer is $8x^2(2x^2-3x+1)$.
20. Take it one clear step at a time and keep the original question in mind. GCF $= 7x^2$. So the answer is $7x^2(5x+2)$.
21. Use the given numbers to build the model, then finish the calculation. $6x^2+9x = 3x(2x+3)$. Possible dimensions: $3x$ by $2x+3$.
22. Set up the model from the story, then calculate carefully. Perimeter $= 4\cdot$ side, and $12x+20 = 4(3x+5)$. Side $= 3x+5$.
23. GCF is πr. (This is the formula for lateral surface area + circle area — factored, it's the surface area of an open cylinder.).
24. Name the quantities first so the model is easy to read. GCF $= 2x^2$. Inside: $x-2$. So $2x^2(x-2)$.

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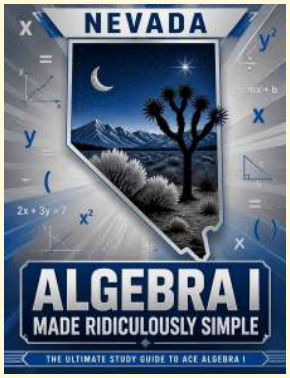

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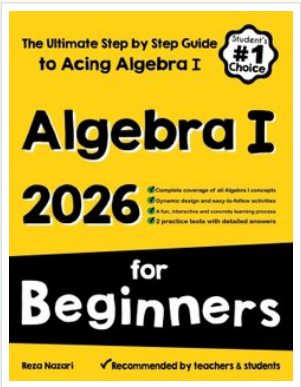

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