Practice

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3 Factor each polynomial, if possible. If the polynomial cannot be factored using integers, write *prime*.

10. $5x^2 + 34x + 24$

11 $2x^2 + 19x + 24$

12. $4x^2 + 22x + 10$

13. $4x^2 + 38x + 70$

14. $2x^2 - 3x - 9$

15. $4x^2 - 13x + 10$

16. $2x^2 + 3x + 6$

17. $5x^2 + 3x + 4$

18. $12x^2 + 69x + 45$

19. $4x^2 - 5x + 7$

20. $5x^2 + 23x + 24$

21. $3x^2 - 8x + 15$

22. SHOT PUT An athlete throws a shot put with an initial upward velocity of 29 feet per second and from an initial height of 6 feet.

    a. Write an equation that models the height of the shot put in feet with respect to time in seconds.

    b. After how many seconds will the shot put hit the ground?

Solve each equation. Confirm your answers using a graphing calculator.

23. $2x^2 + 9x - 18 = 0$

24. $4x^2 + 17x + 15 = 0$

25. $-3x^2 + 26x = 16$

26. $-2x^2 + 13x = 15$

27. $-3x^2 + 5x = -2$

28. $-4x^2 + 19x = -30$

29. BASKETBALL When Jerald shoots a free throw, the ball is 6 feet from the floor and has an initial upward velocity of 20 feet per second. The hoop is 10 feet from the floor.

    a. Use the vertical motion model to determine an equation that models Jerald's free throw.

    b. How long is the basketball in the air before it reaches the hoop?

    c. Raymond shoots a free throw that is 5 foot 9 inches from the floor with the same initial upward velocity. Will the ball be in the air more or less time? Explain.

30. DIVING Ben dives from a 36-foot platform. The equation $h = -16t^2 + 14t + 36$ models the dive. How long will it take Ben to reach the water?

Examples 1–3 Factor each polynomial.

1. $x^2 - 9$

2. $4a^2 - 25$

3. $9m^2 - 144$

4. $2p^3 - 162p$

5. $u^4 - 81$

6. $2d^4 - 32f^4$

7 $20r^4 - 45n^4$

8. $256n^4 - c^4$

9. $2c^3 + 3c^2 - 2c - 3$

10. $f^3 - 4f^2 - 9f + 36$

11. $3t^3 + 2t^2 - 48t - 32$

12. $w^3 - 3w^2 - 9w + 27$

Example 4 **EXTENDED RESPONSE** During an accident, skid marks may result from breaking. The formula $\frac{1}{24}s^2 = d$ approximates a vehicle's speed s in r given the length d in feet of the skid marks on dry concrete.

13. If skid marks on dry concrete are 54 feet long, how fast was the car the brakes were applied?

14. If the skid marks on dry concrete are 150 feet long, how fast was the when the brakes were applied?

Check Your Understanding

Example 1 Determine whether each trinomial is a perfect square trinomial. Write *yes* or *no*. If so, factor it.

   1. $25x^2 + 60x + 36$

   2. $6x^2 + 30x + 36$

Example 2 Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

   3. $2x^2 - x - 28$

   4. $6x^2 - 34x + 48$

   5. $4x^2 + 64$

   6. $4x^2 + 9x - 16$

Examples 3–4 Solve each equation. Confirm your answers using a graphing calculator.

   7. $4x^2 = 36$

   8. $25a^2 - 40a = -16$

   9. $64y^2 - 48y + 18 = 9$

   10. $(z + 5)^2 = 47$

Example 5 **11.** **CCSS REASONING** While painting his bedroom, Nick drops his paintbrush off hi ladder from a height of 6 feet. Use the formula $h = -16t^2 + h_0$ to approximate number of seconds it takes for the paintbrush to hit the floor.

Practice and Problem Solving

Extra Pra

Example 1 Determine whether each trinomial is a perfect square trinomial. Write *yes* or *n* If so, factor it.

   12. $4x^2 - 42x + 110$

   13. $16x^2 - 56x + 49$

   14. $81x^2 - 90x + 25$

   15 $x^2 + 26x + 168$