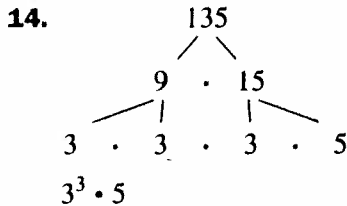
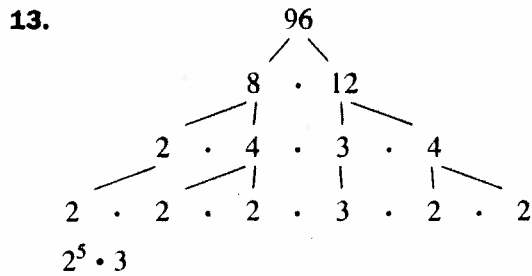


Answers

Lesson 4.1

Practice A

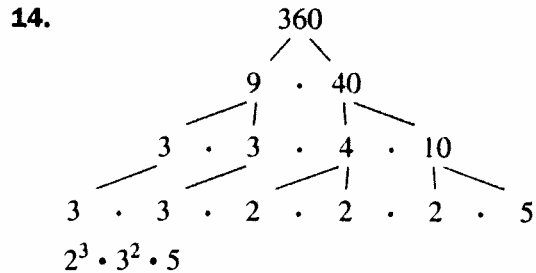
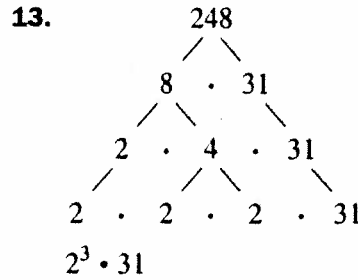
1. 1, 2, 3, 6, 9, 18 2. 1, 2, 3, 4, 6, 8, 12, 24
 3. 1, 2, 4, 5, 8, 10, 20, 40 4. 1, 3, 9, 27
 5. 1, 3, 11, 33 6. 1, 41 7. prime
 8. composite 9. composite 10. prime
 11. prime 12. prime



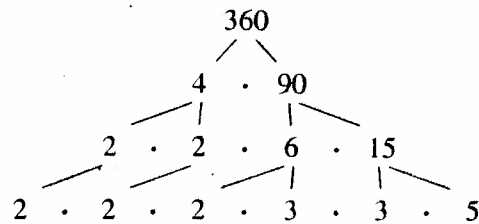
15. $2 \cdot 7$ 16. $2 \cdot 3^2$ 17. $2^2 \cdot 5$ 18. 7^2
 19. $2 \cdot 3^3$ 20. $2 \cdot 31$ 21. 2^6 22. $2^3 \cdot 3^2$
 23. $2^4 \cdot 5$ 24. $2 \cdot 2 \cdot 2 \cdot x \cdot y$
 25. $2 \cdot 2 \cdot 2 \cdot 2 \cdot a \cdot a \cdot b$
 26. $5 \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z$
 27. $3 \cdot 3 \cdot 3 \cdot g \cdot g \cdot h \cdot h \cdot h$
 28. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot r \cdot s \cdot s \cdot s$
 29. $3 \cdot 3 \cdot 5 \cdot m \cdot m \cdot m \cdot n$ 30. 6 ways
 31. 12 ways 32. 1 ft long by 24 ft wide; 2 ft long by 12 ft wide; 3 ft long by 8 ft wide; 4 ft long by 6 ft wide; 6 ft long by 4 ft wide; 8 ft long by 3 ft wide; 12 ft long by 2 ft wide; 24 ft long by 1 ft wide; there are 3 dimensions more than 3 feet long and less than 10 feet long.

Practice B

1. 1, 2, 4, 7, 14, 28 2. 1, 2, 17, 34
 3. 1, 2, 4, 11, 22, 44 4. 1, 2, 23, 46 5. 1, 59
 6. 1, 5, 13, 65 7. prime 8. prime
 9. composite 10. composite 11. composite
 12. prime



15. $2^3 \cdot 7$ 16. $3 \cdot 23$ 17. $3 \cdot 19$
 18. $7 \cdot 11$ 19. $7 \cdot 13$ 20. $5 \cdot 17$
 21. $3 \cdot 31$ 22. $2 \cdot 3 \cdot 19$ 23. $2^2 \cdot 3^3$
 24. $2 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot y$ 25. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot b \cdot b \cdot b \cdot b \cdot b \cdot c \cdot c \cdot c \cdot c$
 26. $17 \cdot r \cdot r \cdot r \cdot s \cdot s \cdot s \cdot s$ 27. $2 \cdot 2 \cdot 2 \cdot 3 \cdot z \cdot z$
 28. $2 \cdot 2 \cdot 2 \cdot 5 \cdot g \cdot g \cdot g \cdot h$
 29. $3 \cdot 19 \cdot c \cdot d \cdot d \cdot d \cdot d$
 30. Sample answer:



The results are the same.

31. 8 arrangements
 32. 16 groups

Lesson 4.2

Practice A

1. 2, 3, or 6 2. Sample answer: 4 and 15
 3. 8 4. 7 5. 7 6. 11 7. 6 8. 2 9. 4
 10. 18 11. 14 12. 3; not relatively prime
 13. 3; not relatively prime 14. 1; relatively prime
 15. 1; relatively prime 16. 13; not relatively prime
 17. 1; relatively prime
 18. $3x$ 19. 4 20. $16y$ 21. $7r^2$ 22. $9s^3$
 23. $11z^2$ 24. no 25. yes 26. no
 27. a. $6 = 2 \cdot 3$; $12 = 2 \cdot 2 \cdot 3$; $4 = 2 \cdot 2$; $8 = 2 \cdot 2 \cdot 2$ b. The common prime factor is 2.

Lesson 4.2 continued

Practice B

- 12
- 14
- 16
- 1
- 1
- 7
- 2; not relatively prime
- 13; not relatively prime
- 1; relatively prime
- 12; not relatively prime
- 17; not relatively prime
- 1; relatively prime
- $7m$
- $2n$
- $8t^2$
- $3x$
- $2y$
- $5a$
- relatively prime
- relatively prime
- not relatively prime
- $4y$
- $11pq$
- $4abc$
- $4d^2$
- rt
- 3
- 6 teams
- 9 care packages
- Yes; the first number times 3 is divisible by 6, so the first number is also divisible by 2. The second number cannot also be divisible by 2. So, it must be an odd number.

Lesson 4.3

Practice A

- yes
- no
- no
- Sample answer: $\frac{6}{8}, \frac{9}{12}$
- Sample answer: $\frac{6}{16}, \frac{9}{24}$
- Sample answer: $\frac{1}{2}, \frac{12}{24}$
- Sample answer: $\frac{1}{3}, \frac{14}{42}$
- Sample answer: $\frac{1}{5}, \frac{4}{20}$
- Sample answer: $\frac{2}{3}, \frac{8}{12}$
- $\frac{1}{2}$
- $\frac{3}{4}$
- $\frac{7}{8}$
- $\frac{2}{3}$
- $\frac{4}{5}$
- $\frac{7}{9}$
- $\frac{4}{9}$
- a. $\frac{3}{5}$ b. $\frac{2}{5}$
- $\frac{xy^3}{3}$
- $\frac{2a^3}{9}$
- $\frac{16}{9s^2t}$
- $\frac{2}{v}$
- $\frac{61g}{4h^2}$
- $\frac{10n^2}{7}$
- $\frac{5}{8}, \frac{7}{8}$; no
- $\frac{5}{7}, \frac{5}{7}$; yes
- $\frac{7}{9}, \frac{7}{9}$; yes

Practice B

- no
- yes
- no
- Sample answer: $\frac{10}{28}, \frac{15}{42}$
- Sample answer: $\frac{14}{32}, \frac{21}{48}$
- Sample answer: $\frac{9}{10}, \frac{27}{30}$

Practice A

Lesson 4.4

- 90
- 28
- 24
- 30
- 54
- 72
- $5a^2$
- m^5
- $8x^4$
- $132d^3$
- $374k^4$
- $60g^5$
- $\frac{1}{3} < \frac{3}{8}$
- $\frac{4}{5} > \frac{5}{7}$
- $\frac{3}{4} > \frac{7}{10}$
- $\frac{7}{12} < \frac{13}{15}$
- $\frac{11}{20} < \frac{17}{24}$
- $\frac{2}{5} > \frac{3}{11}$
- April
- 18 figures
- After 560 seconds
- $1\frac{9}{14}, \frac{12}{7}, \frac{11}{6}$
- $3\frac{8}{13}, \frac{95}{26}, \frac{15}{4}$
- $2\frac{5}{12}, \frac{8}{3}, \frac{23}{8}$
- $\frac{5}{18}, \frac{1}{3}, \frac{10}{27}$
- $1\frac{3}{5}, \frac{13}{8}, \frac{23}{14}$
- $\frac{277}{63}, \frac{31}{7}, 4\frac{10}{21}$

Practice B

- 168
- 180
- 126
- 30
- 144
- 210
- $91b^3$
- $72y^3$
- $96a^4$
- $93z^3$
- $84m^2n^3$
- $300s^3t^2$
- $\frac{13}{18} < \frac{16}{21}$
- $\frac{17}{30} < \frac{27}{35}$
- $\frac{19}{34} > \frac{19}{36}$
- $\frac{31}{52} > \frac{37}{64}$
- $\frac{9}{20} > \frac{19}{46}$
- $\frac{15}{34} < \frac{29}{51}$
- In 21 days, on August 22
- 6 years
- $\frac{19}{6}, 3\frac{5}{14}, \frac{83}{21}$
- $\frac{239}{33}, 7\frac{2}{3}, \frac{71}{9}$
- $\frac{11}{4}, \frac{99}{34}, 2\frac{16}{17}$
- $\frac{303}{56}, \frac{47}{8}, 5\frac{25}{28}$
- $\frac{55}{18}, \frac{139}{45}, 3\frac{1}{6}$
- $\frac{61}{48}, \frac{31}{24}, 1\frac{5}{16}$
- $\frac{7c}{56}, \frac{4c}{56}$
- $\frac{15a^2}{20ab}, \frac{2b^2}{20ab}$
- $\frac{8t^2}{18w^2t}, \frac{15w}{18w^2t}$

Lesson 4.5

Practice A

- $2x^3 \cdot 2x^6 = 2 \cdot 2 \cdot x^3 \cdot x^6 = 2 \cdot 2 \cdot x^3 + 6 = 4x^9$
- 3^6
- 2^6
- 5^9
- 4^{16}
- 9^8
- 8^{11}
- 2^5
- 5
- 3^9
- 12
- 9^6
- 8^2
- a^5
- b^{13}
- x^{12}
- y^{13}
- $3g^9$
- $20h^9$
- k^2
- m^{11}
- $8n^6$
- $4d^2$
- $\frac{6s^3}{9}$
- $\frac{4r^3}{3}$
- $3x^3$
- $2x^4$
- x^5
- 10^{41} water molecules
- 17
- 3
- 4
- 3
- 11
- 4

Practice B

- 5^{21}
- 4^{17}
- 6^{17}
- 8^{19}
- 9^{25}
- 10^{20}
- 3^8
- 7^6
- 11^4
- 13^3
- 16^3
- 20^2
- d^8
- $12h^{11}$
- $5g^{18}$
- $56e^{19}$
- $18w^9$
- $20v^{13}$
- x^6
- $\frac{3y^{16}}{5}$
- $\frac{3s^7}{8}$
- $\frac{5z^4}{6}$
- $\frac{5a^7}{2}$
- $\frac{3h^{14}}{2}$
- $2x^2$
- $3x^3$
- x^4
- 3^5 times larger
- 40
- 11
- 25
- 20
- 24
- 14

Lesson 4.6

Practice A

1. D 2. $\frac{1}{7^5}$ 3. 1 4. $\frac{1}{9^3}$ 5. $\frac{1}{12^6}$ 6. $\frac{3}{a^7}$
 7. $\frac{14}{g^8}$ 8. 2^{-4} 9. $2^{-3} \cdot 3^{-1}$ 10. $2^{-2} \cdot 3^{-2}$
 11. $5h^{-4}$ 12. $6mn^{-2}$ 13. $8d^3e^{-7}$ 14. $\frac{1}{9^{11}}$
 15. $\frac{1}{11^2}$ 16. $\frac{1}{5^6}$ 17. t^4 18. $\frac{1}{v^4}$ 19. $\frac{24}{s^5}$
 20. $\frac{1}{10^3} = \frac{1}{1000}$ meter 21. a. $\frac{10^{-6} \text{ m}}{10^{-12} \text{ m}}$
 b. 10^6 ; there are 10^6 picometers in a micrometer.
 22. $\frac{1}{5^6}$ 23. $\frac{1}{10^9}$ 24. 17^8 25. $15g^2$ 26. $\frac{3}{h^{10}}$
 27. $\frac{5f^{12}}{4}$ 28. 0.006 29. 0.020 30. 0.004

Practice B

1. C 2. $\frac{1}{14^3}$ 3. $\frac{1}{9^7}$ 4. $\frac{1}{18^5}$ 5. a 6. $\frac{24}{d}$
 7. $\frac{m^4}{n^2}$ 8. 3^{-3} 9. 3^{-4} 10. $3^{-2} \cdot 7^{-1}$
 11. $5t^{-4}$ 12. $6zy^{-5}$ 13. $11p^2q^{-6}$ 14. 22^4
 15. $\frac{1}{8}$ 16. $\frac{1}{12^{11}}$ 17. $\frac{3}{w^5}$ 18. $45h^8$ 19. $\frac{84}{m^{13}}$
 20. $\frac{1}{10^8} = \frac{1}{100,000,000}$ meter 21. 10^{-7}
 22. 10^6 23. $\frac{9}{4a^{29}}$ 24. $\frac{15u}{17}$ 25. $\frac{19}{k^{26}}$
 26. $14r^{11}$ 27. $\frac{c}{d^5}$ 28. $\frac{y^7}{w^8}$ 29. 0.004
 30. 0.001 31. 0.018

Lesson 4.7

Practice A

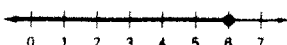
1. The answer is off by a power of ten; $48,000 = 4.8 \times 10^4$. 2. 1.8×10^3
 3. 3.2×10^4 4. 2.4×10^{-2} 5. 7.5×10^{-3}
 6. 6.34×10^5 7. 8.1×10^{-4} 8. 310
 9. 0.028 10. 0.0052 11. 19,000
 12. 0.000073 13. 860,000 14. < 15. <
 16. > 17. = 18. 2×10^4 19. 6.8×10^5
 20. 6.6×10^3 21. 6.4×10^{-4} 22. 7.2×10^2 ; 3200; 3.3×10^3 23. 5.5×10^4 ; 56,000;
 5.7×10^4 24. 2.7×10^{-2} ; 2.4×10^{-1} ; 0.25
 25. 0.0073; 7.1×10^{-2} ; 7.2×10^{-2}
 26. $3.54 \times 10^3 \text{ km}^3$ 27. $9 \times 10^{-4} \text{ g/mL}$
 28. 21,785 in. 29. 0.155956 m
 30. 0.00001323 m^3

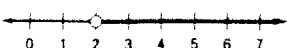
Practice B


1. 1.25×10^3 2. 2.05×10^5 3. 3.5×10^{-3}
 4. 5.8×10^{-4} 5. 5.22×10^6 6. 6.4×10^{-5}
 7. 530 8. 0.072 9. 0.0043 10. 120,000
 11. 0.0000945 12. 6,320,000 13. < 14. >
 15. > 16. < 17. 1.8×10^6 18. 9×10^7
 19. 9.6×10^4 20. 1.25×10^{-4}
 21. 1.09×10^2 22. 2.5×10^2 ; 2.3×10^3 ; 2400
 23. 4.7×10^5 ; 4.8×10^5 ; 481,000
 24. 3.5×10^{-2} ; 0.036; 3.7×10^{-2}
 25. 8.2×10^{-4} ; 8.3×10^{-4} ; 0.0084
 26. $4.92 \times 10^3 \text{ km}^3$ 27. $1.787 \times 10^{-4} \text{ g/mL}$
 28. 416,000 m^2 29. 0.066294 m
 30. 0.000021 m^3

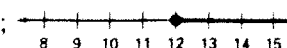
Cumulative Practice

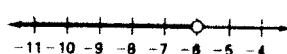
1. 2 to the fourth power; $2 \cdot 2 \cdot 2 \cdot 2$; 16
 2. 7 to the third power, or 7 cubed; $7 \cdot 7 \cdot 7$; 343
 3. 4 to the second power, or 4 squared; $4 \cdot 4$; 16
 4. 13 to the first power; 13; 13 5. 12 6. -16
 7. 13 8. -10 9. 110 tons 10. -6
 11. -8 12. -45 13. 26 14. -5 15. 9
 16. -16 17. -2 18. 5 19. 22 20. 8
 21. -7 22. -130 23. -25 24. -9
 25. -65 26. -1.8 27. 4.67 28. 0.18
 29. -5.7

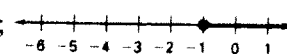
1. $x \leq 6$; 

2. $y > 2$; 

3. $p \geq -4$; 

4. $a \geq 12$; 

34. $k < -6$; 

35. $m \geq -1$; 

36. composite; 2^3 37. composite; $2^3 \cdot 3^2$

38. prime 39. prime 40. 12 41. 8 42. 4

43. 1 44. $\frac{22}{29}$ 45. $\frac{7}{12}$ 46. $\frac{2s}{3t^2}$ 47. $\frac{4xy^2}{z}$

48. a^8 49. p^{11} 50. $5x^{12}$ 51. $14t^{11}$

52. $2g^2h^{13}$ 53. c^6 54. x^7 55. $6m^6$ 56. $7y^7$

57. $8y^{12}$ 58. a^9 59. $\frac{2b^6}{3}$ 60. x^5 61. $\frac{1}{y^7}$

62. $\frac{1}{r^5}$ 63. $\frac{1}{n^3}$ 64. 8.28×10^4

65. 9.18×10^{-7} 66. 3.54×10^7