Begin with the prime factorizations of 80 and 120:

$$80 = 2^4 \times 5$$
$$120 = 2^3 \times 3 \times 5.$$

Now select each prime factor, with the greatest exponent from each factorization.

$$\text{Least common multiple} = 2^4 \times 3 \times 5 = 16 \times 3 \times 5 = 240$$

Therefore, it will take 240 minutes, or 4 hours, for the movies to begin again at the same time. By adding 4 hours to 4:00 P.M., they will start together again at 8:00 P.M.

○

STUDY TIP

Example 6 can also be solved by making a partial list of starting times for each movie.

Shorter Movie (Runs 1 hour, 20 minutes):

4:00, 5:20, 6:40, 8:00, . . .

Longer Movie (Runs 2 hours):

4:00, 6:00, 8:00, . . .

The list reveals that both movies start together again at 8:00 P.M.

CHECK POINT 6 A movie theater runs two documentary films continuously. One documentary runs for 40 minutes and a second documentary runs for 60 minutes. Both movies begin at 3:00 P.M. When will the movies begin again at the same time?

EXERCISE SET 5.1

• Practice Exercises

Use rules of divisibility to determine whether each number given in Exercises 1–10 is divisible by

a. 2 **b.** 3 **c.** 4 **d.** 5 **e.** 6
f. 8 **g.** 9 **h.** 10 **i.** 12.

1. 6944 **2.** 7245 **3.** 21,408 **4.** 25,025
5. 26,428 **6.** 89,001 **7.** 374,832 **8.** 347,712
9. 6,126,120 **10.** 5,941,221

In Exercises 11–24, use a calculator to determine whether each statement is true or false. If the statement is true, explain why this is so using one of the rules of divisibility in Table 5.1 on page 229.

11. 3|5958 **12.** 3|8142 **13.** 4|10,612
14. 4|15,984 **15.** 5|38,814 **16.** 5|48,659
17. 6|104,538 **18.** 6|163,944 **19.** 8|20,104
20. 8|28,096 **21.** 9|11,378 **22.** 9|23,772
23. 12|517,872 **24.** 12|785,172

In Exercises 25–44, find the prime factorization of each composite number.

25. 75 **26.** 45 **27.** 56 **28.** 48
29. 105 **30.** 180 **31.** 500 **32.** 360
33. 663 **34.** 510 **35.** 885 **36.** 999
37. 1440 **38.** 1280 **39.** 1996 **40.** 1575
41. 3675 **42.** 8316 **43.** 85,800 **44.** 30,600

In Exercises 45–56, find the greatest common divisor of the numbers.

45. 42 and 56 **46.** 25 and 70 **47.** 16 and 42
48. 66 and 90 **49.** 60 and 108 **50.** 96 and 212
51. 72 and 120 **52.** 220 and 400 **53.** 342 and 380
54. 224 and 430 **55.** 240 and 285 **56.** 150 and 480

In Exercises 57–68, find the least common multiple of the numbers.

57. 42 and 56 **58.** 25 and 70 **59.** 16 and 42
60. 66 and 90 **61.** 60 and 108 **62.** 96 and 212
63. 72 and 120 **64.** 220 and 400 **65.** 342 and 380
66. 224 and 430 **67.** 240 and 285 **68.** 150 and 480

• Practice Plus

In Exercises 69–74, determine all values of d that make each statement true.

69. 9|12,34d **70.** 9|23,42d **71.** 8|76,523,45d
72. 8|88,888,82d **73.** 4|963,23d **74.** 4|752,67d

A **perfect number** *is a natural number that is equal to the sum of its factors, excluding the number itself. In Exercises 75–78, determine whether or not each number is perfect.*

75. 28 **76.** 6 **77.** 20 **78.** 50

A prime number is an **emirp** *("prime" spelled backward) if it becomes a different prime number when its digits are reversed. In Exercises 79–82, determine whether or not each prime number is an emirp.*

79. 41 **80.** 43 **81.** 107 **82.** 113

Begin with the prime factorizations of 80 and 120:

$$80 = 2^4 \times 5$$
$$120 = 2^3 \times 3 \times 5.$$

Now select each prime factor, with the greatest exponent from each factorization.

$$\text{Least common multiple} = 2^4 \times 3 \times 5 = 16 \times 3 \times 5 = 240$$

Therefore, it will take 240 minutes, or 4 hours, for the movies to begin again at the same time. By adding 4 hours to 4:00 P.M., they will start together again at 8:00 P.M.

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