





9. Two towns are 80 km apart. Sylvia wants to drive from one town to the other in exactly one hour. For the first 30 minutes she drives at a rate of 60 km/h. At what constant rate must she drive for the next 30 minutes if she is to accomplish her goal?
10. Before beginning an exam, Gerry calculated that, if she were to spend 10 minutes solving each of the 12 problems, then she would be able to complete the exam in 2 hours. During the exam, Gerry found some problems difficult. They each took her twice as long as she had calculated. She found the remaining problems easy. They took only half as long as she calculated. She completed the 12 problems in exactly 2 hours. How many problems did Gerry find to be difficult?
11. A cask is filled with 45 gallons of wine. Nine gallons are removed, and the cask is refilled with water. Then nine gallons of the mixture are removed and the cask is refilled with water again. What is the ratio of water to wine in the final mixture?

12. Al and Bert must arrive at a town 22.5 km away. They have one bicycle between them and must arrive at the same time. Bert sets out riding at 8km/h, leaves the bicycle and then walks at 5 km/h. Al walks at 4 km/h, reaches the bicycle and rides at 10 km/h. For how many minutes was the bicycle not in motion?
13. A professional lawn mower charges \$40 per hour. It takes Mike, the professional lawn mower, 45 minutes to mow an area of 10 m by 30 m. How much will it cost to hire him to mow a rectangular area of 20 m by 60 m?
14. A rubber ball is known to rebound to  $\frac{1}{2}$  the height that it drops. The ball is dropped from a height of 8 feet. Assuming that it bounces straight up and down, how many feet will it have traveled by the time it hits the ground the 6th time? Give your answer as a common fraction in lowest terms.

15. A circular ceiling fan rotates at a constant speed of 80 revolutions per minute. A point halfway between the center of the fan and the outer edge of the fan travels 97,968 inches in 15 minutes. How far does a point on the outer edge of the fan travel in 30 minutes?
16. Alex and Becky are racing in a peculiar manner. They both begin at the same spot on a 1 km circular track and move in opposite directions. Alex runs at 4 m/s and Becky runs at 5 m/s. How many times would they have passed each other if the race stops after 1 hour?
17. If it takes Jeremy 18 hours to dig a 2 m by 2 m by 2 m hole, how many hours would it take three men (each working at the same rate as Jeremy) to dig a 4 m by 4 m by 4 m hole?

18. A small hose fills a swimming pool in 16 hours. A large hose fills the same pool in 12 hours. With the pool empty, the owner turns on the smaller hose at 8:00 AM. He turns on the larger hose at 10:00 AM. Both hoses are used from 10:00 AM to 3:00 PM. Rounded to the nearest percent, how full is the pool at 3:00 PM?
19. Two bottles of equal volume contain orange juices with different concentrations. The first bottle contains a mixture of orange juice to water with a ratio of 3:2. The second bottle contains a mixture of orange juice to water with a ratio of 3:4. If the two bottles are put together, what is the ratio of orange juice to water?
20. Two triangles share a common side. The sides of one triangle are in the ratio 8 : 9 : 15 and the sides of the other triangle are in the ratio 7 : 10 : 12. Assuming that all of the sides of both triangles are of integral, what is the smallest possible length of the common side?
- (a) 18                      (b) 24                      (c) 30                      (d) 36                      (e) 56

21. A wire is cut into two parts in the ratio 3 : 2. Each part is bent to form a square. What is the ratio of the area of the larger square of the area of the smaller square?

- (A) 3 : 2      (B) 9 : 4      (C) 5 : 3      (D) 5 : 2      (E) 12 : 5

22. In older TVs, the ratio of screen width to screen height is 4:3. In newer flat-screen TVs, the ratio of screen width to screen height is 16:9. Both pictures below show a 32-inch 4:3 screen TV. (Here 32 inches means that the diagonal measure 32 inches) A newer TV show has been shot for 16:9 TVs. When it is viewed on a 4:3 TV, equal grey bands are produced at the top and bottom, so that the rest of the picture is in the correct 16:9 ratio. What is the vertical height in inches of one of these grey bands? Express the answer as a decimal, to the nearest tenth of an inch.

