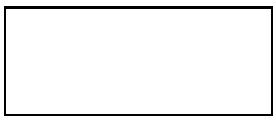
Problem 1. It takes David 6 hours to paint his fence. Since he doesn't have enough time, he asks his friends Alex and Chris to help. If Alex can paint the entire fence in just 3 hours and Chris can paint the entire fence in 4 hours, how many hours will it take all three to paint the fence?

Problem 1. It takes David 6 hours to paint his fence. Since he doesn't have enough time, he asks his friends Alex and Chris to help. If Alex can paint the entire fence in just 3 hours and Chris can paint the entire fence in 4 hours, how many hours will it take all three to paint the fence?

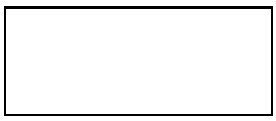
Problem 2. A circle is inscribed in a regular hexagon. If the perimeter of the hexagon is 12, what is the area of the circle?

Problem 2. A circle is inscribed in a regular hexagon. If the perimeter of the hexagon is 12, what is the area of the circle?



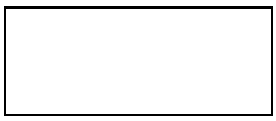
Problem 3. How many points (m, n) with integer coordinates are on the line segment joining $(-2, 3)$ and $(34, 30)$?

Problem 3. How many points (m, n) with integer coordinates are on the line segment joining $(-2, 3)$ and $(34, 30)$?



Problem 4. Four identical tennis balls are packed tightly in a cylindrical can. What fraction of the volume of the can is unoccupied?

Problem 4. Four identical tennis balls are packed tightly in a cylindrical can. What fraction of the volume of the can is unoccupied?



Problem 5. What is the angle, in degrees, formed by the hands of a clock at precisely 1:20? (Choose the angle less than 180°.)

Problem 5. What is the angle, in degrees, formed by the hands of a clock at precisely 1:20? (Choose the angle less than 180°.)

Problem 6. Fill in the missing digits so that N will be divisible by 99:

$$N = 8\_52\_6$$

Problem 6. Fill in the missing digits so that N will be divisible by 99:

$$N = 8\_52\_6$$

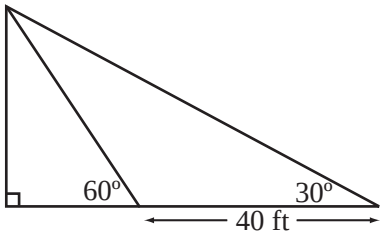
Problem 7. A 25-meter ladder is placed against the wall and the foot of the ladder is 7 meters away from the wall. When the top of the ladder slides 4 meters down the wall, how far does the foot of the ladder slide (in meters)?

Problem 7. A 25-meter ladder is placed against the wall and the foot of the ladder is 7 meters away from the wall. When the top of the ladder slides 4 meters down the wall, how far does the foot of the ladder slide (in meters)?

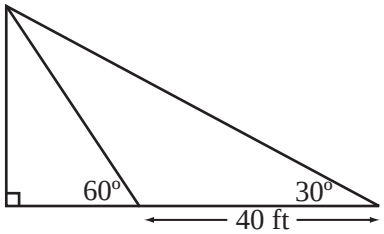
Problem 8. A fair coin is tossed 8 times. What is the probability that it comes up heads at least 4 times?

Problem 8. A fair coin is tossed 8 times. What is the probability that it comes up heads at least 4 times?

Problem 9. An ant on the ground must look up at a 60° angle to see the top of a nearby building. When she walks 40 ft away from the building, she must now look up at a 30° angle to see the top of the building. How high is the building?



Problem 9. An ant on the ground must look up at a 60° angle to see the top of a nearby building. When she walks 40 ft away from the building, she must now look up at a 30° angle to see the top of the building. How high is the building?



Problem 10. If r and s are the solutions of

$$x^2 + ax + b = 0\,,$$

then express $r^3 + s^3$ in terms of a and b.

Problem 10. If r and s are the solutions of

$$x^2 + ax + b = 0\,,$$

then express $r^3 + s^3$ in terms of a and b.