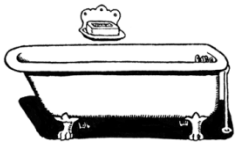
# Challenge 2

1. _____ If the equations y=3x+b and y=ax+3 intersect at (3,-3), what is a + b?

2. _____ A circle of radius 7 is plotted on the coordinate plane with its center at (3,4). What is the shortest distance between the origin and any point on the circumference of this circle?

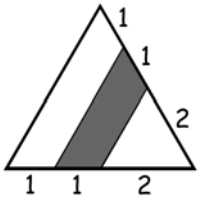
3. _____ Mr. Lewis has ten pencils to lend to the four students who are participating in this year's state Algebra competition. How many different ways can Mr. Lewis distribute the ten identical pencils to the four members of his math team if every student must get at least one pencil?

4. _____ min It takes 4 minutes to fill a bathtub and 6 minutes to drain it. How many minutes will it take to fill the tub with the drain open?



5. _____ In three rolls of a standard six-faced die, what is the probability that the same number will appear on consecutive rolls at least once? Express your answer as a common fraction in simplest form.

6. _____




What fraction of the equilateral triangle is shaded? Express your answer as a common fraction in simplest form.

7. _____ For how many single-digits x does $x^{100}$ leave a remainder of one when divided by 10?

8. _____ mi A pirate treasure map gives the following directions:

*"From whar' ye be, travel 1 mile northwards, 2 miles westwards, 3 miles southwards, 4 miles eastwards, 5 miles northwards, and so forth in a spiraling pattern until you have traveled a total distance of 210 miles. Thar' be the treasure."*

What is the length in miles of the shortest straight-line path to the treasure? Express your answer in simplest radical form.

9. _____ Express $\left(\frac{8}{27}\right)^{\left(-\frac{2}{3}\right)}$ as a common fraction in simplest form.

10. _____ Bridgett writes each of the first n positive integers on a board. After Nathan erases all of the multiples of 2 and all of the multiples of 3, there are 20 numbers left. What is the smallest possible value of n?