Target 1

Evaluating $f(-2)$ gives $(3 \times (-2) - 2)/(-2 - 2) = -8/(-4) = 2$. Evaluating $f(-1)$ gives $(3 \times (-1) - 2)/(-1 - 2) = -5/(-3) = 5/3$. Evaluating $f(0)$ gives $(3 \times 0 - 2)/(0 - 2) = -2/(-2) = 1$. Therefore, $f(-2) + f(-1) + f(0) = 2 + 5/3 + 1 = 6/3 + 5/3 + 3/3 =$ **14/3**.

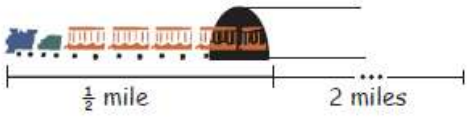
Target 2

A 5% increase means that Toby will be paying 105% of what he paid each month last year. So, the amount that Toby should expect to pay for utilities is $1.05 \times 216 =$ \$**226.80**.

Target 3

If the ratio of Sophie's acres of land to Nate's is 4:3, then we can let $4x$ represent Sophie's land and $3x$ represent Nate's land. Then, $4x + 3x = 280 \rightarrow 7x = 280 \rightarrow x = 40$. Thus, Sophie should receive $4 \times 40 =$ **160** acres. Alternatively, if Sophie and Nate are given land in the ratio 4:3, it follows that Sophie will receive 4/7 of the land. That means Sophie will receive $4/7 \times 280 =$ **160** acres.

Target 4



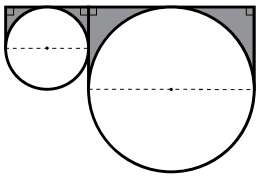
This problem is a little tricky because we have to figure out how far the train has traveled from the time the front of the first train car entered the tunnel to the time the rear of the last train car exited the tunnel. The tunnel is 2 miles long, but the train has actually traveled farther than this. The front of the train entered the tunnel, traveled 2 miles, exited the tunnel, and then traveled another half-mile before the rear of the last train car was completely out of the tunnel. So, we need to find the number of minutes it took for this train to travel 2 + 0.5 = 2.5 miles. We can use the equation *distance = rate × time*, where the distance is 2.5 miles, the rate is the speed of the train 10 mi/h, and the time t hours is how long it took the train to travel 2.5 miles going 10 mi/h. Doing so, we have $2.5 = 10t$, so $t = 2.5 \div 10 = 0.25$ hours. The problem asked for the number of minutes, and 0.25 hours is a quarter of an hour, which is **15** minutes.

Target 5

There are a total of $4 \times 4 = 16$ possible outcomes. The product of Greg's and Heidi's numbers will only be greater than 9 when the two numbers rolled are 3 and 4, 4 and 3, 3 and 3, or 4 and 4. This is 4 possibilities out of the 16 possible outcomes, so the probability that Heidi will win is 4/16 = **1/4**.

Target 6

First, we can create rectangles by drawing the diameter of each circle that intersects its respective tangent lines, as shown. Each rectangle has a length equal to that circle's radius and a width equal to its diameter. The area of the smaller rectangle is $4 \times 2 = 8$ ft^2. The area of the larger rectangle is $8 \times 4 = 32$ ft^2. Their total area is $32 + 8 = 40$ ft^2. These areas include the shaded areas and the unshaded semicircles. So, subtracting the areas of the semicircles will give us the areas of the shaded regions. The area of the smaller semicircle, which has radius 2 ft, is $1/2 \times \pi \times r^2 = 1/2 \times \pi \times 2^2 = 2\pi$ ft^2. The area of the larger semicircle, which has radius 4 ft, is $1/2 \times \pi \times r^2 = 1/2 \times \pi \times 4^2 = 8\pi$ ft^2. So, the total area to be subtracted is $2\pi + 8\pi = 10\pi$. The total area of the shaded regions, then, is $40 - 10\pi \approx$ **8.58** ft^2.



Target 7

First, let's rewrite the equation in terms of y to get $y = 20x^2 + 24$. We know that $20x^2$ will never be negative because x^2 will always be positive, and the product of two positive numbers is also positive. So, the least possible value for y would be when $x = 0$, and $y = 20 \times 0^2 + 24 =$ **24**.

Target 8

If we currently have 80% ammonia, then 4 gallons are ammonia, and 1 gallon is water. In quarts, this is 16 quarts of ammonia and 4 quarts of water. We want to drain out x quarts of the mixture and add in x quarts of water so that the mixture contains 10 quarts of water and 10 quarts of ammonia. So, $16 - 0.8x = 10$ and $4 - 0.2x + x = 10$. Setting these expressions equal to each other and simplifying, we see that $16 - 0.8x = 4 - 0.2x + x \rightarrow 16 - 4 = 0.8x - 0.2x + x \rightarrow 12 = 1.6x \rightarrow x = 7.5$. Therefore, **7.5** quarts must be drained from the mixture.