Sprint 1
If Andy's dog weighs 27 pounds, which is 3/4 as much as Seher's dog, then 27 ÷ 3 = 9 pounds must be 1/4 of Seher's dog. So, Seher's dog weighs 9 × 4 = **36** pounds.

Sprint 2
Since 15 minutes is 15 ÷ 60 = 1/4 hour, Tamisha drives 10 miles every 1/4 hour, or 4 × 10 = 40 miles in 1 hour. This is **40** mi/h.

Sprint 3
The total number of marbles that Jon and Jeremy have combined is 240 ÷ 3 = 80 marbles. If Jon has 50 marbles, then Jeremy must have 80 − 50 = **30** marbles.

Sprint 4
Using the formula for the area of a triangle 1/2 × base × height, we see that this triangle with base length 8 cm and height 12 cm has area 1/2 × 8 × 12 = 4 × 12 = **48** cm^2.

Sprint 5
The difference between 3 °F and −3 °F is 3 − (−3) = **6** °F.

Sprint 6
The giraffe's tongue is 19 ÷ 3.9 ≈ **5** times as long as a human's tongue.

Sprint 7
The original mixture requires twice as much water as tetraborate. If the new mixture uses 1/2 cup of tetraborate, we'll need 1/2 × 2 = **1** cup of water.

Sprint 8
Rearranging the equation, we have $1/n = 1/3 - 1/6 - 1/7$. Using the common denominator of 42 on the right side of the equation and simplifying, we get $1/n = (14 - 7 - 6)/42$, and $1/n = 1/42$. For this to be true, it must be that n = **42**.

Sprint 9
A square with an area of 9 m^2 has side length $\sqrt{9}$ = 3 meters. Since equilateral triangle ABC also has side length 3 meters, it follows that pentagon ABCDE has perimeter 5 × 3 = **15** meters.

Sprint 10
Company A sells packs of 12 pencils, so to get 60 pencils, 60 ÷ 12 = 5 packs are needed. At $1.50 per pack, the total cost is 5 × 1.50 = $7.50. Company B sells packs of 15 pencils, so to get 60 pencils, 60 ÷ 15 = 4 packs are needed. At $2.00 per pack, the total cost is 4 × 2 = $8.00. That's a difference in cost of 8.00 − 7.50 = $**0.50** or $**.50**.

Sprint 11
We are looking for an even integer greater than 10,000 and we want to minimize its value, so we'll let the units digit be 0. We are told that three of the digits must be distinct odd digits. Since the value needs to be minimized we will use 1, 3 and 5 as the distinct odd digits. The least possible value of the ten-thousands digit is 1. So, we have a number of the form 1 _ _ _ 0. There are no restrictions on repeated digits so let's make the remaining digits 0, 3 and 5. To arrange these digits to obtain the smallest even integer greater than 10,000, we get **10,350**.

Sprint 12
After spending 1/4 of the money in his account, Sean had 3/4 of the starting balance left, or 3/4 × 72 = 3 × 18 = $54. Then, after depositing $54.33 into his account, Sean has 54 + 54.33 = $**108.33**.

Sprint 13
Since the consecutive primes we consider must begin with 2, let's just add consecutive primes until we reach the first multiple of 7.

2 primes: 2 + 3 = 5, not a multiple of 7
3 primes: 2 + 3 + 5 = 10, not a multiple of 7
4 primes: 2 + 3 + 5 + 7 = 17, not a multiple of 7
5 primes: 2 + 3 + 5 + 7 + 11 = 28, a multiple of 7

Therefore, for the fewest consecutive primes beginnning with 2 that sum to a multiple of 7 is **5** primes.

Sprint 14
The sum of the angle measures of a triangle is 180, so the measure of the unknown angle in the given triangle is 180 − (33 + 49) = 180 − 82 = 98 degrees. Angle A is the supplement of the angle of measure 98 degrees, so the measure of angle A is 180 − 98 = **82** degrees. NOTE: The measure of the supplement of an angle of a triangle is always equal to the sum of the other two angles.

Sprint 15
Squaring the binomial of the expression $(1.6 + 5)^2 - 1.6^2 - 5^2$ gives us $1.6^2 + 1.6 \times 5 + 1.6 \times 5 + 5^2 - 1.6^2 - 5^2$. Some terms are opposites, so we can further simplify: $\boxed{1.6^2} + 1.6 \times 5 + 1.6 \times 5 \boxed{+ 5^2} \boxed{- 1.6^2} \boxed{- 5^2} = 2 \times 1.6 \times 5 = 1.6 \times 10 =$ **16**.

Sprint 16
This distance between 5/8 and 7/4 on a number line is 7/4 − 5/8 = (14 − 5)/8 = 9/8. Two-thirds of this distance is 9/8 × 2/3 = 3/4. Therefore, the number that is 2/3 of the way from 5/8 to 7/4 on a number line is 5/8 + 3/4 = (5 + 6)/8 = **11/8**.

Sprint 17
Let the n represent the number in question, and we can write $n^3 = 3n^2$. Dividing both sides by n^2, we see that $n =$ **3**.

Sprint 18
At a ratio of 4 parts red to 5 parts white, the amount of red in the pink paint is 4/5 the amount of white. To make this pink paint, the amount of red that should be mixed with 1 gallon of white is 1 × 4/5 = **4/5** gallon.

Sprint 19
This increase from 24,500 people to 26,950 people is an increase of (26,950 − 24,500)/24,500 = 2450/24,500 = 1/10 = **10**%.

Sprint 20
The mean of the weekly attendance amounts is (32 + 27 + 28 + 23)/4 = 110/4 = 27.5. The median of the weekly attendance amounts 23, 27, 28, 32 is the mean of 27 and 28, or (27 + 28)/2 = 55/2 = 27.5. The sum of the mean and median of the weekly attendance amounts is 27.5 + 27.5 = **55** students.

Sprint 21
To solve $99^2 + 101^2$, we could square both values and add, but another approach is to rewrite the expression as $(100 - 1)^2 + (100 + 1)^2$. It may be faster to evaluate this expression, which involves squares and multiples of 100 and 1 rather than squares of 99 and 101. Simplifying, we get $100^2 - 200 + 1 + 100^2 + 200 + 1 = 2 \times 100^2 + 2 = 2 \times 10{,}000 + 2 = 20{,}000 + 2 =$ **20,002**.

Sprint 22
We need to find the area of the pizza that Griffin bakes with a diameter of 10 in, or radius 5 in. Using the formula for the area of a circle πr^2, we see that the pizza has a total area of $\pi \times 5^2 = 25\pi$ in^2. At $0.20 per square inch, the cost of this pizza is $25 \times 3.14 \times 0.20 = 3.14 \times 5 =$ $15.70, which is approximately $**16** or $**16.00**. (Because we were not allowed to use a calculculator for this, we approximated π to be 3.14.)

Sprint 23
We are asked to find the arithmetic mean of $1^2 = 1$, $2^2 = 4$, $3^2 = 9$, $4^2 = 16$, $5^2 = 25$, $6^2 = 36$, $7^2 = 49$, $8^2 = 64$, $9^2 = 81$, $10^2 = 100$. We have $(1 + 4 + 9 + 16 + 25 + 36 + 49 + 64 + 81 + 100)/10 = 385/10 =$ **38.5**.

Sprint 24
The perimeter of the room is $2(24\tfrac{6}{12} + 20\tfrac{5}{12}) = 2 \times 44\tfrac{11}{12} = 88\tfrac{11}{6} = 89\tfrac{5}{6}$ ft. Not including the door and window, the walls have a total area of $89\tfrac{5}{6} \times 8 = 712\tfrac{20}{3} = 718\tfrac{2}{3}$ ft^2. Taking out the area of the window and door, the combined area of walls that need to be painted is $718\tfrac{2}{3} - 50 = 668\tfrac{2}{3}$ ft^2. If a can paint covers 400 ft^2, a single can is not enough to cover the walls, but 2 cans of paint cover $400 \times 2 = 800$ ft^2, which is more area than the $668\tfrac{2}{3}$ ft^2 that need to be painted. So, **2** whole cans need to be purchased.

Sprint 25
Let q and d represent the numbers of quarters and dimes, respectively. Based on the informtaion given, we can write the equations $0.25q + 0.10d = 18.90$ and $2q = d$. Substituting $2q$ for d in the first equation gives us $0.25q + 0.10(2q) = 18.90$. Simplifying and solving for q, we get $0.25q + 0.20q = 18.90 \rightarrow 0.45q = 18.90 \rightarrow q = 18.90/0.45 = 42$. So, Sam starts with 42 quarters. We know that Sam spends 5 quarters and $2 \times 5 = 10$ dimes at the convenience store. Sam also spends 55 cents at the donut shop and pays the exact amount, so he must have spent 1 quarter and 3 dimes. In all, Sam spent $5 + 1 = 6$ quarters. Therefore, the number of quarters Sam has left is $42 - 6 =$ **36** quarters.

Sprint 26
The width of the wall is 8 feet 7 inches, or $8 \times 12 + 7 = 96 + 7 = 103$ inches. The frame is 10 inches wide, so its horizontal center, which is $10/2 = 5$ inches from its left edge, must be on the vertical line at the horizontal center of the wall, which is $103/2 = 51\tfrac{1}{2}$ inches from the left edge of the wall. So, the distance from the left edge of the wall to the left edge of the frame is $51\tfrac{1}{2} - 5 = 46\tfrac{1}{2}$ inches, or 3 feet $10\tfrac{1}{2}$ inches. Therefore, $x = 3$ and $y =$ **$10\tfrac{1}{2}$**.

Sprint 27
Using the properties of the angles created by parallel lines cut by a transversal, we see that the angle labeled 4 and the angle labeled 6 are alternate interior angles, and alternate interior angles are equal. So, if the angle labeled 4 measures 104, it follows that the angle labeled 6 also measures 104 degrees. Next, we notice that the angle labeled 6 and the angle labeled 7 are supplementary angles. Therefore, the measure of the angle labeled 7 is $180 - 104 =$ **76** degrees.

Sprint 28

According to the figure, the length of the moth is 1.6 cm. We know that 2 meters = 2 × 100 = 200 cm. So, to determine the number of moths that have a combined length of 2 meters when placed end to end, we divide and see that the total is 200 ÷ 1.6 = **125** moths.

Sprint 29

Each 7-day week (Monday through Sunday), Eli adds 1 + 2 + 3 + 4 + 5 + 6 + 7 = $28. In 3 weeks, Eli would have saved 3 × 28 = $84. To get a total of $93, Eli must have saved another 93 − 84 = $9. So, we need to find a subset of consecutive daily amounts that have a sum of 9. We see that 2 + 3 + 4 = 9. One way to think about it is that Eli started by inserting $2. In this case, he would have 3 full weeks of saving (Tuesday through Monday) followed by 3 days of saving (Tuesday, Wednesday, Thursday). So, the first day Eli inserted money into his piggy bank was a **Tuesday**.

Sprint 30

Cogwheel A has 10 teeth, the smallest cogwheel has 5 teeth and cogwheel B has 6 teeth. We are told that cogwheel A makes one complete revolution every 2 seconds. With 1/2 the number of teeth of cogwheel A, the smallest cogwheel must revolve 2 times as fast, meaning it makes 2 complete revolutions every 2 seconds, or 1 revolution per second. With 6/5 to number of teeth of the smallest cogwheel, cogwheel B must revolve 5/6 as fast, meaning it makes 5/6 revolution every second, or 5/6 × 60 = 5 × 10 = **50** revolutions every minute.

Target 1

We can set up the proportion 0.624782 lugs/1 pique = 200 lugs/x piques. Cross-multiplying and solving for x gives us 0.624785x = 200, so x = 200/0.624785 ≈ **320** piques.

Target 2

It is important to first recognize that the numbers do not increase from left to right in each row. In fact, the numbers "snake" increasing left to right in odd rows and increasing right to left in even rows. Now notice that in the odd rows, the entries of column C are 3 times the row number. In other words, C-1 is 3 × 1 = 3 and C-3 is 3 × 3 = 9. So, C-22 will be one more than C-21, which is 3 × 21 = 63. Since odd rows increase from left to right and then continue snaking so that even rows increase from right to left, we must have the following:

A	B	C	
61	62	63	Row 21
66	65	**64**	Row 22

So, the entry in column C of row 22 is **64**.

Alternatively, notice that in the odd rows, the entries of column C are 3 times the row number. Now notice that in even rows the entries of column C are one more than the entry in the row above it. In other words, C-2 is 4, which is one more than C-1, and C-4 is 10, which is 1 more than C-3. In other words, C-1 is 3 × 1 = 3 and C-3 is 3 × 3 = 9. So, C-22 will be one more than C-21, which is 3 × 21 = 63. Therefore, C-22, the entry in column C of row 22 must be 63 + 1 = **64**.

Target 3

Jamie puts jam on 1/3 × 120 = 40 slices. She puts butter on 15 slices. She puts avocado on 0.50 × 120 = 60 slices. That means the number of slices with no spread is 120 − (40 + 15 + 60) = 120 − 115 = **5** slices.

Target 4

We know that AB = 2808. Since X is the midpoint of segment AB, then XB = 2808 ÷ 2 = 1404. Since R is 3/4 of the distance from X to B, it follows that XR = 3/4 × 1404 = 1053. Finally, since S is 5/9 of the distance from X to R, then RS must be the remaining 4/9 of the distance from X to R, or 4/9 × 1053 = **468** units.

Target 5

The area of an equilateral triangle of side length s is $s^2\sqrt{3}/4$. So, the total area of six equilateral triangles of side length 6 cm is $6 \times 6^2\sqrt{3}/4 = 54\sqrt{3}$ cm^2. The rectangle with length 6 + 6 + 6 = 18 cm and width 6 cm has area 18 × 6 = 108 cm^2. The total area, then, is $54\sqrt{3} + 108 \approx$ **201.53** cm^2.

Target 6

We know that Noah's last move must be flipping all 6 coins that are heads up to tails up so that he ends up with all 10 coins that are tails up. Noah starts with all 10 coins that are heads up [HEADS = 10, TAILS = 0]. In his first move, Noah must flip 6 coins from heads up to tails up [HEADS = 10 − 6 = 4, TAILS = 0 + 6 = 6]. There is no way for his second move to be flipping 6 coins that are heads up to tails up so that he ends up with all 10 coins that are tails up, but let's see if his second move can result in 6 coins that are heads up and 4 coins that are tails up. Let h represent the number of coins Noah flips from heads up to tails up and let t represent the number of coins he flips tails up to heads up. For the 4 coins that are heads up, Noah needs $4 - h + t = 6$, which simplifies to $-h + t = 2$. We also know that $h + t = 6$. Adding the equations $-h + t = 2$ and $h + t = 6$, we get $2t = 8$, so $t = 8/2 = 4$, which also means that $h + 4 = 6$, and $h = 6 - 4 = 2$. So, in his second move, Noah needs to flip 2 coins from heads up to tails up and 4 coins from tails up to heads up [HEADS = 4 − 2 + 4 = 6, TAILS = 6 − 4 + 2 = 4]. Now, in his third move, Noah can flip the 6 coins that are heads up to tails up so that all 10 coins are tails up [HEADS = 6 − 6 = 0, TAILS = 4 + 6 = 10]. Therefore, Noah must make at least **3** moves.

Target 7

We know that $60 = 2^2 \times 3 \times 5$, and any multiple of 60 must have at least those factors. We also know that $35n = 5 \times 7 \times n$. The factors that are missing, which would make $35n$ a multiple of 60, are $2^2 \times 3$. Therefore, the least possible value of n is $2^2 \times 3 =$ **12**.

Target 8

Let's label the tiles, from smallest to largest, #1 through #8. We are told that the arc etched onto each tile is a quarter circle. That means the length of the arc on each tile is 1/4 the circumference of a circle whose radius r is the side length of the tile, or $1/4 \times 2\pi r = 1/2 \times \pi r$. The two smallest tiles, #1 and #2, each have side length 10 cm and arc length 1/2 × π × 10 = 5π cm. So, the combined length of the arcs on tile #1 and tile #2, then, is 5π + 5π = <u>10π</u> cm. Tile #3 has a side that coincides with the sides of adjacent tiles #1 and #2, giving tile #3 a side length of 10 + 10 = 20 cm. So, the length of the arc on tile #3 is 1/2 × π × 20 = <u>10π</u> cm. Tile #4 has a side that coincides with the sides of adjacent tiles #1 and #3, giving tile #4 a side length of 10 + 20 = 30 cm. So, the length of the arc on tile #4 is 1/2 × π × 30 = <u>15π</u> cm. Tile #5 has a side that coincides with the sides of adjacent tiles #1, #2 and #4, giving tile #5 a side length of 10 + 10 + 30 = 50 cm. So, the length of the arc on tile #5 is 1/2 × π × 50 = <u>25π</u> cm. Tile #6 has a side that coincides with the sides of adjacent tiles #2, #3 and #5, giving tile #6 a side length of 10 + 20 + 50 = 80 cm. So, the length of the arc on tile #6 is 1/2 × π × 80 = <u>40π</u> cm. Tile #7 has a side that coincides with the sides of adjacent tiles #3, #4 and #6, giving tile #7 a side length of 20 + 30 + 80 = 130 cm. So, the length of the arc on tile #7 is 1/2 × π × 130 = <u>65π</u> cm. Lastly, tile #8 has a side that coincides with the sides of adjacent tiles #4, #5 and #7, giving tile #8 a side length of 30 + 50 + 130 = 210 cm. So, the length of the arc on tile #8 is 1/2 × π × 210 = <u>105π</u> cm. The length of the spiral is the combined length of the arcs on the eight tiles, which is 10π + 15π + 25π + 40π + 65π + 105π = **270π** cm.