# **Homework 11 – Algebra Part II**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Kara made this sequence of shapes with blocks:



If she continues this pattern, at what stage will she use 28 blocks in a shape?

1. A boy lives on the same road as his school and the road is straight. He bikes to school. When he reaches halfway he notices he has dropped his math book. He bikes back 400 yards to pick it up. He is now 1300 yards from school. How far is his house from school?
2. I’m a mystery number. If you multiply me by 3 and then add 4 the result is the same number as when you multiply me by 4 and then add 3. What number is the result and what number am I?
3. Rory knows he is 8 inches shorter than his sister. He’s figured out that his height in inches is 7/8 her height in inches. How tall is he in inches?
4. Sosna is moving. She can carry 16 books at once in her arms to the car. She can also carry 26 DVDs in one load. She doesn’t mix books and DVDs to keep things organized. Sosna made 7 trips to the car with arms fully loaded and carried a total of 142 objects. How many DVDs did she carry to the car?
5. Joe and Sue are planting trees in the park for Arbor Day. On the first day they planted 38 trees. Joe did not work the next day, but Sue planted the same number of trees that she had planted the first day. Together Sue and Joe planted 60 trees over the two days. What was the number of trees Joe planted?
6. If r – s = 1 and 2r + 3s = 32, what is the value of the expression r + 4s?
7. Sherry has five times as many computer games as Jay. Nairan has three times as many computer games as Jay. Sherry has 16 computer games more than Nairan has. How many computer games does Jay have?
8. Admission to the local movie theater is $3 for each child and $7 for each adult. A group of 12 people pays $64 admission. How many children are in this group?
9. Every weekend, Mary dedicates all her spare time to her favorite singer, Justin Bieber. This past Saturday, she spent 84 minutes listening to her favorite Justin Bieber song 20 times in a row and pasting 24 Justin Bieber photos in her scrapbook. On Sunday, she took 62 minutes to listen to the same song 10 times in a row and paste 32 photos in her scrapbook. Assuming Mary spends the same amount of time pasting each photo in her scrapbook, and that she doesn’t paste and listen to the song at the same time, how long does it take Mary to listen to her favorite song?

**Solutions to Homework 11 – Algebra Part II**

*Note: There are many acceptable strategies to solving each problem. This sheet shows just one strategy.*

1. Let S = the stage number

Let B = the number of blocks in a particular stage.

Looking at the pattern, we notice there are always 4 blocks along the bottom. Plus, there are a certain number of blocks stacked tall on the left and right sides, and that number of blocks is always the same as the Stage number. So …

 B = 4 + S + S

We want 28 blocks, so 28 = 4 + S + S

Simplifying, 28 = 4 + 2S

Subtracting 4 from each side, 28 – 4 = 4 + 2S – 4

Simplifying, 24 = 2S

Dividing both sides by 2, 24 ÷ 2 = 2S ÷ 2

Simplifying, 12 = S

**Answer: Stage 12**

1. Let D = the distance from the house to the school, in yards.

 (D ÷ 2) + 400 = 1300

Subtracting 400 from both sides, (D ÷ 2) + 400 – 400 = 1300 – 400

Simplifying, (D ÷ 2) = 900

Multiplying both sides by 2, D ÷ 2 × 2 = 900 × 2

Simplifying, D = 1800

**Answer: 1800 yards**

1. Let M = the mystery number

 3M + 4 = 4M + 3

Subtracting 3 from both sides, 3M + 4 – 3 = 4M + 3 – 3

Simplifying, 3M + 1 = 4M

Subtracting 3M from both sides, 3M + 1 – 3M = 4M – 3M

Simplifying, 1 = M

**Answer: 1**

1. Let R = Rory’s height in inches.

Let S = his sister’s height in inches.

Rory is 8 inches shorter than his sister. So, R = S – 8

His height is 7/8 of her height. So, R = $\frac{7}{8}$ × S

Substituting the value for R from the first equation into the second equation, you get:

 S – 8 = $\frac{7}{8}$ × S

Adding 8 to both sides of the equation, S – 8 + 8 = $\frac{7}{8}$ S + 8

Simplifying, S = $\frac{7}{8}$ S + 8

Subtracting $\frac{7}{8}$ S from both sides of the equation, S - $\frac{7}{8}$ S = $\frac{7}{8}$ S + 8 - $\frac{7}{8}$ S

Simplifying, $\frac{1}{8}$ S = 8

Multiplying both sides of the equation by 8, $\frac{1}{8}$ S × 8 = 8 × 8

Simplifying, S = 64

So, given the original formula for R, if S = 64, then R = 56.

**Answer: 56 inches.**

1. Let B = the number of trips to carry books

Let D = the number of trips to carry DVDs

She made 7 trips total, B + D = 7

There are 142 objects total, 16B + 26D = 142

Subtracting D from both sides of first equation, B + D – D = 7 - D

Simplifying, B = 7 – D

Substituting this value for B into the 2nd equation, 16(7-D) + 26D = 142

Simplifying, 112 – 16D + 26D = 142

Simplifying further, 112 + 10D = 142

Subtracting 112 from both sides, 112 + 10D – 112 = 142 – 112

Simplifying, 10D = 30

Dividing both sides by 10, 10D ÷ 10 = 30 ÷ 10

Simplifying, D = 3

So she made 3 trips with DVDs, and took 26 DVDs each trip. Therefore she took 3 × 26 DVDs total, or 78 DVDs.

**Answer: 78 DVDs**

1. Let S = the number of trees Sue planted on each day

Let J = the number of trees Joe planted on the first day

On the first day, they planted 38 trees, S + J = 38

Together Sue and Joe planted 60 trees over two days, S + J + S = 60

Subtracting J from both sides in the first equation, S + J – J = 38 – J

Simplifying, S = 38 – J

Substituting this value for S into the 2nd equation, 38 – J + J + 38 – J = 60

Simplifying, 76 – J = 60

Adding J to both sides, 76 – J + J = 60 + J

Simplifying, 76 = 60 + J

Subtracting 60 from both sides, 76 – 60 = 60 + J – 60

Simplifying, 16 = J

**Answer: 16 trees**

1. Transposing, we know that r = s + 1. Substituting s+1 for r in the second equation, we get 2(s+1) + 3s = 32 or 5s + 2 = 32. Solving for s, 5s = 30, s = 6. Knowing s = 6, r = 7, so r + 4s = 7 + 24 = 31.

**Answer: 31**

1. Let x = the number of computer games Jay has. Then Nairan has 3x computer games and Sherry has 5x computer games. We can also say that Sherry has 3x + 16 computer games. So 5x = 3x + 16, 2x = 16, and x = 8.

**Answer: 8 computer games**

1. Let x = the number of children and y = the number of adults. x + y = 12, and 3x + 7y = 64. Multiplying the first equation by -3, we get -3x - 3y = -36. Adding that to the second equation, we get 0x + 4y = 28, therefore y = 7. Since y = 7, x = 5.

**Answer: 5 children**

1. Let the length of the song = x and the amount of time to paste a photo = y. On Saturday, 20x + 24y = 84, and on Sunday, 10x + 32y = 62. Multiplying the first equation by -1/2, we get -10x - 12y = -42. Adding the two equations together, we get 20y = 20, therefore y = 1. Since y = 1, 20x + 24 = 84, solving for x, 20x = 60, and x = 3.

**Answer: 3 minutes**