Casting Out Nines (1)

Facts and Reminders

$$86 \longleftarrow \textbf{quotient}$$

$$\textbf{divisor} \longrightarrow 9\overline{)774} \longleftarrow \textbf{dividend}$$

Some quotients (answers in division) have no remainders. You can tell before you do the problem if a division problem will have a remainder.

> **Rule:** If the divisor is 9 and all of the digits in the dividend add up to 9 or a multiple of 9, there will be no remainder in the quotient.

Examples

1. $9\overline{)63}$ 6 plus 3 equals 9.
The quotient is 7 with no remainder.

2. $9\overline{)4,536}$ Together the digits in the dividend add up to 18 (4 + 5 + 3 + 6), a multiple of 9.
The quotient is 504 with no remainder.

3. $9\overline{)27,918}$ Together the digits in the dividend add up to 27, a multiple of 9.
The quotient is 3,102 with no remainder.

4. $9\overline{)15,318}$ Together the digits add up to 18, a multiple of 9.
The quotient is 1,702 with no remainder.

5. $9\overline{)3,617}$ Together the digits add up to 17, which is not a multiple of 9.

The quotient is 401 with a remainder of 8.

6. $9\overline{)3,67\_}$ What digit will go in the empty space to make this dividend divisible by 9?
The answer is 2 because this will make the digit total in the dividend equal 18 which is a multiple of 9.

        $9\overline{)3,672}$ The quotient is 408.

Casting Out Nines

Divisibility by 9

If the divisor is 9 and all of the digits in the dividend add up to 9 or a multiple of 9, there will be no remainder in the quotient.

$$9\overline{)4{,}536}$$

The sum of the digits in the dividend, 4 + 5 + 3 + 6, equals 18 and is a multiple of 9.
The quotient is 504 with no remainder.

Directions: Complete these problems. Determine if there is a remainder. Compute the remainder if there is one.

1. $9\overline{)279}$ R__

2. $9\overline{)6{,}399}$ R__

3. $9\overline{)4{,}581}$ R__

4. $9\overline{)9{,}045}$ R__

5. $9\overline{)3{,}618}$ R__

6. $9\overline{)81{,}189}$ R__

7. $9\overline{)7{,}217}$ R__

8. $9\overline{)8{,}019}$ R__

9. $9\overline{)5{,}455}$ R__

10. $9\overline{)4{,}419}$ R__

11. $9\overline{)6{,}374}$ R__

12. $9\overline{)4{,}566}$ R__

13. $9\overline{)9{,}279}$ R__

14. $9\overline{)2{,}759}$ R__

15. $9\overline{)1{,}881}$ R__

16. $9\overline{)9{,}144}$ R__

17. $9\overline{)3{,}429}$ R__

18. $9\overline{)13{,}329}$ R__

Word Problems

Directions: Use the system for casting out nines to help you compute these answers.

1. You and your friends found a chest filled with 1,233 pennies. You are going to split the pennies evenly among the 9 of you. How many pennies will each of you receive? _____ Will any pennies be left over? _____

2. Your mother wants you and your friends to paint a fence at your house which has 342 square feet. If the 9 of you divide the job evenly, how many square feet will each of you have to paint? _____

3. Your teacher gives 9 boys a huge bag containing 22,143 jellybeans. They decide to divide them evenly before they eat them. You get any leftover jellybeans. How many jellybeans does each boy receive? _____ How many leftover jellybeans do you receive? _____

4. A family of 9 children has decided to evenly divide the job of painting the outside of their house which covers 33,354 square feet of surface area. How many square feet must each child paint? _____

5. Nine girls in your class are going to evenly divide a huge bag containing 34,372 kernels of unpopped popcorn. You get the remainder. How many kernels does each girl have? _____ How many kernels do you get? _____

6. You deal a deck of 52 cards to yourself and 8 friends for a game of War. Any leftover cards will be placed in the center for the first match. How many cards are placed in the center? _____ How many cards does each player get? _____

7. You win a huge bag of 76,329 marbles in a contest sponsored by Marbles R Us. You split them evenly among 8 of your friends and yourself. How many marbles does each person receive? _____

8. You have a gigantic roll of kite string which is 221,814 centimeters long. If you divide the string among 9 of your best friends, how many centimeters will each friend receive? _____

9. How many dollars would each person receive if $111,111,111 were divided evenly among 9 friends? _____

Page 8
1. 31 R0
2. 711 R0
3. 509 R0
4. 1,005 R0
5. 402 R0
6. 9,021 R0
7. 801 R8
8. 891 R0
9. 606 R1
10. 491 R0
11. 708 R2
12. 507 R3
13. 1,031 R0
14. 306 R5
15. 209 R0
16. 1,016 R0
17. 381 R0
18. 1,481 R0

Page 9
1. 137 pennies, 0 left over
2. 38 sq. ft.
3. 2,460 jelly beans, 3 left over
4. 3,706 sq. ft.
5. 3,819 kernels, 1 kernel
6. 7 cards, 5 cards
7. 8,481 marbles
8. 24,646 cm
9. $12,345,679

Page 10
1. 384
2. 1,208
3. 9,871
4. 120
5. 8,639
6. 48,101
7. 74,037
8. 50,602
9. 309,107
10. 84,038
11. 1,020,905
12. 727,503
13. 510
14. Answers will vary.

15. Answers will vary.
16. 3,109
17. Answers will vary.
18. Answers will vary.
19. 109,033
20. Answers will vary.
21. Answers will vary.

Page 12
1. 32
2. 56
3. 74
4. 987
5. 742
6. 915
7. 8,745
8. 4,578
9. 8,123
10. 34
11. 81
12. 96
13. 548
14. 761
15. 453
16. 8
17. 9
18. 12
19. 28
20. 95
21. 78
22. 100,000
23. 10,000
24. 1,000
25. 100
26. 10

Page 13
1. 161
2. 443
3. 484
4. 600
5. 4,442
6. 5,318
7. 17
8. 112
9. 193
10. 200
11. 425
12. 1,314
13. 1,971
14. 2,152
15. 4,080
16. 5
17. 31
18. 38
19. 40
20. 198
21. 421
22. 2,775
23. 1,110
24. 222

Page 14
1. 104
2. 1,077
3. 1,104
4. 2,071
5. 404
6. 407
7. 3,071
8. 1,404
9. 2,107
10. 2,704
11. 30,414
12. 3,707
13. 681
14. 779
15. 410
16. 2,451
17. 912
18. 640
19. 3,116
20. 5,156

Page 16
1. 0.345
2. 0.2111
3. 0.4563
4. 0.08
5. 0.6512
6. 0.098
7. 0.111
8. 0.7612
9. 0.005
10. 0.3018
11. 0.454
12. 0.2107
13. 0.078
14. 0.1386
15. 0.2
16. 0.28292
17. 21.532
    3.9854
    1.6453
    0.6521
    0.0076
18. 54.942
    1.23
    0.96435
    0.02
    0.0023
19. 32.1
    4.8632
    4.86314
    0.7812
    0.77982
20. 0.0932
    0.02632
    0.021001
    0.013751
    0.006321
21. 11211.3
    1121.13
    112.113
    1.12113
22. 89.654
    3.87439
    1.2397
    0.063418

Page 17
1. 40.43
2. 555.01
3. 6.534
4. 87.771
5. 24.0629
6. 14.553
7. 6.8603
8. 22.1224
9. 10.88
10. 0.83681
11. 13.60288
12. 0.4871
13. 0.81 cm
14. 9.055 cm
15. 8.156 cm
16. 11.918 cm
17. 7.5 cm
18. 1.4 cm

Page 18
1. 0.042
2. 0.335
3. 0.84
4. 0.1384
5. 0.02478
6. 3.132
7. 6.42
8. 38.6343
9. 240.24
10. 0.00138
11. 8,026
12. 0.000916
13. 20,702.3
14. 0.84 cm
15. 0.825 cm
16. 1.284 cm
17. 1.305 cm
18. 0.492 cm

Page 20
1. 32,000,000,000,000
2. 44,000,000,000,000,000,000
3. 45,000,000
4. 123,000,000,000,000,000