

# Divisibility

A number is divisible by another number if it is a true multiple of the other number (or if the division problem does **not** have a remainder.

24 is divisible by 3 because  $24 \div 3 = 8$  with no remainder.

25 is not divisible by 3 because it would have a remainder of 1!

This first section of this booklet will help you to learn the divisibility rules that you will need and use every day. The numbers are all less than 169 because using the Fraction Actions method, **you will never end up** with numbers greater than 169 that are not already finished numbers. The last section of the book will help you with a few rules that you will need to know for NC EOG testing purposes.

## Divisibility Rules

### Divisibility Rule for 2

When the last digit in a number is 0, 2, 4, 6, or 8, the number is divisible by 2

### Divisibility Rule for 5

When the last digit in a number is 0 or 5, the number is divisible by 5

### Divisibility Rule for 3

When the sum of the digits is a multiple of 3, the number is divisible by 3

### Divisibility Rule for 7

Double the last digit in a number and subtract it from the rest of the number.

If the result is a known multiple of 7, then the number is divisible by 7.

If the result is not known, repeat the rule with the new number!

### Divisibility Rule for 11

When the sum of the odd digits is equal to (or 11 more than) the sum of the even digits, the number is divisible by 11

### Divisibility Rule for 13

Nine times the last digit in a number and subtract it from the rest of the number.

If the result is a known multiple of 13, then the number is divisible by 13.

If the result is not known, repeat the rule with the new number!

### Divisibility Rule for 4

When the last 2 digits in a number are a multiple of 4, the number is divisible by 4

### Divisibility Rule for 6

When a number is divisible by 2 and 3, the number is divisible by 6

### Divisibility Rule for 9

When the sum of the digits is a multiple of 9, the number is divisible by 9

### Divisibility Rule for 10

When the last digit in a number is 0, the number is divisible by 10

## Divisibility (2 and 5)

### Lesson Box

The divisibility rule for 2 and 5 ask you to look at the last digit of the number.

If the last digit is 0, 2, 4, 6, or 8 the number is divisible by 2.

If the last digit is 0 or 5, the number is divisible by 5.

### Models

$$\underline{2, 5} \quad 8\underline{0}$$

80 ends with 0. According to the rules, numbers that end with 0 are divisible by 2 and 5.

$$\underline{2} \quad 15\underline{8}$$

158 ends with 8. 8 is part of the 2 rule.

$$\underline{\emptyset} \quad 15\underline{1}$$

151 ends with 1. 1 is not part of either rule, so 151 is not divisible by 2 or 5.

$$\underline{5} \quad 21\underline{5}$$

215 ends with 5. Twenty-five is divisible by 5!

Apply the divisibility rules for 2 and 5. If the number is divisible by 2 or 5, write which ever answer is true. You do not need to write both answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 160	_____ 145	_____ 107	_____ 37	_____ 41
_____ 80	_____ 136	_____ 115	_____ 20	_____ 156
_____ 158	_____ 133	_____ 120	_____ 137	_____ 59
_____ 151	_____ 124	_____ 35	_____ 105	_____ 34
_____ 76	_____ 78	_____ 141	_____ 24	_____ 112
_____ 25	_____ 106	_____ 159	_____ 23	_____ 162
_____ 108	_____ 36	_____ 44	_____ 68	_____ 61
_____ 66	_____ 103	_____ 111	_____ 167	_____ 100
_____ 87	_____ 73	_____ 157	_____ 67	_____ 96
_____ 72	_____ 130	_____ 46	_____ 54	_____ 30
_____ 29	_____ 154	_____ 74	_____ 89	_____ 99

[use **Key 1** to check your answers]

## Divisibility (3)

### Lesson Box

The divisibility rule for 3 asks you to find the sum of the digits.

If the sum of the digits is a multiple of 3, then the number is divisible by 3.

257

$$2 + 5 + 7 = 14.$$

14 is **not** a multiple of 3.

257 is **not** divisible by 3.

342

$$3 + 4 + 2 = 9.$$

9 is a multiple of 3.

342 is **divisible** by 3.

To **cast out 3's** don't add any 3, 6 or 9's.

$$342 \dots 4 + 2 = 6$$

$$268 \dots 2 + 8 = 10$$

$$692 \dots 2 = 2$$

### Models

$$\underline{3} \quad 138$$

$$1 + 8 = 9 \text{ (or } 1 + 3 + 8 = 12)$$

$$\underline{\emptyset} \quad 58$$

$$5 + 8 = 13$$

$$\underline{3} \quad 126$$

$$1 + 2 = 3 \text{ (or } 1 + 2 + 6 = 9)$$

$$\underline{\emptyset} \quad 101$$

$$1 + 1 = 2$$

Apply the divisibility rule for 3. If the number is divisible by 3, write 3. If the number is not divisible by 3, enter  $\emptyset$ .

_____ 47	_____ 164	_____ 54	_____ 156	_____ 108
_____ 70	_____ 68	_____ 137	_____ 55	_____ 117
_____ 122	_____ 77	_____ 92	_____ 107	_____ 106
_____ 140	_____ 61	_____ 83	_____ 87	_____ 31
_____ 169	_____ 148	_____ 141	_____ 78	_____ 41
_____ 51	_____ 145	_____ 56	_____ 96	_____ 74
_____ 111	_____ 46	_____ 90	_____ 155	_____ 19
_____ 60	_____ 64	_____ 44	_____ 72	_____ 124
_____ 86	_____ 81	_____ 75	_____ 167	_____ 36
_____ 100	_____ 131	_____ 159	_____ 134	_____ 95
_____ 38	_____ 119	_____ 166	_____ 69	_____ 59
_____ 14	_____ 26	_____ 50	_____ 40	_____ 29

[use **Key 2** to check your answers]

## Divisibility Drills 2, 3 and 5

Apply the divisibility rules for **2, 3 and 5**. If the number is divisible by 2, 3 or 5, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 103	_____ 75	_____ 65	_____ 30	_____ 139
_____ 24	_____ 112	_____ 28	_____ 105	_____ 123
_____ 53	_____ 143	_____ 64	_____ 26	_____ 136
_____ 49	_____ 90	_____ 164	_____ 140	_____ 96
_____ 50	_____ 152	_____ 111	_____ 104	_____ 125
_____ 31	_____ 81	_____ 145	_____ 71	_____ 113
_____ 169	_____ 107	_____ 95	_____ 131	_____ 129
_____ 19	_____ 165	_____ 149	_____ 29	_____ 124
_____ 36	_____ 127	_____ 137	_____ 84	_____ 109
_____ 141	_____ 32	_____ 63	_____ 100	_____ 14

[use **Key 3** to check your answers]

Apply the divisibility rules for **2, 3 and 5**. If the number is divisible by 2, 3 or 5, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 55	_____ 48	_____ 98	_____ 40	_____ 83
_____ 119	_____ 155	_____ 130	_____ 151	_____ 157
_____ 51	_____ 106	_____ 116	_____ 135	_____ 27
_____ 17	_____ 70	_____ 25	_____ 117	_____ 42
_____ 120	_____ 156	_____ 160	_____ 62	_____ 34
_____ 101	_____ 41	_____ 133	_____ 121	_____ 72
_____ 153	_____ 146	_____ 159	_____ 148	_____ 45
_____ 44	_____ 134	_____ 167	_____ 122	_____ 79
_____ 162	_____ 161	_____ 67	_____ 168	_____ 126
_____ 154	_____ 12	_____ 110	_____ 85	_____ 23

[use **Key 4** to check your answers]

# Divisibility (7)

## Lesson Box

- Double the last digit in a number and subtract it from the rest of the number.
- If the result is a known multiple of 7, then the number is divisible by 7.
- If the result is not known, repeat the rule with the new number!

257

$$7 * 2 = 14.$$

$$25 - 14 = 11.$$

257 is **not** divisible by 7.

343

$$3 * 2 = 6.$$

$$34 - 6 = 28.$$

343 is **divisible** by 7.

49

$$9 * 2 = 18.$$

$$18 - 4 = 14.$$

49 is **divisible** by 7. (notice you can subtract the first digits from the doubled last if you need to!)

## Models

$$\underline{\quad \emptyset \quad} 138$$

$$8 * 2 = 16 ; 16 - 13 = 3 ; 138 \text{ is } \mathbf{not} \text{ divisible by } 7$$

$$\underline{\quad 7 \quad} 168$$

$$8 * 2 = 16 ; 16 - 16 = 0 ; 168 \text{ is divisible by } 7$$

$$\underline{\quad 7 \quad} 133$$

$$3 * 2 = 6 ; 13 - 6 = 7 ; 133 \text{ is divisible by } 7$$

$$\underline{\quad \emptyset \quad} 101$$

$$1 * 2 = 2 ; 10 - 2 = 8 ; 101 \text{ is } \mathbf{not} \text{ divisible by } 7$$

Apply the divisibility rule for 7. If the number is divisible by 7, write 7. If the number is not divisible by 7, enter  $\emptyset$ .

_____ 46	_____ 117	_____ 139	_____ 66	_____ 70
_____ 55	_____ 161	_____ 140	_____ 31	_____ 69
_____ 111	_____ 153	_____ 35	_____ 63	_____ 119
_____ 49	_____ 132	_____ 105	_____ 13	_____ 78
_____ 141	_____ 28	_____ 93	_____ 110	_____ 130
_____ 156	_____ 88	_____ 121	_____ 143	_____ 95
_____ 15	_____ 155	_____ 54	_____ 21	_____ 136
_____ 60	_____ 166	_____ 72	_____ 23	_____ 123
_____ 133	_____ 59	_____ 167	_____ 17	_____ 107
_____ 92	_____ 160	_____ 45	_____ 168	_____ 145
_____ 30	_____ 102	_____ 43	_____ 68	_____ 41
_____ 152	_____ 142	_____ 83	_____ 149	_____ 124

[use **Key 5** to check your answers]

## Divisibility Drills 2, 3, 5, and 7

Apply the divisibility rules for **2, 3, 5 and 7**. If the number is divisible by 2, 3, 5 or 7, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 163	_____ 95	_____ 128	_____ 81	_____ 18
_____ 142	_____ 29	_____ 38	_____ 149	_____ 40
_____ 28	_____ 69	_____ 101	_____ 156	_____ 117
_____ 80	_____ 31	_____ 162	_____ 90	_____ 16
_____ 129	_____ 160	_____ 34	_____ 77	_____ 67
_____ 136	_____ 97	_____ 58	_____ 167	_____ 105
_____ 124	_____ 32	_____ 139	_____ 126	_____ 144
_____ 141	_____ 146	_____ 88	_____ 140	_____ 111
_____ 92	_____ 169	_____ 78	_____ 19	_____ 15
_____ 65	_____ 107	_____ 96	_____ 123	_____ 89

[use **Key 6** to check your answers]

Apply the divisibility rules for **2, 3, 5 and 7**. If the number is divisible by 2, 3, 5 or 7, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 147	_____ 35	_____ 164	_____ 47	_____ 82
_____ 158	_____ 132	_____ 93	_____ 118	_____ 110
_____ 33	_____ 76	_____ 113	_____ 49	_____ 133
_____ 68	_____ 52	_____ 43	_____ 22	_____ 57
_____ 75	_____ 21	_____ 119	_____ 154	_____ 70
_____ 64	_____ 166	_____ 168	_____ 42	_____ 27
_____ 72	_____ 130	_____ 51	_____ 103	_____ 79
_____ 85	_____ 24	_____ 45	_____ 39	_____ 100
_____ 104	_____ 62	_____ 120	_____ 56	_____ 63
_____ 61	_____ 134	_____ 137	_____ 159	_____ 145

[use **Key 7** to check your answers]

# Divisibility (11)

## Lesson Box

When the sum of the odd digits is equal to (or 11 more than) the sum of the even digits, the number is divisible by 11.

257  
 $7 + 2 \neq 5$ .  
 257 is **not** divisible by 11.

2574  
 $2 + 7 = 5 + 4$ .  
 257 is **divisible** by 11.

346  
 $3 + 6 \neq 4$ .  
 346 is **not** by 11.

209  
 $2 + 9 = 0$  (+ 11 more)  
 209 is **divisible** by 11.

## Models

$$\underline{\quad 11 \quad} \underline{264}$$

$$2 + 4 = 6$$

$$\underline{\quad \emptyset \quad} \underline{235}$$

$$2 + 5 \neq 3$$

$$\underline{\quad 11 \quad} \underline{220}$$

$$2 + 0 = 2$$

$$\underline{\quad \emptyset \quad} \underline{212}$$

$$2 + 2 \neq 1$$

$$\underline{\quad 11 \quad} \underline{968}$$

$$9 + 8 = 6$$
 (+ 11 more)

Apply the divisibility rule for 11. If the number is divisible by 11, write 11. If the number is not divisible by 11, enter  $\emptyset$ .

_____ 151	_____ 110	_____ 153	_____ 132	_____ 119
_____ 129	_____ 154	_____ 99	_____ 141	_____ 147
_____ 166	_____ 165	_____ 113	_____ 135	_____ 112
_____ 143	_____ 162	_____ 109	_____ 120	_____ 156
_____ 117	_____ 155	_____ 159	_____ 104	_____ 146
_____ 107	_____ 158	_____ 106	_____ 163	_____ 126
_____ 149	_____ 139	_____ 123	_____ 150	_____ 103
_____ 160	_____ 124	_____ 142	_____ 128	_____ 131
_____ 118	_____ 114	_____ 102	_____ 133	_____ 164
_____ 167	_____ 148	_____ 157	_____ 130	_____ 121
_____ 125	_____ 134	_____ 101	_____ 100	_____ 168

[use **Key 8** to check your answers]

## Divisibility Drills 2, 3, 5, 7, and 11

Apply the divisibility rules for **2, 3, 5, 7, and 11**. If the number is divisible by 2, 3, 5, 7, and 11, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 27	_____ 159	_____ 43	_____ 126	_____ 143
_____ 90	_____ 53	_____ 84	_____ 110	_____ 51
_____ 57	_____ 40	_____ 45	_____ 46	_____ 92
_____ 47	_____ 100	_____ 21	_____ 96	_____ 131
_____ 42	_____ 129	_____ 142	_____ 140	_____ 26
_____ 125	_____ 75	_____ 101	_____ 78	_____ 83
_____ 73	_____ 156	_____ 56	_____ 97	_____ 34
_____ 161	_____ 145	_____ 86	_____ 150	_____ 49
_____ 31	_____ 128	_____ 98	_____ 106	_____ 16
_____ 15	_____ 99	_____ 164	_____ 79	_____ 112

[use **Key 9** to check your answers]

Apply the divisibility rules for **2, 3, 5, 7, and 11**. If the number is divisible by 2, 3, 5, 7, and 11, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 28	_____ 146	_____ 111	_____ 12	_____ 103
_____ 148	_____ 74	_____ 141	_____ 13	_____ 50
_____ 154	_____ 20	_____ 58	_____ 63	_____ 167
_____ 162	_____ 94	_____ 127	_____ 29	_____ 144
_____ 155	_____ 70	_____ 82	_____ 71	_____ 19
_____ 160	_____ 118	_____ 30	_____ 152	_____ 69
_____ 32	_____ 107	_____ 139	_____ 135	_____ 85
_____ 59	_____ 113	_____ 48	_____ 41	_____ 72
_____ 121	_____ 149	_____ 157	_____ 33	_____ 80
_____ 60	_____ 52	_____ 64	_____ 24	_____ 67

[use **Key 10** to check your answers]



## Divisibility Drills – Proof of Mastery – No Errors Allowed!

Apply the divisibility rules for **2, 3, 5, 7, and 11**. If the number is divisible by 2, 3, 5, 7, and 11, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 129	_____ 36	_____ 105	_____ 99	_____ 112
_____ 72	_____ 47	_____ 34	_____ 87	_____ 46
_____ 120	_____ 157	_____ 146	_____ 17	_____ 135
_____ 26	_____ 92	_____ 149	_____ 31	_____ 83
_____ 23	_____ 168	_____ 73	_____ 16	_____ 123
_____ 33	_____ 56	_____ 59	_____ 169	_____ 49
_____ 141	_____ 150	_____ 158	_____ 122	_____ 138
_____ 96	_____ 152	_____ 153	_____ 42	_____ 35
_____ 103	_____ 156	_____ 25	_____ 82	_____ 79
_____ 154	_____ 107	_____ 54	_____ 130	_____ 65

[use **Key 11** to check your answers]

Apply the divisibility rules for **2, 3, 5, 7, and 11**. If the number is divisible by 2, 3, 5, 7, and 11, write which ever answer is true. You do not need to write all of the answers. (example: 110 is divisible by both 2 and 5, you may answer 2) If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 139	_____ 164	_____ 12	_____ 32	_____ 144
_____ 85	_____ 80	_____ 45	_____ 163	_____ 81
_____ 50	_____ 159	_____ 110	_____ 161	_____ 102
_____ 95	_____ 69	_____ 62	_____ 75	_____ 53
_____ 101	_____ 70	_____ 148	_____ 67	_____ 115
_____ 84	_____ 29	_____ 37	_____ 44	_____ 30
_____ 21	_____ 116	_____ 60	_____ 143	_____ 142
_____ 113	_____ 43	_____ 28	_____ 145	_____ 27
_____ 108	_____ 63	_____ 137	_____ 78	_____ 40
_____ 134	_____ 98	_____ 74	_____ 89	_____ 88

[use **Key 12** to check your answers]

## Congratulations!

If you made 0 errors, you have mastered the rules you will use to find prime and composite numbers and never be puzzled when doing prime factoring problems. If you need more practice, you can visit the divisibility rules page @ Math6.org and keep your skills sharp. Practice the rules that give you the butterflies, not the ones you are good at! You may also print the problems only version of this workbook so that you can drill yourself to greater mastery.

To tell whether a number that is less than 169 is **prime** or **composite**, simply check it for divisibility by 2, 3, 5, 7, and 11. As soon as it passes one of those rules, the number is composite. If it fails **all** of the rules, the number is prime! You could add the 13 rule so that you could go past 169, but you will need that rule so rarely that most teachers don't ask you to go there. If you want help with the 13 rule, Math6.org offers help.

Using these rules to know the divisor for a factor tree will help you to quickly and efficiently find the prime factors of any number. Prime Factoring easy numbers is the foundation of the Fraction Actions method as taught @ Math6.org. By using the Fraction Actions method, all fraction problems become very similar and you will find that fraction problems become easy. To learn more about prime factoring or the **Fraction Actions** method, visit the Fraction Actions page @ Math6.org.

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Since most fractions methods require you to know all of the factors of a number, there are a few more rules to master. Most **tests** will want to know all of the rules. We still need to work on and master the following rules to declare ourselves a Divisibility Rules Master.

### Divisibility Rules

#### Divisibility Rule for 4

When the last 2 digits in a number are a multiple of 4, the number is divisible by 4

#### Divisibility Rule for 6

When a number is divisible by 2 and 3, the number is divisible by 6

#### Divisibility Rule for 9

When the sum of the digits is a multiple of 9, the number is divisible by 9

#### Divisibility Rule for 10

When the last digit in a number is 0, the number is divisible by 10

The following sets of drills will ask you to list **all** of the numbers that the given number is divisible by. You will need to master this skill for testing purposes and to make fractions easier if you choose to learn a method for fraction computations other than the **Fraction Actions** method.

## Divisibility (4)

### Lesson Box

When the last 2 digits in a number are a multiple of 4, the number is divisible by 4. (if the 10's digit is even, the final digit will be 4 or 8. If the 10's digit is odd, the final digit will be 0, 2 or 6.

338 and 2738

38 is not a multiple of 4.

338 and 2738 are **not** divisible by 4.

272 and 3172

72 is a multiple of 4.

272 and 3172 **are divisible** by 4.

285 and 47285

85 is not a multiple of 4.

285 and 47285 are **not** divisible by 4.

312 and 916312

12 is a multiple of 4.

312 and 916312 **are divisible** by 4.

### Models

4    276

76 is a multiple of 4.

4    248

48 is a multiple of 4.

Ø    170

70 is **not** a multiple of 4.

Ø    455

55 is **not** a multiple of 4.

4    392

92 is a multiple of 4.

Apply the divisibility rule for 4. If the number is divisible by 4, write 4. If the number is not divisible by 4, enter Ø.

_____ 32	_____ 127	_____ 90	_____ 134	_____ 143
_____ 62	_____ 56	_____ 54	_____ 166	_____ 114
_____ 118	_____ 34	_____ 100	_____ 98	_____ 144
_____ 66	_____ 48	_____ 28	_____ 149	_____ 40
_____ 128	_____ 124	_____ 131	_____ 52	_____ 60
_____ 88	_____ 94	_____ 38	_____ 44	_____ 168
_____ 132	_____ 136	_____ 165	_____ 108	_____ 104
_____ 112	_____ 130	_____ 78	_____ 115	_____ 92
_____ 122	_____ 106	_____ 80	_____ 160	_____ 158
_____ 86	_____ 123	_____ 36	_____ 142	_____ 58
_____ 148	_____ 74	_____ 146	_____ 167	_____ 162
_____ 135	_____ 138	_____ 30	_____ 76	_____ 26

[use **Key 13** to check your answers]

## Divisibility Drills 2, 3, 4, 5, 7, and 11

Tell whether each number is divisible by **2, 3, 4, 5, 7, and 11**. If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 56	_____ 92	_____ 150
_____ 28	_____ 87	_____ 65
_____ 49	_____ 25	_____ 147
_____ 38	_____ 31	_____ 36
_____ 163	_____ 57	_____ 18
_____ 82	_____ 122	_____ 128
_____ 45	_____ 145	_____ 62
_____ 71	_____ 135	_____ 35
_____ 168	_____ 160	_____ 126
_____ 16	_____ 23	_____ 79
_____ 111	_____ 12	_____ 14
_____ 88	_____ 32	_____ 151

[use **Key 14** to check your answers]

Tell whether each number is divisible by **2, 3, 4, 5, 7, and 11**. If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 72	_____ 78	_____ 63
_____ 85	_____ 149	_____ 99
_____ 100	_____ 69	_____ 70
_____ 166	_____ 53	_____ 138
_____ 134	_____ 96	_____ 105
_____ 156	_____ 52	_____ 86
_____ 61	_____ 64	_____ 121
_____ 47	_____ 131	_____ 80
_____ 157	_____ 127	_____ 169
_____ 117	_____ 29	_____ 165
_____ 13	_____ 120	_____ 144
_____ 59	_____ 123	_____ 162

[use **Key 15** to check your answers]

## Divisibility (6)

### Lesson Box

If a number is divisibly by **both** 2 and 3, the number is also divisible by 6!

312

312 is divisible by 2.

$$1 + 2 = 3$$

312 is divisible by 6.

320

320 is divisible by 2.

2 is **not** a multiple of 3

320 is **not** divisible by 6.

297

297 is **not** divisible by 2.

297 is **not** divisible by 6.

228

228 is divisible by 2.

$$2 + 8 + 2 = 12$$

228 is divisible by 6.

### Models

6 144

4 works for 2.  $1 + 4 + 4 = 9$

Ø 328

4 works for 2.  $2 + 8 = 10$

Ø 260

0 works for 2.  $2 + 6 = 8$

Ø 275

5 does **not** work for 2.

6 336

6 works for 2. I tossed out all of the numbers!

Apply the divisibility rule for 6. If the number is divisible by 6, write 6. If the number is not divisible by 6, enter Ø.

_____ 66	_____ 154	_____ 105	_____ 96	_____ 135
_____ 158	_____ 58	_____ 56	_____ 22	_____ 102
_____ 86	_____ 32	_____ 150	_____ 117	_____ 126
_____ 49	_____ 60	_____ 64	_____ 144	_____ 20
_____ 90	_____ 85	_____ 145	_____ 118	_____ 148
_____ 155	_____ 40	_____ 87	_____ 130	_____ 78
_____ 92	_____ 106	_____ 24	_____ 128	_____ 162
_____ 38	_____ 44	_____ 62	_____ 26	_____ 69
_____ 12	_____ 114	_____ 100	_____ 88	_____ 54
_____ 115	_____ 104	_____ 142	_____ 138	_____ 140
_____ 18	_____ 27	_____ 111	_____ 15	_____ 46
_____ 134	_____ 89	_____ 136	_____ 30	_____ 120

[use **Key 16** to check your answers]

## Divisibility Drills 2, 3, 4, 5, 6, 7, and 11

Tell whether each number is divisible by **2, 3, 4, 5, 6, 7, and 11**. If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 153	_____ 149	_____ 92
_____ 31	_____ 55	_____ 28
_____ 64	_____ 147	_____ 106
_____ 24	_____ 129	_____ 32
_____ 83	_____ 75	_____ 81
_____ 36	_____ 35	_____ 102
_____ 12	_____ 60	_____ 101
_____ 19	_____ 72	_____ 168
_____ 21	_____ 51	_____ 115
_____ 139	_____ 16	_____ 112
_____ 107	_____ 57	_____ 122
_____ 47	_____ 30	_____ 56

[use **Key 17** to check your answers]

Tell whether each number is divisible by **2, 3, 4, 5, 6, 7, and 11**. If the number is not divisible by these rules, enter  $\emptyset$ .

_____ 71	_____ 114	_____ 66
_____ 134	_____ 159	_____ 63
_____ 23	_____ 152	_____ 111
_____ 90	_____ 131	_____ 165
_____ 155	_____ 109	_____ 22
_____ 138	_____ 87	_____ 95
_____ 49	_____ 135	_____ 13
_____ 86	_____ 119	_____ 27
_____ 69	_____ 97	_____ 125
_____ 150	_____ 74	_____ 85
_____ 158	_____ 15	_____ 117
_____ 116	_____ 126	_____ 166

[use **Key 18** to check your answers]

## Divisibility (9)

### Lesson Box

The divisibility rule for 9 asks you to find the sum of the digits. If the sum of the digits is a multiple of 9, then the number is divisible by 9.

297

$$2 + 9 + 7 = 18.$$

18 is a multiple of 9.

297 **is divisible** by 9.

342

$$3 + 4 + 2 = 9.$$

9 is a multiple of 9.

342 **is divisible** by 9.

To **cast out 9**'s don't add any 9's.

$$954 \dots 5 + 4 = 9$$

$$298 \dots 2 + 8 = 10$$

$$692 \dots 2 + 6 = 8$$

### Models

$$\underline{\quad \emptyset \quad} \quad 581$$

$$5 + 8 + 1 = 14$$

$$\underline{\quad 9 \quad} \quad 657$$

$$6 + 5 + 7 = 18$$

$$\underline{\quad \emptyset \quad} \quad 921$$

$$2 + 1 = 3 \text{ (or } 9 + 2 + 1 = 12)$$

$$\underline{\quad 9 \quad} \quad 369$$

$$3 + 6 = 9 \text{ (or } 3 + 6 + 9 = 18)$$

$$\underline{\quad 9 \quad} \quad 783$$

$$7 + 8 + 3 = 18$$

Apply the divisibility rule for 9. If the number is divisible by 9, write 9. If the number is not divisible by 9, enter  $\emptyset$ .

_____ 129	_____ 110	_____ 166	_____ 104	_____ 572
_____ 117	_____ 288	_____ 324	_____ 127	_____ 664
_____ 254	_____ 290	_____ 210	_____ 228	_____ 448
_____ 206	_____ 256	_____ 298	_____ 153	_____ 208
_____ 143	_____ 226	_____ 270	_____ 322	_____ 456
_____ 144	_____ 162	_____ 125	_____ 268	_____ 306
_____ 208	_____ 252	_____ 234	_____ 142	_____ 644
_____ 111	_____ 113	_____ 126	_____ 108	_____ 536
_____ 157	_____ 216	_____ 286	_____ 161	_____ 284
_____ 222	_____ 105	_____ 332	_____ 167	_____ 216
_____ 103	_____ 116	_____ 135	_____ 134	_____ 334
_____ 114	_____ 260	_____ 224	_____ 468	_____ 592

[use **Key 19** to check your answers]

## Divisibility Drills 2, 3, 4, 5, 6, 7, 9, 10 and 11 (all rules)

Tell whether each number is divisible by **2, 3, 4, 5, 6, 7, 9, 10 and 11**. If not enter  $\emptyset$ .

_____ 134	_____ 111	_____ 79
_____ 154	_____ 68	_____ 109
_____ 108	_____ 133	_____ 105
_____ 49	_____ 63	_____ 48
_____ 82	_____ 17	_____ 120
_____ 31	_____ 90	_____ 76
_____ 45	_____ 64	_____ 119
_____ 15	_____ 88	_____ 59
_____ 62	_____ 158	_____ 13
_____ 131	_____ 104	_____ 20
_____ 42	_____ 47	_____ 95
_____ 84	_____ 148	_____ 92

[use **Key 20** to check your answers]

Tell whether each number is divisible by **2, 3, 4, 5, 6, 7, 9, 10 and 11**. If not enter  $\emptyset$ .

_____ 37	_____ 166	_____ 101
_____ 145	_____ 124	_____ 167
_____ 152	_____ 116	_____ 89
_____ 22	_____ 149	_____ 71
_____ 132	_____ 107	_____ 159
_____ 24	_____ 141	_____ 163
_____ 23	_____ 87	_____ 53
_____ 99	_____ 150	_____ 29
_____ 126	_____ 85	_____ 106
_____ 16	_____ 32	_____ 103
_____ 61	_____ 83	_____ 143
_____ 144	_____ 50	_____ 78

[use **Key 21** to check your answers]



Key 1  
Any **one** answer from the list is correct!

2,5	5	Ø	Ø	Ø
2,5	2	5	2	2
2	Ø	2,5	Ø	Ø
Ø	2	5	5	2
2	2	Ø	2	2
5	2	Ø	Ø	2
2	2	2	2	Ø
2	Ø	Ø	Ø	2,5
Ø	Ø	Ø	Ø	2
2	2,5	2	2	2,5
Ø	2	2	Ø	Ø

Key 2

Ø	Ø	3	3	3
Ø	Ø	Ø	Ø	3
Ø	Ø	Ø	Ø	Ø
Ø	Ø	Ø	3	Ø
Ø	Ø	3	3	Ø
3	Ø	Ø	3	Ø
3	Ø	3	Ø	Ø
3	Ø	Ø	3	Ø
Ø	3	3	Ø	3
Ø	Ø	3	Ø	Ø
Ø	Ø	Ø	3	Ø
Ø	Ø	Ø	Ø	Ø

Key 3  
Any **one** answer from the list is correct!

∅	3, 5	5	2, 3	∅
2, 3		2	3	3
∅	∅	2	2	2
∅	2, 3, 5	2	2	2, 3
2, 5	2	3	2	5
∅	3	5	∅	∅
∅	∅	5	∅	3
∅	3, 5	∅	∅	2
2, 3, 5	∅	∅	2, 3	∅
3	2	3	2, 5	2

Key 4  
Any **one** answer from the list is correct!

5	2, 3	2	2, 5	∅
∅	5	2, 5	∅	∅
3	2	2	3, 5	3
∅	2, 5	5	3	2, 3
2, 3, 5	2, 3	2, 5	2	2
∅	∅	∅	∅	2, 3
3	2	3	2	3, 5
2	2	∅	2	∅
2, 3	∅	∅	2, 3	2, 3
2	2, 3	2, 5	5	∅

Key 5

∅	∅	∅	∅	7
∅	7	7	∅	∅
∅	∅	7	7	7
7	∅	7	∅	∅
∅	7	∅	∅	∅
∅	∅	∅	∅	∅
∅	∅	∅	7	∅
∅	∅	∅	∅	∅
7	∅	∅	∅	∅
∅	∅	∅	7	∅
∅	∅	∅	∅	∅
∅	∅	∅	∅	∅

Key 8

∅	11	∅	11	∅
∅	11	11	∅	∅
∅	11	∅	∅	∅
11	∅	∅	∅	∅
∅	∅	∅	∅	∅
∅	∅	∅	∅	∅
∅	∅	∅	∅	∅
∅	∅	∅	∅	∅
∅	∅	∅	∅	∅
∅	∅	∅	∅	11
∅	∅	∅	∅	∅

Key 6  
Any **one** answer from the list is correct!

∅	5	2	3	2, 3
2	∅	2	∅	2, 5
2,7	3	∅	2, 3	3
2, 5	∅	2, 3	2, 3, 5	2
3	2, 5	2	7	∅
2	∅	2	∅	3, 5, 7
2	2	∅	2, 3, 7	2, 3
3	2	2	2, 5, 7	3
2	∅	2, 3	∅	3, 5
5	∅	2, 3	3	∅

Key 7  
Any **one** answer from the list is correct!

3, 7	5, 7	2	∅	2
2	2, 3	3	2	2, 5
3	2	∅	7	7
2	2	∅	2	3
3, 5	3, 7	7	2, 7	2, 5, 7
2	2	2, 3, 7	2, 3, 7	3
2, 3	2, 5	3	∅	∅
5	2, 3	3, 5	3	2, 5
2	2	2, 3, 5	2, 7	3, 7
∅	2	∅	3	5

Key 9  
Any **one** answer from the list is correct!

3	3	∅	2, 3, 7	11
2, 3, 5	∅	2, 3, 7	2, 5, 11	3
3	2, 5	3, 5	2	2
∅	2, 5	3, 7	2, 3	∅
2, 3, 7	3	2	2, 5, 7	2
5	3, 5	∅	2, 3	∅
∅	2, 3	2, 7	∅	2
7	5	2	2, 3, 5	7
∅	2	2, 7	2	2
3, 5	3, 11	2	∅	2, 7

Key 10  
Any **one** answer from the list is correct!

2, 7	2	3	2, 3	∅
2	2	3	∅	2, 5
2, 7	2, 5	2	3, 7	∅
2, 3	2	∅	∅	2, 3
5	2, 5, 7	2	∅	∅
2, 5	2	2, 3, 5	2	3
2	∅	∅	3, 5	5
∅	∅	2, 3	∅	2, 3
11	∅	∅	3, 11	2, 5
2, 3, 5	2	2	2, 3	∅

Key 11  
Any **one** answer from the list is correct!

3	2, 3	3, 5, 7	3, 11	2, 7
2, 3	∅	2	3	2
2, 3, 5	∅	2	∅	3, 5
2	2,	∅	∅	∅
∅	2, 3, 7	∅	2,	3
3, 11	2, 7	∅	∅	7
3	2, 3, 5	2	2	2, 3
2, 3	2	3	2, 3, 7	5, 7
∅	2, 3	5	2	∅
2, 7, 11	∅	2, 3	2, 5	5

Key 12  
Any **one** answer from the list is correct!

∅	2	2, 3	2	2, 3
5	2, 5	3, 5	∅	3
2, 5	3	2, 5, 11	7	2, 3
5	3	2	3, 5	∅
∅	2, 5, 7	2	∅	5
2, 3, 7	∅	∅	2, 11	2, 3, 5
3, 7	2	2, 3, 5	11	2
∅	∅	2, 7	5	3,
2, 3	3, 7	∅	2, 3	2, 5
2	2, 7	2	∅	2, 11

Key 13

4	∅	∅	∅	∅
∅	4	∅	∅	∅
∅	∅	4	∅	4
∅	4	4	∅	4
4	4	∅	4	4
4	∅	∅	4	4
4	4	∅	4	4
4	∅	∅	∅	4
∅	∅	4	4	∅
∅	∅	4	∅	∅
4	∅	∅	∅	∅
∅	∅	∅	4	∅

Key 16

6	∅	∅	6	∅
∅	∅	∅	∅	6
∅	∅	6	∅	6
∅	6	∅	6	∅
6	∅	∅	∅	∅
∅	∅	∅	∅	6
∅	∅	6	∅	6
∅	∅	∅	∅	∅
6	6	∅	∅	6
∅	∅	∅	6	∅
6	∅	∅	∅	∅
∅	∅	∅	6	6

Key 14 - **All** answers are required for your answer to be correct!

2, 4, 7	2, 4	2, 3, 5
2, 4, 7	3	5
7	5	3, 7
2	∅	2, 3, 4
∅	3	2, 3
2	2	2, 4
3, 5	5	2
∅	3, 5	5, 7
2, 3, 4, 7	2, 4, 5	2, 3, 7
2, 4	∅	∅
3	2, 3, 4	2, 7
2, 4, 11	2, 4	∅

Key 15- **All** answers are required for your answer to be correct!

2, 3, 4	2, 3	3, 7
5	∅	3, 11
2, 4, 5	3	2, 5, 7
2	∅	2, 3
2	2, 3, 4	3, 5, 7
2, 3, 4	2, 4	2
∅	2, 4	11
∅	∅	2, 4, 5
∅	∅	13
3	∅	3, 5, 11
∅	2, 3, 4, 5	2, 3, 4
∅	3	2, 3



Key 17 - **All** answers are required for your answer to be correct!

3	∅	2, 4
∅	5, 11	2, 4, 7
2, 4	3, 7	2
2, 3, 4, 6	3	2, 4
∅	3, 5	3,
2, 3, 4, 6	5, 7	2, 3, 6
2, 3, 4, 6	2, 3, 4, 5, 6	∅
∅	2, 3, 4, 6	2, 3, 4, 6, 7
3, 7	3	5
∅	2, 4	2, 4, 7
∅	3	2
∅	2, 3, 5, 6	2, 4, 7

Key 18 - **All** answers are required for your answer to be correct!

∅	2, 3, 6	2, 3, 6, 11
2	3	3, 7
∅	2, 4	3
2, 3, 5, 6	∅	3, 5, 11
5	∅	2, 11
2, 3, 6	3	5
7	3, 5	∅
2	7	3
3	∅	5
2, 3, 5, 6	2	5
2	3, 5	3
2, 4	2, 3, 6, 7	2

**Key 19**

Ø	Ø	Ø	Ø	Ø
9	9	9	Ø	Ø
Ø	Ø	Ø	Ø	Ø
Ø	Ø	Ø	9	Ø
Ø	Ø	9	Ø	Ø
9	9	Ø	Ø	9
Ø	9	9	Ø	Ø
Ø	Ø	9	9	Ø
Ø	9	Ø	Ø	Ø
Ø	Ø	Ø	Ø	9
Ø	Ø	9	Ø	Ø
Ø	Ø	Ø	9	Ø

Key 20 - **All** answers are required for your answer to be correct!

2	3	∅
2, 7, 11	2, 4	∅
2, 3, 4, 6, 9	7	3, 5, 7
7	3, 7, 9	2, 3, 4, 6
2	∅	2, 3, 4, 5, 6, 10
∅	2, 3, 5, 6, 9, 10	2, 4
3, 5, 9	2, 4	7
3, 5	2, 4, 11	∅
2	2	∅
∅	2, 4	2, 4, 5, 10
2, 3, 6, 7	∅	5
2, 3, 4, 6, 7	2, 4	2, 4

Key 21 - **All** answers are required for your answer to be correct!

∅	2	∅
5	2, 4	∅
2, 4	2, 4	∅
2, 11	∅	∅
2, 3, 4, 6, 11	∅	3
2, 3, 4, 6	3	∅
∅	3	∅
3, 9, 11	2, 3, 5, 6, 10	∅
2, 3, 6, 7, 9	5	2
2, 4	2, 4	∅
∅	∅	11
2, 3, 4, 6, 9	2, 5, 10	2, 3, 6