# Number Sense Stretch

1. _____ A four-digit number is divisible by 5 but not by 10. The tens digit is greater than 4 and is a power of 3. The hundreds digit is greater than 4 and is a power of 2. The thousands digit is less than 4 and is a power of 2 and of 3. What is the number?

2. _____ There are more than 12 but fewer than 32 students in Al Gorithm's class. When grouped by twos, there was one student left. When grouped by threes, there were two students left. When grouped by fours, there were three students left. How many students are in the class?

3. _____ As $x$ increases from 0 to 1, how many of the following also increase?

$$x,\ x^2,\ \frac{1}{x},\ 1-x^2,\ 1-x,\ x-1,\ \frac{1}{x^2}$$

4. _____ A two-digit number and the number formed by reversing its digits are added. What is the largest integer that will always divide the sum?

5. _____ The greatest common factor of two numbers is 14, and the least common multiple is 168. If the two numbers are not 14 and 168, what is their sum?

6. _____ How many two-digit positive integers are divisible by 5 but not by 3?

7. _____ What is the least positive integer $m$ such that $126 \cdot m$ is a perfect square?

8. _____ What digit should replace the tens digit $d$ so that the seven-digit number 5,376,5$d$4 is divisible by 24?

9. _____ What is the arithmetic mean of the set of all two-digit multiples of 3? Express your answer as a decimal to the nearest tenth.

10. _____ One hundred people, each with either blond or red hair, are arbitrarily seated in four rooms. What is the greatest number of people with the same color hair that we can be sure to find in one of these rooms?

# Number Sense Stretch

**Answers**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | 1895 | (T, G) | 5. | 98 | (F, G) | 8. | 0 | (G, P) |
| 2. | 23 | (M, T, E) | 6. | 12 | (T, E, P) | 9. | 55.5 | (C, F) |
| 3. | 3 | (C, S, E) | 7. | 14 | (C, T, G) | 10. | 13 | (M) |
| 4. | 11 | (M, T, G, P) | | | | | | |

# Factoring Stretch

1. _____ What is the sum of all of the distinct, positive prime factors of 1260?

2. _____ What is the product of all of the values of $n$ that make 546,324,16$n$ divisible by 6?

3. _____ Billy tosses one fair 6-sided die with faces labeled 1 through 6. He records the outcome. Billy does this three more times and the product of his four outcomes is 120. How many possible combinations of 4 rolls could he have rolled? (Rolling a 1, 1, 2, 2 is considered the same combination as rolling a 1, 2, 2, 1.)

4. _____ The numbers 1 - 400, inclusive, are put into a hat. What is the probability that the first number chosen at random is a multiple of 4 or 17? Express your answer as a common fraction.

5. _____ If a and b are distinct, odd primes, then how many distinct positive factors does $4a^2b^3$ have?

6. _____ What is the smallest positive integer that has 2, 3, 4, 6, 7 and 12 as factors?

7. _____ What is the sum of the three greatest consecutive integers less than 200 for which the least number has 4 as a factor, the second number has 5 as a factor and the greatest number has 6 as a factor?

8. _____ What is the greatest whole number less than 150 that has an odd number of distinct positive factors?

9. _____ Find n such that $2! \cdot 3! \cdot 4! \cdot n = 8!$.

10. _____ What is the smallest positive integer n for which 72 is a factor of n! ?

# Factoring Stretch

**Answers**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | 17 | (C) | 5. | 36 | (F, P) | 8. | 144 | (P, E) |
| 2. | 16 | (F, E, G) | 6. | 84 | (C) | 9. | 140 | (C, E, P) |
| 3. | 3 | (P, G, E) | 7. | 555 | (E) | 10. | 6 | (P, E) |
| 4. | $\frac{59}{200}$ | (P, E) | | | | | | |

# Number Sense Stretch

1. _____ The cube of $n$ is 9 _ , _ _ 5 . What is the value of $n$?

2. _____ Select values for A, B and C from the set {0.2, 0.5, 0.02, 0.04} such that $A \neq B \neq C$ and the expression $(A - B) \div C$ has the greatest possible value. What is that value?

3. _____ To calculate 17% of 50, John divides an integer $n$ by 2. What is the value of $n$?

4. _____ What is the value of $\sqrt{1{,}000{,}000} - \sqrt[3]{1{,}000{,}000}$ ?

5. _____ 175% of an integer $k$ is an integer between 80 and 90. What is the value of $k$?

6. _____ What is the least possible product of three distinct members of the set {−3, −2, −1, 1, 2, 3} ?

7. _____ In this sum of two 2-digit numbers, each letter represents a distinct digit, but if a letter is used twice, it represents the same digit each time. What is the least possible value for A?

$$\begin{array}{r} AB \\ +\ BA \\ \hline CDC \end{array}$$

8. _____ Jake has discovered a quick way to divide by 0.25. For example, to calculate 6.75 ÷ 0.25, Jake multiplies 6 by 4 and adds a number $r$. What is the value of $r$?

9. _____ To calculate $31^2$, Emily mentally figures the value $30^2$ and adds 61. Emily subtracts a number from $30^2$ to calculate $29^2$. What number does she subtract?

10. _____ If $a$, $b$, $c$ and $d$ satisfy the following inequalities, arrange $a$, $b$, $c$ and $d$ from least to greatest value.

$a \times c < 0$ $\quad b - a > 0$ $\quad a \times b > 0$ $\quad c \times d > 0$ $\quad d > a$ $\quad d - c < 0$

# Number Sense Stretch

**Answers**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | 45 | (*C*, E, *G*, P) | 5. | 48 | (*C*, T) | 8. | 3 | (*C*) |
| 2. | 23 | (*G*, M, T) | 6. | –18 | (*C*, T) | 9. | 59 | (*C*, F) |
| 3. | 17 | (*C*) | 7. | 3 | (E, *G*, M, P, T) | 10. | *a*, *b*, *d*, *c* | (E, *G*, P, T) |
| 4. | 900 | (*C*) | | | | | | |