**TOSS-UP**

1) MATHEMATICS *Multiple Choice* Which of the following regular polygons cannot tessellate in a plane?

W) hexagon

X) triangle

Y) quadrilateral

Z) octagon

ANSWER: Z) OCTAGON

**BONUS**

1) MATHEMATICS *Short Answer* Which tessellation of a regular polygon has the most polygon?

ANSWER: TRIANGLE

**TOSS-UP**

2) MATHEMATICS *Multiple Choice* Which of the following is a solution the inequality |2x-5|< 3?

W)-1

X) -4

Y) 2

Z) 0

ANSWER: Y) 0

**BONUS**

2) MATHEMATICS *Short Answer* What is the slope of the equation y=|-3x+4| at 3

ANSWER: 3

**TOSS-UP**

3) MATHEMATICS *Short Answer* Using either numbers or words, denote which of the following curves can be created with the intersection of a cone and plane.

1. parabola

2. ellipse

3. folium of Descartes

ANSWER:1 and 2

**BONUS**

3) MATHEMATICS *Multiple Choice* Which of the following solids has no flat surfaces?

W) Cone

X) Octahedron

Y) Prism

Z) Sphere

ANSWER: Z) SPHERE

**TOSS-UP**

4) MATHEMATICS *Multiple Choice* When a fair six-sided die is rolled, which of the following outcomes is least likely?

W) The result is a prime

X) The result is even

Y) The result is less than 4

Z) The result is a perfect square

ANSWER:Z) THE RESULT IS A PERFECT SQUARE

**BONUS**

4) MATHEMATICS *Multiple Choice* What is the length of the diagonal formed by two opposite vertices in a cube with a side length of 2 to the nearest whole number?

ANSWER: 3

**TOSS-UP**

5) MATHEMATICS *Short Answer* When a Klein bottle is cut in half symmetrically, two of what surface are formed?

ANSWER: MOBIUS STRIP

**BONUS**

5) MATHEMATICS *Short Answer* What is the height of a triangle is similar to and with half the area of a triangle with height of 4 and base of 5 to the nearest whole number?.

ANSWER: 3

**TOSS-UP**

6) MATHEMATICS *Short Answer* A triangle has side lengths of 9, 12, and 15. What is its area?

ANSWER: 54

**BONUS**

6) MATHEMATICS *Short Answer* A triangle has side lengths of 3, 6, and 8. What is its area to the nearest whole number?

ANSWER: 8

**TOSS-UP**

7) MATHEMATICS *Short Answer* There are 8 pairs of shoes in a box. How many shoes must be taken without looking to ensure that there is at least one shoe of each kind?

ANSWER: 15

**BONUS**

7) MATHEMATICS *Short Answer* What is the largest whole number that cannot be made with only two dollar and five dollar bills

ANSWER: 5

**TOSS-UP**

8) MATHEMATICS *Multiple Choice* Is the arithmetic or geometric mean of 4, 6, and 12 greater.

W) The arithmetic mean is greater

X) The geometric mean is greater

Y) Both means are equal

Z) There is not enough information

ANSWER: W) THE ARITHMETIC MEAN IS GREATER

**BONUS**

8) MATHEMATICS *Short Answer* Is the mean, median, or mode of the set “6, 1, 3, 4, 2, 5, 3” greatest?

ANSWER: MEAN

**TOSS-UP**

9) MATHEMATICS *Short Answer* A polyhedron has 24 edges and 12 vertices. How many faces does it have?

ANSWER: 14

**BONUS**

9) MATHEMATICS *Short Answer* If the center of each face of an icosahedrons is replaced with a vertex, and there are the same number of edges, what polyhedron is formed?

ANSWER: DODECAHEDRON

**TOSS-UP**

10) MATHEMATICS *Multiple Choice* Which of the following numbers is prime?

W) 59

X) 91

Y) 57

Z) 39

ANSWER: W) 59

**BONUS**

10) MATHEMATICS Among how many of the first positive integers are there an equal amount of prime and composite numbers?

ANSWER: 9

**TOSS-UP**

11) MATHEMATICS *Multiple Choice* Which of the following can be the intersection of a plane and a point?

W) A point

X) An oval

Y) A line

Z) A sphere

ANSWER: W) A POINT

**BONUS**

11) MATHEMATICS *Short Answer* n terms of π, what is the surface area of a ball cut in half with a radius of 2?

ANSWER: 20

**TOSS-UP**

12) MATHEMATICS *Short Answer* If a fair six-sided die is rolled many times, what will be the average value?

ANSWER: 3.5

**BONUS**

12) MATHEMATICS *Short Answer* If one building is 2 blocks north and 5 blocks east of another, how many ways are there to go from one building to another without turning back?

ANSWER: 21

**TOSS-UP**

13) MATHEMATICS *Short Answer* If 1/2x = 2/3, then what is 5/9x equal to?

]

ANSWER: 20/27

**BONUS**

13) MATHEMATICS *Short Answer* If four plums costs as much as six oranges, and nine oranges cost as much as two pineapples, how many pineapples cost as much as one plum?

ANSWER: ONE HALF

**TOSS-UP**

14) MATHEMATICS *Multiple Choice* Which number has factors of 2, 6, and 7?

W) 21

X) 42

Y) 18

Z) 56

ANSWER: X)42

**BONUS**

14) MATHEMATICS *Short Answer* What is the greatest common factor of 20 and 24 times their least common multiple?

ANSWER: 480

**TOSS-UP**

15) MATHEMATICS *Short Answer* The arithmetic mean of five positive numbers is 24. What is the highest one number can be?

ANSWER: 24

**BONUS**

15) MATHEMATICS *Short Answer* The arithmetic mean of two numbers is 8. The arithmetic mean of these two numbers and another number is 15. What is the third number?

ANSWER: 29

**TOSS-UP**

16) MATHEMATICS *Multiple Choice* Two sides of a triangle are 9 and 11. How long can the third side be?

W) 20

X) 3

Y) 1

Z) 24

ANSWER: X) 3

**BONUS**

16) MATHEMATICS *Short Answer* What is the area of an equilateral triangle with a side length of 5 to the nearest whole number?

ANSWER: 11

**TOSS-UP**

17) MATHEMATICS *Short Answer* A quadrilateral is inscribed in a circle. If one its the angles is 24°, what is the measure of the angle opposite it?

ANSWER: 156°

**BONUS**

17) MATHEMATICS *Multiple Choice* Which of the following polyhedra has the most vertices?

W) octahedron

X) cube

Y) tetrahedron

Z) hexagonal tetrahedron

ANSWER: Z) HEXAGONAL TETRAHEDRON

**TOSS-UP**

18) MATHEMATICS *Short Answer* If the chance of clouds is 40%, the chance of a clear day with no rain is 50%, and the chance of rain is 20%, what is the chance of a clear day with rain?

ANSWER: 10%

**BONUS**

18) MATHEMATICS *Short Answer* There are 11 cats. 3 of them have stripes, 6 are brown, and 4 are hungry. There are 2 striped brown cats, 2 brown hungry cats, 1 striped hungry cat, and 1 striped brown hungry cat. How many cats are neither striped, brown, nor hungry?

ANSWER: 2

**TOSS-UP**

19) MATHEMATICS *Short Answer* What is the sum of the integers from 1 to 100?

ANSWER: 5500

**BONUS**

19) MATHEMATICS *Short Answer* What is the sum of the first 5 prime numbers?

ANSWER: 28

**TOSS-UP**

20) MATHEMATICS *Short Answer* A rectangle has an area of 18, with one side twice as long as the other. How long is the diagonal of this rectangle to the nearest whole number?

ANSWER: 7

**BONUS**

20) MATHEMATICS *Short Answer* A trapezoid has its parallel sides of length 6 and 9. The other sides have length 4 and 5. What is the area of this trapezoid?

ANSWER: 30

**TOSS-UP**

21) MATHEMATICS *Short Answner* What percent of 72 is 101 to the nearest whole number?

ANSWER: 113%

**BONUS**

21) MATHEMATICS *Multiple Choice* A store offers discount of 30% and coupon for $5. When buying a $31 item, which order are they applied for the least cost?

W) the coupon first

X) the discount first

Y) it doesn’t matter

Z) there is no least cost

ANSWER: X) THE DISCOUNT FIRST

**TOSS-UP**

22) MATHEMATICS *Short Answer* Using words or numbers, denote which of the following statements is true if “All birds are animals” is true

1. All animals are birds

2. What is not an animal is not a bird.

3. All not birds are not animals

ANSWER: 1 and 2

**BONUS**

22) MATHEMATICS *Short Answer* If there are 6 people in a room, and everyone shakes everyone else’s hand, how many handshakes will there be?

ANSWER: 360

**TOSS-UP**

23) MATHEMATICS *Short Answer* What is 55 base 6 equal to in base 10?

ANSWER: 35

**BONUS**

23) MATHEMATICS *Short Answer* What is the number 91 in binary?

ANSWER: 1011011

**TOSS-UP**

24) MATHEMATICS *Multiple Choice* Which of the following numbers is the number of diagonals in a polygon

W) 4

X) 2

Y) 7

Z) 9

ANSWER: Z)9

**BONUS**

24) MATHEMATICS *Short Answer* If there are people in a room, and any pair is either friends or strangers, what is the lowest amount of people so that there must be a group of three friends or three strangers?

ANSWER: 6

**TOSS-UP**

25) MATHEMATICS *Short Answer* There are several trees in rows with each row having one less than the next. If there are 21 trees, how many rows are there?

ANSWER: 6

**BONUS**

25) MATHEMATICS *Short Answer* What is the sum of the first 4 terms of the geometric sequence beginning 2, 8?

ANSWER: 170