<u>ANSWERS</u>

1) 224 or 224%

2) 3746 or 3746_8

3) 220

4) 38,024

5) -62

6) $32

7) 16.25 or $16\frac{1}{4}$

8) Friday

9) 23

10) 0

11) 36

12) 144π

13) 3025

14) $\frac{19}{50} + \frac{17}{50}i$

15) -7

16) 2

17) 2192

18) $216 + 108\sqrt{3}$

19) 3,326,400

20) 32,724

21) 1.6×10^{25}

22) 1024

23) 9

24) 6π

25) -1024

SOLUTIONS

1) **224%** If r = 1, A = 1π. If r = 1.8, A = (1.8)^{2}π = 3.24π. The increase in area is 224%.

2) **3746**

$$512\overline{)2022}^{\,3746}$$

-1536

$$64\overline{)486}$$

-448

$$8\overline{)38}$$

-32

$$1\overline{)6}$$

3) **220** $12C3 = \dfrac{12!}{9!3!} = \dfrac{12\cdot11\cdot10\cdot9!}{9!\cdot3\cdot2} = 220$

4) **38,024** Use

$$\dfrac{[n(n+1)(2n+1)]}{6} = \dfrac{48(49)(97)}{6} = 38,024$$

5) **-62**

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      98
   9  8  7  9  8
0  2  0  0  2      36 - 98 = -62
7  9  2  7  9
      36
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6) **$32** 25 · 1.065 = $26.63
26.63 · 1.2 = $31.96 → $32

7) **16.25 or 16$\frac{1}{4}$** $\dfrac{6.25}{5} = \dfrac{c}{13}$ → 5c = 81.25 → c = 16.25

8) **Friday**

9) **23** Use the Chicken McNuggets Theorem :
5 · 7 - 5 - 7 = 23

10) **0** Each grouping of digits adds to 9.

11) **36** To find the measure of the interior angles of a regular polygon, $I = \dfrac{(n-2)(180)}{n}$

175°

$175 = \dfrac{(n-2)(180)}{n}$

175n = 180n - 360

-5n = -360

n = 72

170°

$170 = \dfrac{(n-2)(180)}{n}$

170n = 180n - 360

10n = -360

n = 36

72 - 36 = 36

12) **144π**
x^2 - 10x + 25 + y^2 + 12y + 36 = 83 + 25 + 36 = 144
This is a circle, A = 144π

13) **3025**

$$\left[\dfrac{n(n+1)}{2}\right]^2 = \left[\dfrac{10\cdot11}{2}\right]^2 = (5\cdot11)^2 = 55^2 = 3025$$

14) $\dfrac{23}{50} + \dfrac{11}{50}i$ $\dfrac{3+2i}{(3+i)(2-i)} = \dfrac{3+2i}{6-i-i^2} = \dfrac{3+2i}{7-i}\cdot\dfrac{7+i}{7+i}$

$$= \dfrac{21+17i-+2i^2}{49-i^2} = \dfrac{19+17i}{50} = \dfrac{19}{50} + \dfrac{17}{50}i$$

15) **-7** (x + 6y)(x^2 - 6xy + y^2) - (x + 6y) =
(x + 6y)(x^2 - 6xy + y^2 - 1) → -6 + (-1) = -7

16) **2** A number is divisible by 8 if its last 3 digits are divisible by 8. So, 79u must be divisible by 8.

$$8\overline{)79u}^{\,\,9}\text{ Therefore, u = 2}$$

72
—
7u

17) **2192** a = 101 + 103 = 204. b = 991 + 997 = 1988. 204 + 1988 = 2192.

18) **216 + 108$\sqrt{3}$**
$A = 3s^2(2+\sqrt{3}) = 3(6)^2(2+\sqrt{3}) = 108(2+\sqrt{3}) = 216+108\sqrt{3}$

19) **3,326,400.**

$$\frac{12!}{2!3!3!2!} = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 3 \cdot 2 \cdot 3 \cdot 2 \cdot 2} = 3,326,400$$

20) **32,724**
$(10 + i)(324)(10 - i) = 324(100 - i^2) = 324(101) =$
32,724

21) **1.6 x 10^{25}**
$(2^4)^7$ x 5^{24}
2^{28} x 5^{24}
2^{24} x 2^4 x 5^{24}
10^{24} x 2^4
16 x 10^{24}
1.6 x 10^{25}

22) **1024** $2^{10} = 1024$

23) **9** The only thing that matters is the 7 in the units place. It repeats in the pattern 1 - 7 - 9 - 3 with remainders 0 - 1 - 2 - 3 respectively when the exponent is divided by 4. You need just divide 90 by 4, which gives a remainder of 2. So, the units digit is 9.

24) **6π**
$9x^2 + 54x + 4y^2 - 16y = -61$
$9(x^2 + 6x) + 4(y^2 - 4y) = -61$
$9(x^2 + 6x + 9) + 4(y^2 - 4y + 4) = -61 + 81 + 16$
$\dfrac{9(x + 3)^2}{36} + \dfrac{4(y - 2)^2}{36} = \dfrac{36}{36}$
$\left(\dfrac{x+3}{2}\right)^2 + \left(\dfrac{y-2}{3}\right)^2 = 1$
A = abπ = 6π

25) **-1024** $(1 - i)^{20} = [(1 - i)^2]^{10} = [1 - 2i + i^2]^{10} =$
$(-2i)^{10} = 1024i^{10} = 1024i^2 = -1024$

SPEED MATH ANSWER KEY

224% 1) When the radius of a circle is increased by 80%, what is the percent increase in the circle's area?

3746 2) Convert 2022_{10} to base 8.

220 3) How many ways are there to distribute 12 identical objects among 3 people?

38,024 4) Calculate $1 + 4 + 9 + 16 = \ldots = 48^2$.

-62 5) Find the determinant. $\begin{bmatrix} 9 & 8 & 7 \\ 0 & 2 & 0 \\ 7 & 9 & 2 \end{bmatrix}$

$32 6) My dinner costs $25. Then, 6.5% sales tax is added to my bill and rounded to the nearest penny. I add 20% tip, round to the nearest penny, and, finally, round up to the nearest dollar. What is my total?

16.25 7) A churro recipe calls for $6\frac{1}{4}$ cups of sour cream per serving, which feeds 5 people. Brighten is hosting 13 people for a get together. How many cups of sour cream will he need?

Friday 8) Freed was born on January 23, 1959. What day of the week was that date? Hint : Freed is happy that day was not the 13th.

23 9) What is the greatest number of Chicken McNuggets Lindsay can not buy with boxes of 5 and 7 McNuggets?

0 10) What is the remainder when 62108152280736668915211 is divided by 9?

36 11) One regular polygon has interior angles measuring 170° and another has interior angles measuring 175°. What is the positive difference in the number of sides of the two polygons?

144π 12) What is the area enclosed by the graph of $x^2 + y^2 - 10x + 12y - 83$?

3025 13) What is the sum of the cubes of the first ten Natural Numbers?

$\frac{23}{50} + \frac{11}{50}i$ 14) Simplify the fraction to remove the imaginary parts in the denominator: $\frac{3+2i}{(3+i)(2-i)}$.

-7 15) Factor completely. Then, give the sum of the coefficient of the xy term and the constant term. $x^3 + 216y^3 - x - 6y$.

____2____ 16) The four digit number 179u (where u is the units digit) is divisible by 8. What is the value
of u?

___2192___ 17) Let a = the sum of the two smallest 3-digit prime numbers and b = the sum of the two largest
3-digit prime numbers. Find a + b.

216+108$\sqrt{3}$ 18) Find the area of the regular dodecagon with side length 6.

_3,326,400_ 19) Find the number of distinguishable permutations of the word THONOTOSASSA.

___32,724___ 20) Simplify. $(10 + i)(3240 - 324i)$ where $i = \sqrt{-1}$.

__**1.6 x 10^{25}**__ 21) Write 16^7 x 5^{24} in Scientific Notation.

___1024___ 22) If Row 0 of Pascal's Triangle is 1, what is the sum of the entries of Row 10.

____9____ 23) Find the units digit of $3427^{12345678901234567890}$

___**6π**___ 24) Find the area enclosed by the graph of $9x^2 + 4y^2 + 54x - 16y + 61 = 0$.

__-1024__ 25) Simplify $(1 - i)^{20}$ where $i = \sqrt{-1}$.