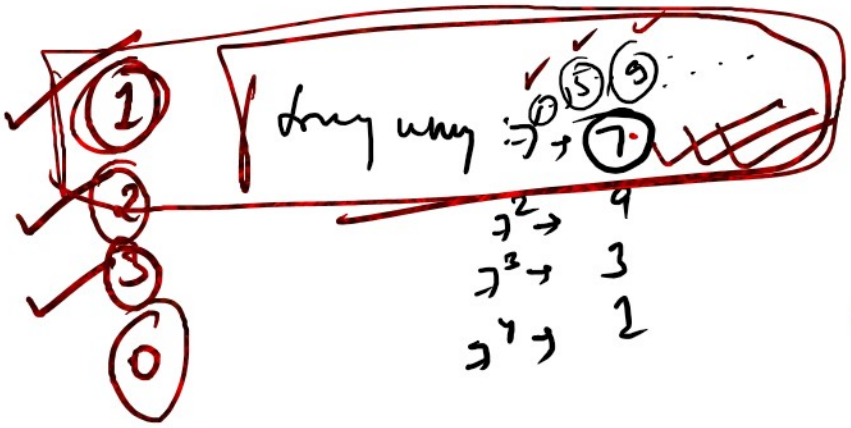
09 January 2024 06:06 PM

$2^{2^{2^2}} = 2^{2^4} = 2^{16}$ (ans).

$\{[2^2]^2\}^2 = [2^2]^4 = 2^{16}$ (ans).



$7^1, 7^5, 7^9, \ldots$

$7^2 \to 9$
$7^3 \to 3$
$7^4 \to 1$

ans (7).

if $m > n$
$a^m > a^n$
if $a > b$
$a^m > b^m$

2^{500} 3^{400} 4^{300} 5^{200}

$2^{5\times100}$ $3^{4\times100}$ $4^{3\times100}$ $5^{2\times100}$

$(32)^{100}$ $(81)^{100}$ $(64)^{100}$ $(25)^{100}$

$\therefore (81)^{100} = 3^{400}$ is largest no.

2^{88} 3^{66} 5^{44} 7^{33}

$(2^8)^{11}$ $(3^6)^{11}$ $(5^4)^{11}$ $(7^3)^{11}$

(1) Square : $(x+4) = (x-4)^2$ ✓

(1) Suppose

$$x \Delta y = (x-y)^2$$
$$x \circ y = (x+y)^2$$
$$x * y = (x \times y)^{-1}$$
$$x \cdot y = x \times y$$

What is $\{(197 \overset{x}{\circ} 315) - (197 \overset{y}{\Delta} 315)\} \cdot (197 \overset{x}{*} 315) \overset{y}{?}$

$$= \{(197+315)^2 - (197-315)^2\}(197 \times 315)^{-1}$$

$$= \{(x+y)^2 - (x-y)^2\}(x \times y)^{-1}$$

$$= \{x^2 + y^2 + 2xy - x^2 - y^2 + 2xy\} \frac{1}{xy}$$

$$= \frac{4xy}{xy} = 4 \text{ (ans)}.$$

(2) How many pairs of positive integer have GCD 20 and LCM 600? (a) 4, (b) 0, (c) 1 and (d)

We know that for any two number a and b

$$HCF(a,b) \times LCM(a,b) = a \times b$$
$$20 \times 600 = a \times b$$
$$a \times b = 12000$$

Let $a = 20x$, $b = 20y$

$$20x \times 20y = 12000$$
$$\boxed{x \times y = 30}$$

x	1	2	3	5
y	30	15	10	6

4 pairs

$(3^4, 4^3)$, $(3^2, 4^3)$, $(3^4, 4^2)$, $(4^2, 3^2)$

(3) 2^{3^4}, 2^{4^3}, 3^{2^4}, 3^{4^2}, 4^{2^3}, 4^{3^2}

which of the given numbers are largest?

(a) 2^{3^4} (b) 3^{4^2} (c) 4^{3^2} (d) ~~4^{2^3}~~

2^{81} → 2×2^{80}

$= 2 \times 2^{2 \times 40}$

$= 2 \times 4^{40}$

3^{16} → 3^{16}

$4^{40} > 16$ (the power)

11 > 3 (the bar

2×4^{40} 3^{11}

(5) Probability, $P(E) = \frac{\text{No. of successful outcomes}}{\text{Total no. of possible outcomes}}$

Q what is the probability of getting an even number when a dice is thrown ?

(a) 1/3 (b) 1/4 (c) 1/2 (d) 7/12

Formulas: a) Sum of probability = 1.

b) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ ✓

$P(A \cup B)$: occurrence of A or B

$P(A \cap B)$: A and B

c) $P(A \cap B) = P(A) + P(B) - P(A \cup B)$ ✓

(d) when two events are mutually exclusive events
then $P(A \cap B) = 0$ ✓
and $P(A \cup B) = P(A) + P(B)$ ✓

Q The probabilities of three mutually exclusive events x, y and z are given by $\frac{3}{7}$, $\frac{4}{7}$ and $\frac{2}{7}$ respectively. The statement is
(a) True (b) False (c) Nothing can be said
(d) could be either.

Formula for Permutation and Combination

① Factorial ?

$$n! = n(n-1)(n-2)(n-3)\cdots 3 \cdot 2 \cdot 1$$

ie, $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$ (ans)

Also note: $0! = 1$

② Permutation $\left({}^{\downarrow n}P_{\uparrow r}\right) = \frac{n!}{(n-r)!}$

Example ${}^{10}P_5 = \frac{10!}{(10-5)!} = \frac{10!}{5!} = \frac{10 \times 9 \times 8 \times 7 \times 6 \times \cancel{5!}}{\cancel{5!}}$

${}^{5}P_2 = \frac{5!}{3!} = \frac{5 \times 4 \times \cancel{3!}}{\cancel{3!}} = 20$ (ans).

③ Combination $\left({}^{n}C_{r}\right) = \frac{n!}{r!(n-r)!}$

(3) Combination $({}^{n}C_{r}) = \frac{n!}{r!(n-r)!}$

Example: ${}^{5}C_{2} = \frac{5!}{2!(5-2)!} = \frac{5!}{2!3!}$

$= \frac{5 \times \cancel{4}^{2} \times \cancel{3!}}{\cancel{2} \times 1 \times \cancel{3!}}$

$= 10$ (ans)

${}^{7}C_{3} = \frac{7!}{3!(7-3)!} = \frac{7!}{3!4!} = \frac{\cancel{7} \times \cancel{6}^{2} \times 5 \times \cancel{4!}}{\cancel{3} \times \cancel{2} \times 1 \times \cancel{4!}}$

$= 35$ (ans)