(1) Quant A $\frac{a+b+c}{5}$ Quant B. $\frac{1}{5ab}+\frac{c}{5}$.

~~A~~ ~~B~~ ~~C~~ (D)

Solⁿ A $\frac{a+b+c}{5}$ B $\frac{1}{5ab}+\frac{c}{5}$

Plug in $a=2$, $b=3$, $c=5$

$10 > 1\frac{1}{30}$

Plug in $a=-2$, $b=-3$ $c=+20$ (bigger)

$\frac{-2-3+20}{5} = 3 < \frac{1}{30}+4 = 4\frac{1}{30}$

Ans D. The relationship cannot be determined.

(2) 1 yard = 3 feet

Q3. $130 < x < 150$.

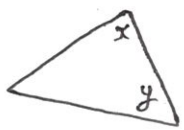
A The greatest odd factor of x B The greatest even factor of x

Solⁿ $x = \{131, 132, 133 \ldots\ldots 149\}$

A Greatest odd factor is 149 B. Greatest even factor possible is 148 or less

∴ A. Quantity A is greater.

Q4



A $358-2(x+y)$ B $180-(x+y)$

Solⁿ

A $358-2(180-z)$ B. $180-(180-z)$

$358-360+2z$ z

$2(z-1)$ —— z

~~A~~ ~~B~~ ~~C~~ (D)

A $2(z-1)$ B z

let $z=2$

$2(2-1)=2$ 2

let $z=20$.

$38 > 20$

D. The relationship cannot be det.

Q5 k is for thousand

<500	5 %
500-750	18 %
750-1000	23 %
1k-1250	26 %
1250-1500	19 %
15k-1750	3 %
1750-2k	5 %
>2k	

Total = 8000

Q. find the Median?

Solⁿ Median = 50th %cile

$5+18+23 = 46\%$. (from above)

$19+3+5 = 27\%$ (from below)

50th %ile lies in 26% (1000-1250 group).

Q6

Q7 Two sweaters are originally the same price. Both are discounted 10%. Then one of the sweaters is discounted an additional 10%. By approximately what % would the price of the cheaper of the two sweaters have to be increased so that the sweaters once again sell for the same price?

A) 9% B) 10% C) 11% D) 15% E) 20%

Sol^n

	S_1	S_2
Original price	\$100	\$100
10% disc.	90\$	\$90.
Add. 10% discon	81\$	—

Difference = 9\$

$\frac{9}{81} \times 100 = 11.11\%$.

Q8 n is a +ve integer

Col A		Col B
$(0.99)^n$		0.01
	$n = 1$	
0.99	A ~~B~~ ~~C~~ ~~D~~	0.01
	$n = 2$	
$(0.99)^2 = 0.9801$		0.01
$(0.99)^3 = 0.9703$		

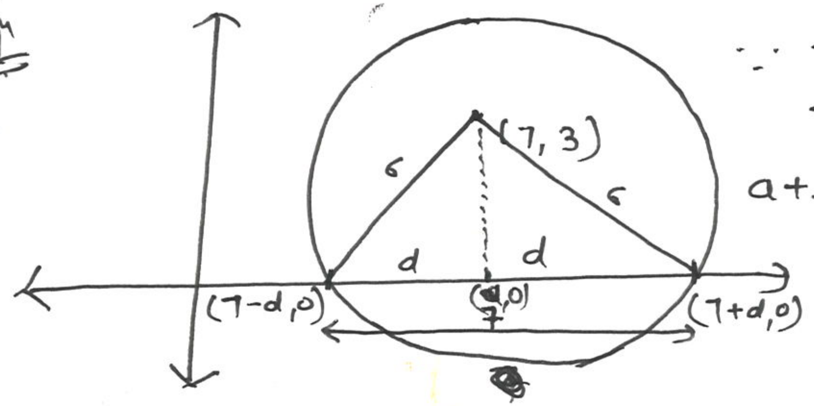
⋮

$(0.99)^n$ = approaches 0.

Hence D, Relationship cannot be det.

Q9 In the standard x, y plane, a circle has a radius 6 and center $(7,3)$. The circle intersects the ~~axis~~ x axis at $(a,0)$ & $(b,0)$. What is the value of $a+b$?

Sol^n



$\therefore 7-d = a$

$7+d = b$.

$a+b = 7-\cancel{d}+7+\cancel{d}$

$= 14$ Ans.

Q10 2600 has how many positive divisors?

Sol^n $2600 = 2\times2\times2\times5\times5\times13$

$= 2^3 \times 5^2 \times 13^1$

Add 1 to the exponents & multiply,

$(3+1)\times(2+1)(1+1)$

$4\times3\times2 = 24$ Ans

To find odd factors, simply eliminate 2 (the even no.)

To find even factors, simply subtract Total − odd factors

Q11 The area of a circle is equal to the area of a square

A	B
Circumf. of circle	Perimeter of the square

Sol^n

A		B
$2\pi r$	$\pi r^2 = x^2$	$4 \times x$
$2\pi r$	$\sqrt{\pi}\, r = x$.	$4 \times \sqrt{\pi}\, r$
↓	$\cancel{2}$ is common.	
π		$2\sqrt{\pi}$.
π^2	Divide both side by π	4π.
π	$\boxed{B}$	4 ✓

Q12 When a coin is flipped, the probability of getting heads is $1/2$, and the probability of getting tails is $1/2$.
A coin is flipped 5 times

A	B
Prob. of getting 2 heads	Prob. of getting 3 heads.

P(2 Heads) P(3 Heads) = P(2 Tails) [5 − 3] = 2

As $P(H) = P(T) = 1/2$

$\therefore P(2H) = P(2T)$

Hence $\boxed{C}$

Q13 X town & Y-town are connected by ~~30~~ 420 miles. Person A & B start from X & Y town towards each other. A travels at 56 miles/hr B travels 49 m/hr. how many miles apart will A & B be 1 hour before they meet.

Sol^n X ——— 420 miles ——— Y

A → 56 m/hr in 1 hr. ← B 49 m/hr in 1 hr.

$\therefore$ Relative speed = 105 miles/hr.
In 1 hr, gap shrinks ~~they are~~ by 105 m/hr.
$\therefore$ 105 miles is the difference b/w A & B just 1 hour before they meet

Q14 If n is an integer greater than 50, then the expression $(n^2-2n)(n+1)(n-1)$ MUST be divisible by which of the following?

Sol^n $(n^2-2n)(n+1)(n-1)$
$(n-2)(n-1)(n)(n+1)$

✓ I 8 ✓ II 12 III 18.

I → 8 for 8 we need a multiple of 4 & 2;
Rule says any 4 digit consecutive nos. contain 2 even & 2 odd nos. ∴ 8 can easily be divisible by the expression.

II → 12 for 12 we need a multiple of 4 & 3
In 4 consecutive integers it is possible to have a multiple of 3 & 4 (already seen in the case of 8)

~~III~~ → 18 → for 18 we need 2 multiple of 3 which is not possible coz if the mult of 3 occurs at 2nd cons. int, then only one mult

Note -:

a) Odd ± odd = even.
b) even ± odd = odd
c) Even(Integers) = Even.
d) odd × odd = odd.
e) $\frac{\text{Even}}{\text{odd}}$ = can give an integer
f) $\frac{\text{odd}}{\text{even}}$ = can never give an integer.
g) 1 is not prime no. (1 is an odd no.)
h) 0 is not ±, non -ve int.
i) 0 is an even integer.
j) General way to write even integer = $2n$
odd integer = $2n+1$
k) Dividend = divisor × Quotient + Remainder
l) factor & divisor is same
m) $0 < N^2 < N < 1$ for $N < 1$
n) $1 < N < N^2$ for $N > 1$
o) $0 < N < 1$, then $N < \sqrt{N}$ + $\sqrt{N} < 1$
p) $N > 1$, then $\sqrt{N} < N$ + $\sqrt{N} < 1$
q) $N > 1$, then $\sqrt{N} < N$ & $\sqrt{N} > 1$
r) odd set of consecutive nos. n, the sum is divisible by n.

will be possible.

s) In a set of 3 consecutive Integers we can have 2 even & 1 odd, or 2 odds & 1 even. In a set of 4 cons. integers we must have 2 even and 2 odds.

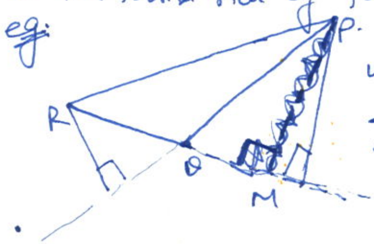
t) If I say that 1997 is a number that when divided by 12, has a remainder of 5, then you could find others of this set by adding or subtracting 12 or multiples of 12.

u) Which is the least +ve integer when Divided by 12, yields a remainder 5?
Sol^n → 5 Ans coz $12\overline{)5}(0$, -0, 5

w) List of prime nos. b/w 20 - 60.
$\boxed{23, 29, 31, 37, 41, 43, 47, 53, 59}$
b/w 80 - 90 ⇒ $\boxed{83, 89}$

v) A perfect square always have odd no. of factors.

x) In an obtuse ∠s triangle there is no way to draw an altitude from the vertices of a triangle that connects to the third side of the triangle
eg:



Now, there is no way to draw a ⊥ from P to RQ
∴ a dotted line from P ⊥ to the RQ extended can be one possible altitude.
∴ PM is the ⊥ & RM is the base.

y) Pythagoras Triplets ⇒
{5, 12, 13} {8, 15, 17} {7, 24, 25}
{3, 4, 5}

(2) $P(E \text{ or } F) = P(E) + P(F) - P(E \text{ and } F)$

$P(E \text{ or } F) = P(E) + P(F)$ if E & F are mutually exclusive

$P(E \text{ and } F) = P(E)\,P(F)$ if E and F independent

z) → $\frac{C}{d} = \pi\ (3.14)$

* $rs = t$, r & s are factors and ~~multiples of~~ divisor of t,
t is a multiple of r & s.
t is divisible by both r and s.

* $0! = 1$
0^0 → not defined.

* 25th %ile → 1st quartile
50th %ile → Mean, Second quartile
75th %ile → Third quartile

$SD = \sqrt{\Sigma(x-m)^2}$

Q15 A weighted coin has a probability p of showing heads. If successive flips are independent, & the prob. of getting at least one head in two flips is greater than 0.51, then what could p be?

Sol: Indicate All such values.

(A) 0.1 (B) 0.2 (C) 0.3 (D) 0.4 (E) 0.6 (F) 0.7

Soln: At least case, so handle with the complements.

Cases Head can come 0, 1, 2 in flipping the coin 2 times.

P(atleast 1 head) = 1 − P(no head)

options	Tail $P(\cancel{\text{no head}})$	$(P(\overset{T}{\cancel{\text{no head}}}))^2$ → 2 times flipped	$1-(P(T))^2$
0.1	0.9	0.81	0.19 < 0.50
0.2	0.8	0.64	0.36 < 0.50
0.3	0.7	0.49	0.51 > 0.50
0.4	0.6	0.36	0.64 > 0.50
0.6	0.4	0.16	↓
0.7	0.3	0.09	> .50

∴ Answer is C, D, E, F.

Co-ordinate Geometry.

(1) If a slope of line is $m = 2/3$ & the point is $(2,3)$ then we can trace the line ~~by~~ visually by adding $m = \frac{rise}{run} = \frac{y}{x}$ y coordinate to the rise i.e. y & x coordinate to the run i.e. x ~~coordinate~~.

(2) If any line has a slope $m = 1$ or $m = -1$, then the slope triangle is 45-45-90 triangle.

Q16 In the seq. $a_1, a_2 \ldots\ldots a_n$, each term after the first term is equal to the preceding term plus a constant c.

$$a_1 + a_{11} + a_{21} = 99$$

Col A

$a_3 + a_9$

Col B

66.

Soln
$a_1 = A$
$a_2 = A + c$
$a_3 = A + 2c$
$a_4 = A + 3c$.
$a_n = A + (n-1)c$

$$\therefore \underbrace{A}_{a_1} + \underbrace{A + 10c}_{a_{11}} + \underbrace{A + 20c}_{a_{21}} = 99$$

$3A + 30c = 99$

$A + 10c = 33$.

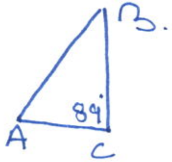
Col A

$a_3 + a_{19} = A + 2c + A + 18c$
$= 2A + 20c = 2(A + 10c) = 66$.

$\boxed{C}$

Col
66

Q17

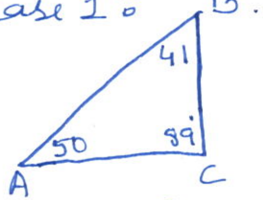


Col A: Length of AB

Col B: Length of BC.

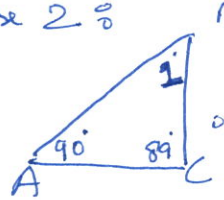
Sol^n

Case 1:



$AB > BC$ ∴ A

Case 2:



∴ B.

So, the answer is $\boxed{D}$

Q18. X → sum of first 31 +ve odd integers
Y → sum of first 30 +ve even integers

Col A: ~~X~~ $X-Y$

Col B: 30

Sol^n:

$X \to 1+3+5+7+\ldots\ldots + 61$

$Y \to 2, 4, 6, 8 + \ldots\ldots + 60.$

$X - Y = (61-60) + (\cancel{60}\ 59-58) \ldots$
$\ldots + (5-4) + (3-2) + 1$

$X - Y = 1+1+1+\ldots\ldots 1$

$= 1 \times$ as many odd integers i.e $= 31$ (or in general ~~the~~ whichever is greater).

Col A 31 $>$ Col B 30

Q19 If $x+4 \neq 0$, then which of the foll. is a sol^n to the inequality.

Sol^n $\dfrac{x^2-4^2-1}{x+4} > \dfrac{-1}{x+4}$

$\dfrac{x^2-4^2-1}{x+4} + \dfrac{1}{x+4} > \dfrac{-1}{x+4} + \dfrac{1}{x+4}$

$\dfrac{x^2-4^2-1+1}{x+4} > 0$

$\dfrac{x^2-4^2}{x+4} > 0$

$\dfrac{\cancel{(x+4)}(x-4)}{\cancel{(x+4)}} > 0$

$\boxed{x > 4}$

In options look which $x > 4$ & mark it an answer.

Q20 If k is the greatest +ve integer such that 3^k is a divisor of 15! then k is?

Sol^n: $15! = 15 \times 14 \times 13 \times 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$15 = 5 \times \underline{3}$ $12 = 4 \times \underline{3}$ $9 = \underline{3} \times \underline{3}$ $6 \to 2 \times \underline{3}$ $3 \to 1 \times \underline{3}$

Greatest power ~~of~~ of k that can divide 15! is 6.

∴ $K = 6$ Ans

Q21 n is a +ve integer, & K is the product of all integers from 1 to n inclusive. If K is a multiple of 1440, then the smallest possible value of n is

A) 8 B) 12 C) 16 D) 18 E) 24.

Sol^n: $K = 1440 \times$ Something
$= 2^5 \times 5 \times 3^2 \times$ Something.

$K = 1 \times \underline{2} \times 3 \times \cancel{4}\,(\underline{2} \times \underline{2}) \times (5) \times (\underline{2} \times 3) \times (7) \times (\underline{2} \times 2 \times 2)$

minimum value of n can be 8.

2	1440
2	720
2	360
2	180
2	90
5	45
3	9
3	3
	1

Q22 If $\frac{5x^2+65x+60}{x^2+10x-24} = \frac{5x+5}{x-2}$

then which of the foll. are possible value of x?

A) -60 B) -12 C) -1 D) 1 E) 2 F) 5 ~~G)~~

Solⁿ: Simplified form of the eqⁿ.

$$\frac{5(x+12)(x+1)}{(x+12)(x-2)} = \frac{5(x+1)}{(x-2)}$$

In the simplified form of the above equation, both sides can be cancelled, which means all the above mentioned options can be the possible Answer

But,

If $x = -12$, equation will be undefined ∴ option (B) eleminated.

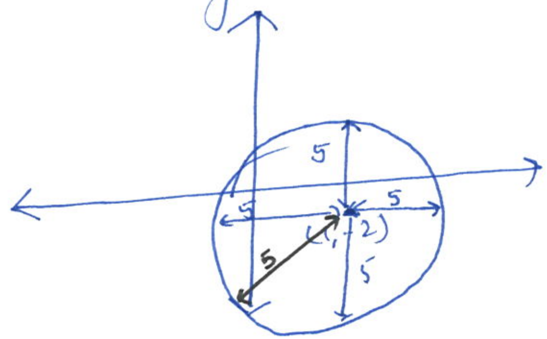
If $x = 2$, equation will be undefined, ∴ option (E) eleminated.

Ans: ⇒ A, C, D, F.

Q23 In the standard x, y plane, a circle has a centre = (1, −2) and radius r = 5, Which of the following are on the circle. Indicate all possible points.

A) (−4, −2) B) (−3, 1) C) (1, −6) D) (1, −7) E) (3, 2) F) (4, −6) G) (6, 1) H) (

Solⁿ: 5 points up, down, left, right from Centre (1, −2), can easily be plotted. ~~through the~~



For the diagonal radius, use pythogorean triplet 3−4−5,

∴ 3 & 4 points left & right of the centre of x & y axis will give points on the circle with radius 5 (diagonally).

Q24 $10^x + 10^y + 10^z = n$, x, y, z are +ve integers. Which of the foll. could be the no. of zeroes, to the left of the decimal point, contained in n?

[A] $x+4$ [B] $y-2$ [C] 2.

Solⁿ: Consider case

I $10^3 + 10^2 + 10^1 = 1110$

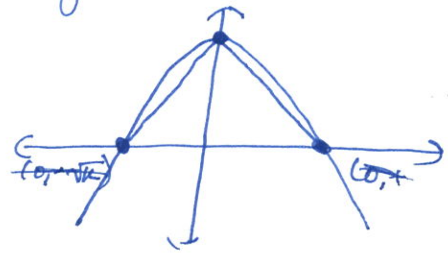
∴ [B] & [C] can work.

II $10^1 + 10^1 + 10^3 = 1020$

[A] can work.

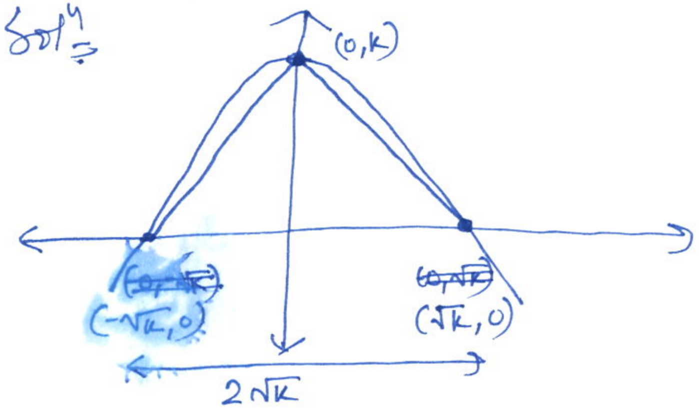
∴ A, B, C answer.

Q25 The figure shows the graph of the equation $y = k - x^2$, where k is a constant. If the area of the triangle ABC is $1/8$, what is the value of K?



$\boxed{0.25.}$

Sol^n:



$A = \frac{1}{2} \times b \times h = \frac{1}{2} \cdot 2\sqrt{k} \times k$

$\frac{1}{8} = \sqrt{k} \cdot k$

$\left(\frac{1}{8}\right)^2 = (k)^{\frac{3}{2} \cdot 2}$

$\frac{1}{64} = k^3$

$k = \frac{1}{4}$

$k = 0.25$ Ans

Q26 x and y are integers > 5
x is y% of x^2.

Col A	B
x	10.

Sol^n $x > 5$ $y > 5$

$x = \frac{y}{100} \times x^2$

$\boxed{xy = 100}$

There could be various cases where ~~x 4 y~~ $x * y$ equals 100, but $\because$ x 4 $y > 5$, $\therefore$ only $x = 10$ 4 $y = 10$ can be considered

$\boxed{x = 10}$

$\therefore$ Col A 10   Col B 10

$\boxed{C}$

Q28 X is a +ve integer.
When x is divided by 2, 4, 6, 8, the remainder is 1

Col A	Col B
x	24.

Sol^n:

−24 → −23 x as x is a +ve integer
0 → 1 → only option less than col B.
24 → 25
48 → 49
72 → 73
⋮

25, 49, 73 greater than col B.

div. by 2,4,6,8   rem. of 1

$\therefore$ $\boxed{D}$

Q27 If K, (K+200), (K+350), and 15*K are all multiples of P, then P could equal which of the following?

Sol^n: K, K+200, K+350 are all multiples of P. This means differences among these will also be multiples of P.

$K + 200 - K = 200$

$K + 350 - K = 350$

$K + 350 - K - 200 = 150$.   ~~350 − 150 = 200~~ 200 − 150 = 50.

$\therefore$ P is a factor of all the nos. 200, 350, 150, 50

So, look for an option which divides all the nos. 200, 350, 150, 50.

Q29. a, b, c, d are different +ve nos. The average of a 4 b is 30. The avg of a, b, c, d is 40.

Col A	Col B
Greatest possible value of d.	99

$\boxed{A}$

Sol^n: $a + b = 60$ $a + b + c + d = 160$

$\therefore c + d = 100$.

The question states a, b, c, d are simply nos. + not integers $\therefore$ d can be equal 99 or 99.1, 99.2, 99.3...... ...+ so on $\therefore$ greatest possible value becomes 99.99

Q30.

Col A	Col B
22% of x	$2/9$ of x

Case I

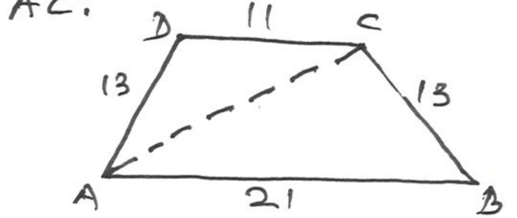
A	B
$\frac{22}{100} \times x$	$\frac{2}{9} \times x$
$0.22x$ (C)	$0.22x$

Case II

A	B
22% of x (B) <	22.22% of x

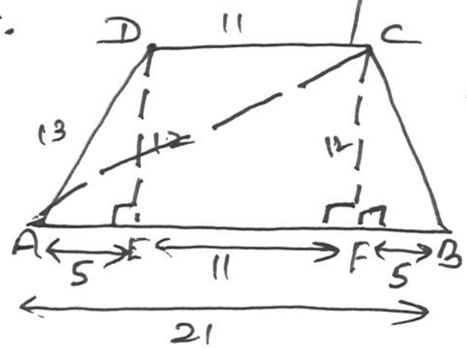
∴ Answer is $\boxed{D}$

Q31. ABCD is a trapezoid with lengths shown. Find diagonal AC.



Sol^n whenever diagonals are asked, in most cases pythagorus theorem has to be applied by some or the other way.

∴



$AC^2 = (AE+EF)^2 + CF^2$

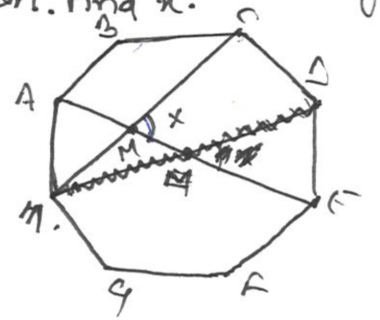
$= \cancel{25}\ 16^2 + 12^2$

$= 256 + 144$

$= 400$

$= 20$ Ans

Q32. ABCDEFGH is a regular Octagon, with two diagonals drawn. Find x.



Sol^n: each ∠s of a regular octagon = 135°.

∠A is bisected as evident in the figure.

∴ $135/2 = 67.5°$

HABC seems to form a symmetric trapezoid.

$\angle A + \angle M = 180°$

$\angle M = 45°$

$\angle AMH = \cancel{180}\ (180 - (67.5 + 45))$

$= 67.5°$

$x = 67.5$ (VOA) Ans

Q33 MAGOOSH. Make three letter words

Case I Repiting ~~words~~ letters in MAGOOSH.

$\_OO$ }
$OO\_$ } each blank can have a choice of 5 letters
O_O }

i.e. 5 or 5 or 5 = 15

Case II

MAGOSH.

$\overline{6}\ \overline{5}\ \overline{4}$

$= 120$

∴ $120 + 15 = 135$ Ans

Q34 The sum of all the digits of the integer from 18 to 21 inclusive is 24 $(1+8+1+9+2+0+2+1 = 24)$

What is the sum of all the digits of the integers from 0 to 99 inclusive?

Sol^n Count the no. of each digit

~~Total Sum~~: number of 2 → units digit + tens digit

02, 12, 22, 32, 42, 52, 62, 72, 82, 92

20, 21, 22, 23, 24, 25, 26, 27, 28, 29.

no. of 2's = 20.

Similarly

$(0 \times 20) + (1 \times 20) + (2 \times 20) \ldots (9 \times 20)$

$= 20(1+2+3+4+5 \ldots 9)$

$= 20(45) = 900.$

GEOMETRY.

1) QUADRILATERALS:-

→ All quadrilaterals: sum of angles = $360°$

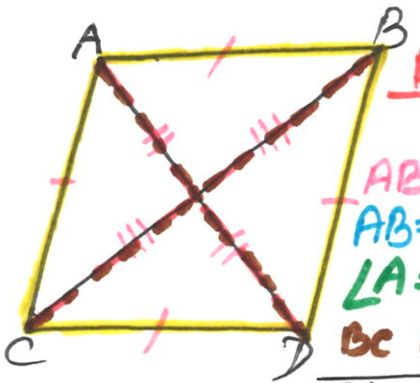
→ "BIG FOUR" — a) $\parallel$ opposite sides.
b) equal opposite sides.
c) equal opposite angles.
d) Diagonals bisect each other.

$\boxed{\text{For Rectangle, Rhombus, } \parallel\text{gram} : A = \text{base} \times \perp \text{height}}$

2) RHOMBUS

→ Type of quadrilateral.

→ "BIG FOUR" + 4 Equal sides.



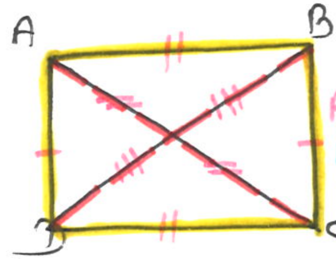
Big four
↓
$AB \parallel CD$ & $AC \parallel BD$
$AB = CD$ & $AC = BD$
$\angle A = \angle D \mid \angle B = \angle C$
BC bisects AD

Characteristic property
$AB = BD = CD = AC$.

3) RECTANGLE

→ Type of quadrilateral.

→ "BIG FOUR" + ALL $90°$ Angles.



Big four
↓
$AB \parallel CD$ & $AD \parallel BC$
$AB = CD$ + $BC = AD$
$\angle A = \angle C \mid \angle B = \angle D$
Diagonal bisect.

Characteristic property.
$\angle A = \angle C = \angle B = \angle D = 90°$.

4) SQUARE (MOST GULLIBLE)

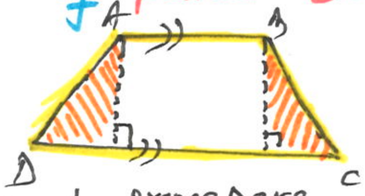
→ A Rectangle + Rhombus + A quadrilateral.

Big Four	Rhombus	Rectangle
$AB \parallel CD \mid AD \parallel BC$		
$AB = CD \mid BC = AD$	$AB = BC = CD = AD$	
$\angle A = \angle C \mid \angle B = \angle D$	- - - - - - →	All equal $90°$

Diagonal bisect at $90°$.

5) Trapezoid.

→ Type of quadrilateral with exactly 1 pair of Parallel sides.



for sym. trap. Orange △ are congruent.

$AB \parallel CD$.

Symmetrical trapezoid.
equal legs
equal angles on each side
equal diagonals.

Weighted Average (% concept)

In a certain company, 70% employees are marketers, who make an average of 40000\$, 20% are programmers who make an avg. of 80,000 \$ & 10% are managers who make an avg. of 1,20,000 \$. What is the avg. salary of all employees at this company?

A_{total} (Average) $= 0.7(40) + 0.2(80) + 0.1(120$

$= 56.$

$= 56000$ \$

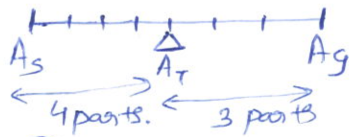
Weighted Avg (~~Taj~~ Tarajoo Method)

At ΔC Corporation, there are two classes of employees: silver & gold. Avg. salary of gold employees is 56k \$ higher than that of silver employees. If there are 120 silver employees & 160 gold employees, then avg. salary for the company is how much higher than the avg. salary for the silver employees?

$S : G = 120 : 160 = 3 : 4.$

from A_S to A_{Total} is 4 "parts"

from A_g to A_{Total} is 3 "parts"



Difference of salary is 56.

∴ $56/7 = 8\$/\text{part}$.

Distance b/w A_S to Avg. in term of salary is

$8 \times 4 = \$32$ i.e. 32000\$

A_{Total} is 32000\$ higher than A_S.

If two events A & B are mutually exclusive then $P(A \text{ and } (\cap) B) = 0$

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

$P(A \cup B) = 0$

∴ $P(A \cap B) = P(A) + P(B)$

If two events A & B are independent, then

$P(A \cup B) = P(A) \cdot P(B)$

∴ $P(A \cap B)$ (or) $= P(A) + P(B) - P(A) \cdot P(B)$

Q. Each of the foll^n linear eq^n y as a function of x for all integers x from 1 to 100. For which of the foll^n equation is the standard deviations of the y-values corres. to all the x-values the greatest?

(A) $y = \frac{x}{3}$

(B) $y = \frac{x}{2} + 40$

(C) $y = x$

(D) $y = 2x + 50.$

(E) $y = 3x - 20.$

Sol^n → $y = ax + b$ (for all values of x)

for mean value $x = m$

∴ $y = am + b.$

→ As standard dev. is the distance of points from the mean value.

∴ $y = |ax + b - am - b|$

$= |ax - am|$

$= |a||x - m|$

∴ ~~Greater the value of a~~

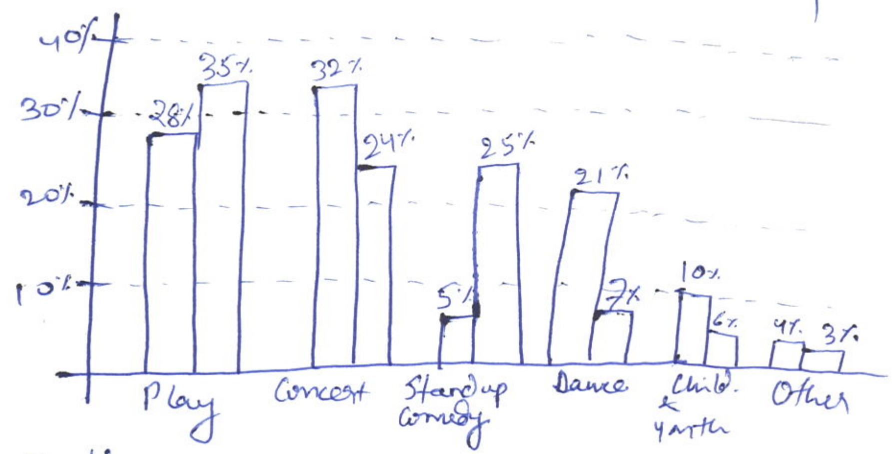
∴ Greater the absolute value of a in $y = ax + b$, greater be the distance of each ~~ey~~ y value from the mean y values.

Scanning choices we get $y = 3x - 20$ with highest value of $a = 3$

∴ Ans $\boxed{y = 3x - 20}$

Q Performing arts centre.
Revenues generated by perf. category in 2005 & 2010.

Total ~~cost~~ for 2005 – 720,000 \$
" " 2010 :– 680,000 \$



Q How many performance categories generated more than 1,00,000 \$ in revenues in both 2005 & 2010?

Sol^n Solving it through proportion. The proportion of ~~100~~ 1 lakh wrt Total for 2005 & 2010 can be further calculated in terms of % rather than ~~seeing~~ going for each option seperately & calc. the ~~%~~ share.

$$\frac{100000}{\text{Tot. for } 2005} = \frac{x}{100}$$

$$\frac{100000}{720000}$$

$$\frac{10}{72} \times 100 = x$$

$$x = 13.8\ \%$$

Similarly,

$$\frac{1,00,000}{680000} = \frac{x}{100}$$

$$\frac{10}{68} \times 100 = x$$

$$x = 14.7\%$$

So among the various performance categories, whichever options equals above 13.8% for 2005 & 14.7% for 2010 will have its revenues more than 1,00,000 for the years.

∴ Answer is Plays & Concerts i.e. 2.

Q M is a random variable that is normally distributed with a mean of 3.05 & a standard deviation of 1.72.

QA
Probability that
$1 < M < 2$

QB,
Probability that
$4 < M < 5$

Sol^n In normal distribution bell curve, closes the ~~no~~ nos is to the mean, greater is its probability to occur.
∴ Here, 4 & 5 are close to 3.05 rather than 1 & 2
so QB is greater.

Q Which of the foll. inequalities describe values that are sol^n of the inequality $|x+2| > 6$?

Sol^n

$x + 2 > 6$ | $x + 2 < -6$
$x > 4.$ | $x < -8$

$4 < x < -8$

Q. Set ~~B~~A has 50 members, set B has 53 members. At least 2 members in set A are not in set B. Which of the following could be the number of members in set B that are not in set A? Indicate all such members.

A → 3   C → 13   E → 50
B → 5   D → 25   F → 53

Sol^n: ~~$2 \le 50 - x \le 50$~~

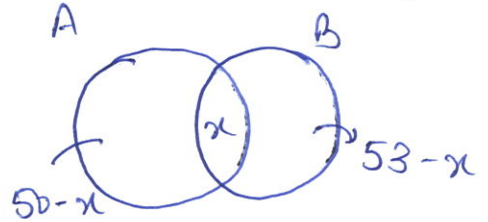
At least 2 & At most 50 members in A that are not in set B.

$2 \le 50 - x \le 50.$

$2 + 3 \le 50 - x + 3 \le 50 + 3$

$5 \le 53 - x \le 53.$

∴ Ans: → B, C, D, E, F.



Q. A computer password 5 characters long.

Ist character – capital letter
IInd character → 0 – 9, inclusive
IIIrd character → 8 symbols.
IV & V^th → combination of (i) capital or lowercase letters
(ii) digits.
(iii) symbols.

Sol^n:

$\underset{26_C}{\downarrow}$ $\underset{10_C}{\downarrow}$ $\underset{8_C}{\downarrow}$ either capital or lowercase → 26+26 = 52

or digits = 10.

or symbols → 8.

$\therefore 26 \times 10 \times 8\,(52 + 10 + 8)$

$= 26 \times 8 \times 70 \times 10$

$= 10192000$

Q. The value of Ms. Smith's house is 10,000 \$ more than the value of Mr. Jackson's house, and 40,000 \$ more than the value of Mrs. Cooper's house.

OA: Avg. of the value of houses

OB: Median of the value of houses

Sol^n: Assume values of houses.

~~S = 100,000~~ S = 100000

J = 90,000

C = 60,000

Avg. = 75 K

Median = ~~60K~~ 90K

$\boxed{B}$

Q. If j and k are even integers & $j < k$, which of the foll. equals the no. of even integers that are greater than j and less than k?

Sol^n $k = j + 2n$.

$k = j + 2(1)$
$k = j + 2(2)$
$k = j + 2(3)$
⋮

there are $(n-1)$ integers b/w j & k

$\therefore$ $k - j = 2n$

$n = \frac{k-j}{2}$

Ans $\frac{k-j}{2} - 1$

$= \frac{k-j-2}{2}$ Ans

Fact: Octagon.

There are 2 diagonals parallel to at least one side and 3 diagonals that are not parallel to any side

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Q 14 → Quant section 2 in Princeton test 1 - Solubility Chart question - very important.
(ques. no. in the test)

Q 15 → Same as above → Very important.

Q. $\frac{a}{b} = \frac{1}{3}$ and $\frac{b}{c} = \frac{15}{4}$

Quan A: a

Quant B: c

$\frac{a}{b} \times \frac{b}{c} = \frac{1}{3} \times \frac{15}{4}$

$\frac{a}{c} = 5/4$. $a > c$.

But consider -ve case

$a = (-)$, $c = (+)$ $= (-\frac{5}{4})$ $= c > a$

$\therefore$ D

Q # Fact.

Make sure whether the question asks greatest % change OR greatest % increase/decrease.

Greatest % change can be any increase or decrease.

Standard Normal distribution has a mean of 0 & S.D. of 1.

Profits = Revenues - production/expenditure

Km/hr to M/sec.
Multiply by 5/18

Items are on a sale for 20 % off. Sale price range from 10 $ to 80 $ off their original price. which of the foll. could be one of the sale item?

Solⁿ: Sale price range from 10 $ to 80 $ off is actually the difference b/w new price - original price.

$$S.D = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

Q. Solⁿ of iodine & alcohol contains 4 ounces of iodine and 16 ounces of alcohol, how many ounces of alcohol need to evaporate so that the ratio of iodine to the solution is 2 : 3?

Solⁿ ⇒ $\frac{\text{iodine}}{\text{solution}} = \frac{2}{3}$ (To be achieved)

$$\frac{4}{4+A} = \frac{2}{3}$$

$12 = 8 + 2A$

$2A = 4$

$A = 2$

original alcohol content = 16

new alcohol content = 2

evaporated alcohol = 16 - 2 = 14 ounces Ans

Q. $S = \{a, b, c, d, e\}$

$L = \{3a, 3b, 3c, 3d, 3e\}$

Standard Deviation of L = 3 × Standard deviation of L

$S = \{a, b, c, d, e\}$

$T = \{3a+5, 3b+5, 3c+5, 3d+5, 3e+5\}$

Standard deviation of T will be same as standard deviation of L as addition causes no change in dispersion of the nos.

Q. If j and k are even integers & j < k. In.

Just before exam tips.

1) Read question properly.
Do not misread words.
Triangle sounds like rectangle but is not a rectangle

2) Make sure, in quant. comp. question, what the question asks. is it asking the value of something or the number of possible values of something.

3) Hunt the word 'INTEGER' in the question.

Q: x y z are lengths of the sides of a triangle

A	B.
$x+y+z$	$2z$

Sol^n:

A	B
$x+y+z-z$	$2z-z$

A	B.
$x+y$	z

Triangle prop. $x+y>z$

∴ A

No. of r-member subsets of a set with n members is equal to $\frac{n!}{r!(n-r)!}$ ^nC_r.

Q: $P(A) = 1/2$ $P(B) = 1/3$. which of the foll'n values could be the probability that the event $A \cup B$ (that is the event A or B or both) will occur? Indicate all values)

A. $1/3$
B. $1/2$
C $3/4$.

Sol^n: Smallest probability possible if B is a subset of A. ~~~~ that makes $A \cup B = P(A) = 1/2$

~~larg~~ greatest probability possible if nothing is common between A & B $P(A \cup B) = \frac{1}{2} + \frac{1}{3} = 5/6$.

∴ value lies b/w $1/2$ and $5/6$ (inclusive) which is

$1/2$ and $3/4$.

Q. In the sequence above, the first 3 terms repeat without end.. What is the sum of the terms of the sequence from the 150th term to the 154th term?

Sol. $1, -3, +4, 1, -3, 4, 1, -3, 4 \ldots\ldots$

Sol^n. 1 -3 4
1st 2nd 3rd.

14th term will be the third time so the pattern for 3rd term after that → 6th 9th 12th 15th and so on is 4. Since 150 is a multiple of 3, the 150th term is 4.

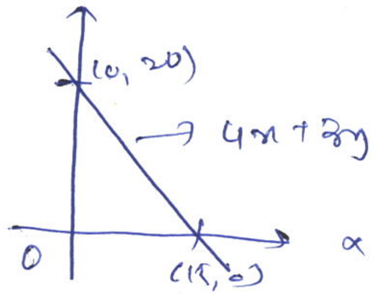
$4, 1, -3, 4, 1. = 7$ **Ans**.

Q. In the xy plane, triangular region R is bounded by the lines $x=0$, $y=0$, and $4x+3y=60$. Which of the foll. points lie inside Region R? Indicate all such pts. :→

A (2, 18)
B (5, 12)
C 10, 7
D 12, 3
E (15, 2)

Sol^n

B, D.



$3y = 60 - 4x$.
$y = 20 - \frac{4}{3}x$
$y < 20 - \frac{4}{3}x$ (for points lying in rectangular region

Substitute ~~the~~ coordinates of x and y should satisfy the eq^n above.

A. (2, 18) → $18 < 20 - \frac{8}{3} = \frac{52}{3}$ 17. — ×
B. $(5, 12) \rightarrow 12 < 20 - \frac{20}{3} = \frac{40}{3}$ 13. ✓
C. $C(10, 7) \rightarrow 7 < 20 - \frac{40}{3} = \frac{20}{3}$ 6. ×
D. $C(12, 3) \rightarrow 3 < 20 - 16$ $3 < 4$ ✓
E ×

Q_2 A washing machine takes 35 minutes to wash one load of laundry, & in the washing of laundry it takes Derek 2 min. to unload & another 4 minutes to reload the machine. If the washing machine begins washing one load of laundry at 12:30 pm, how many loads of laundry can Derek wash & unload before 6:35 pm.?

Sol^n Shortcut method.

One set of clothing takes $(35+2+4)$ minutes to complete. 35 → washing, 2 → unload, 4 → load $= 41$

$\therefore$ 6:35 − 12:30 = 365 minutes.

$$\frac{365}{41} = 8.9$$

So we can say min 8 ~~minutes~~ washings 8 ~~takes~~ equals to $41 \times 8 = 328$ minutes of time consumed. $(365 - 328 = 37$ minutes$)$

$\therefore$ In the left out 37 minutes, 35 minutes of washing & 2 minutes of unloading is possible.

$\therefore$ 9 wash + unloads are possible

Q_3 $n^5 - n^3 < 0$.

Quant A	Quant B
n	n^2

Sol$^n_3$ $n^5 < n^3$.

Substitute values b/w 0 & 1 or any −ve number to satisfy the above equation

$n = \frac{1}{2}$

$\left(\frac{1}{2}\right)^5 < \left(\frac{1}{2}\right)^3$.

A > B
$\frac{1}{2} > \frac{1}{4}$.

$n = -2$

$(-2)^5 < (-2)^3$.

A < B.
$-2 < 4$

$\therefore$ $\boxed{D}$

Q: If $a-b > a+b$, where a & b are integers, which of the foll. must be true? Indicate all that apply.

☐ $a < 0$

☐ $b < 0$

☐ $ab < 0$

Sol:

$$a-b > a+b$$

$$2b < 0$$

$$b < 0.$$

∴ ~~B~~ is correct.

Option ~~B~~ A & C cannot be deduced from the above eqn ∴ can be either -ve or +ve.

Q: Which of the foll. eqn defines a line for which no points on the line lie in quadrant III?

~~Sol:~~

A $y = -3x+4$.

B. $y = 3x+4$.

C. $y = \frac{1}{3}x+4$.

D. $y = -3x-4$.

E $y = 3x-4$.

Continued....

Continued---

Equation of a line going from left to right has a +ve slope & from right to left has a -ve slope ~~....~~.

∴ An equation of a line with -ve slope and a +ve y intercept shall never pass through third quadrant. ∴ Option A is the only option where slope is -ve & y intercept +ve.

Q: Kunal drove the same route to work each morning, Mon. through Fri, in a part. week. On Mon. & Tues. she averaged 20 mile/hr & on her ~~a~~ three rem. work days she avg. 30 mile/hr.

Quant A	Quant B.
Kunal's avg speed for all five mornings comments.	26 miles/hr.

Sol:

Total distance = d (for five days = 5d)

Total time = $d/20$ (for Mon. & Tues) + $d/30$ (for Wed, Thurs, Fri)

∴ Avg. speed = $\frac{\text{Total distance}}{\text{Total time}} = \frac{5d}{d/20 + d/20 + d/30 + d/30 + d/30}$

$= \frac{5d}{d/5} = 25 \cancel{d}/\cancel{d} = 25$ ∴ $\boxed{B}$ is greater

Area of an isosceles Δ : $\frac{b}{4}\sqrt{4a^2-b^2}$

Q. x, y, a, and b are +ve integers. When x is divided by y, the remainder is 6, when a is divided by b, the remainder is 9, which of the foll. is not a possible value for ~~y+b~~ y+b?

Sol. Take minimum value for each x, y, a, b.

$$y\ 7\overset{0}{\overline{)6}}\,x \quad -0 \quad 6 \qquad b\ 10\overset{0}{\overline{)9}}\,a \quad -0 \quad 9$$

$y+b = 17$.

Value of $(y+b)$ should not be less than 17.

∴ 15 is the only value less than 17 - Ans

Q. What fraction is equal to $7.58\bar{3}$?

Sol. $7.58\bar{3} = 7.58 + 0.00\bar{3}$

$$= \frac{758}{100} + (0.\bar{3})(0.01)$$

$$= \frac{758}{100} + \frac{1}{3}\cdot\frac{1}{100} \quad [\because 0.\bar{3} = \frac{1}{3}$$

$$= \frac{758}{100} + \frac{1}{300}$$

$$= \frac{\cancel{2275}\ \cancel{455}\ 91}{\cancel{300}\ \cancel{60}\ 12}$$

$$= 91/12$$

Q. A cockroach population doubles every 3 days. In 30 days, by what % would ~~a~~ cockroach population increase?

Sol. double means initial pop = 1 → 2 → 4 → 8 → 16 $\xrightarrow{3\,days}$

$1 \quad 2^1 \quad 2^2 \quad 2^3 \quad 2^4 \ldots\ldots 2^{10}$

after 30 days with 3 day interval last term will be 2^{10}.

$$\therefore \frac{2^{10}-1}{1} \times 100 = 102300\% \text{ Ans}$$

Q: At a certain school, all 118 juniors have an avg. final score of 88 and all 100 seniors have an avg. of 92.

QA	QB
Avg. of junior & senior combined.	90

Solⁿ: Weighted avg. As the no. of juniors are greater, the avg. would be closer to the junior's avg. than the senior's avg. Since 90 is halfway from 88 and 92, Quantity B is greater.

Q: QA: Avg. of x, y, z — QB: Avg. of $0.5x$, $0.5y$, $0.5z$.

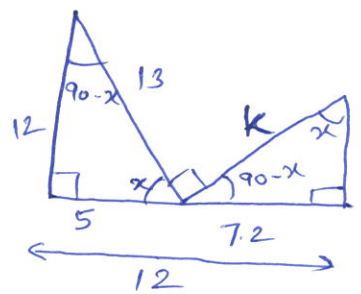
Solⁿ: QA $\frac{x+y+z}{3}$ — QB $\frac{1}{2}\frac{(x+y+z)}{3}$

Consider $(x+y+z)$ being $-ve$ which would make QB > QA

Q: An exam features five questions. 3 of the questions are multiple choice with 4 options each. If Caroline selects one answer for every ques, in how many diff. ways can she answer the exam?

Solⁿ: $4 \times 4 \times 4 \times 2 \times 2 = 256$ Ans

Q:



$= \frac{7.2}{12} = \frac{k}{13}$ ∴ $k = 7.8$.

Q: A solⁿ of acetone + water. She currently has 30 ounces mixed, 10 of which are acetone. How many ounce of acetone should be added to her current mixture to attain a 50/50 mixture of acetone + water if no additional water is added?

Solⁿ: 10 ounces is acetone. ∴ 20 ounces is water.
∴ If we add 10 ounce of acetone, solⁿ becomes 50/50 mixture.

Q: $\sqrt{x}$ is an integer & $xy^2 = 36$, how many values are possible for the integer y?

Sol: $x = 1$ $y = \underline{6}$ or $\underline{-6}$.

$x = 4$ $y = \underline{3}$ or $\underline{-3}$.

$x = 9$. $y = \underline{2}$ or $\underline{-2}$

$x = 36$. $y = \pm 1$.

Total = 8 Ans.

8

... ISC, RF, TT.

*CNM17 → Chatrabhuj Narsee School prelim 2017

Q1 2016 ISC — Find the matrix for which:

$$\begin{bmatrix} 5 & 4 \\ 1 & 1 \end{bmatrix} X = \begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix}$$

Q2 " — Evaluate $\int \tan^3 dx$

Q3 " — Using properties of definite integrals, evaluate

$$\int_0^{\pi/2} \frac{\sin x - \cos x}{1 + \sin x \cos x}\, dx$$

Q4 " — Using property of determinants, prove that:

$$\begin{vmatrix} b+c & a & a \\ b & a+c & b \\ c & c & a+b \end{vmatrix} = 4abc.$$

Q5 " — Find the area of the region bounded by the curves $y = 6x - x^2$ and $y = x^2 - 2x$

Q6 CNM'17 — Simplify: $\cos\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$

Q7 " — Solve the eqn: $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\frac{8}{31}$

Q8 ~~Find the product of~~ using the prop of det., prove that

$$\begin{vmatrix} 1 & a^2+bc & a^3 \\ 1 & b^2+ac & b^3 \\ 1 & c^2+ab & c^3 \end{vmatrix} = (a-b)(c-b)(c-a)(a^2+b^2+c^2)$$

Q9 " — If $\cos^{-1} x/a + \cos^{-1} y/b = \theta$, prove: $\frac{x^2}{a^2} - \frac{2xy}{ab}\cos\theta + \frac{y^2}{b^2} = \sin^2\theta$

Q10 ISE'12 — The binary operation $* : R \times R \to R$ is defined as $a * b = 2a + b$. Find $(2 * 3) * 4$.

Q1. CNM If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ for $-1 < x < 1$, prove that

$$\frac{dy}{dx} = \frac{-1}{(x+1)^2}$$

Q2 Frank Anthony Prove that $2\frac{dy}{dx} + \frac{1}{\sqrt{a^2 - x^2}} = 0$.

Q3 " " Solve :- $(x^2 + xy)\,dy = (x^3 + y^2)\,dx$.

*(In this question, the exp. $(x^3 + y^2)dx$ was originally written as $(x^3 + y2)dx$. If y^2 does not make sense, please try $2y$ instead.

Q4 B rigkhtd ~~pre~~ 2017 Differentiate: $\tan^{-1}\left[\frac{\sqrt{(1+x^2)} + \sqrt{(1-x)^2}}{\sqrt{(1+x^2)} - \sqrt{(1-x^2)}}\right]$

Q5 ~~St. Xavier~~ Cathedral St John Connon Find $\frac{dy}{dx}$ when $y = \log[x^x + \operatorname{cosec}^2 x]$

Q6 " If $x = \sqrt{a^{\sin^{-1} t}}$ & $y = \sqrt{a^{\cos^{-1} t}}$, prove that $\frac{dy}{dx} = \frac{-y}{x}$.