

SAMPLE PAPER -2

DAV – AKT DEFENCE SERVICES PREPARATORY ACADEMY

KALLAKURICHI, Dist. KALLAKURICHI. TAMIL NADU- 600213

DSPA- ENTRANCE EXAMINATION – 2023 (ONLINE)

Marks: 160

Time: 3 hours (2+1 hr)

INSTRUCTIONS:

- (i) This online test comprises 80 Questions in 2 parts. (10th std. level)
Part-A (50 questions) which includes -Mathematics – 20, Science -13, social science-10, GK-7.
Part-B (30 questions) – Mental Ability-30 which will have to be attended separately after completing Part-A.
- (ii) Choose the right answer from the FOUR options given for eachquestion.
- (iii) Each question carries 2 marks.
- (iv) **0.5 mark will be deducted for every wrong answer (Negative marking).**
- (v) Questions not attempted will be marked '0'.
- (vi) Ensure good internet and uninterrupted connectivity.
- (vii) 'SUBMIT' button to be clicked only at the end of the examination- Part-A and Part-B separately. **There is no option to change the answer after submission.**

NOTE :Absolute honesty is expected during the online exam.

(ANY MALPRACTICE OR TAKING EXTERNAL HELP WILL BE IDENTIED DURING THE PERSONAL INTERVIEW WHICH WILL LEAD TO DISQUALIFICATION, IF ESTABLISHED).

PART -1

Mathematics

Q.1) A horse is tied to a peg hammered at one corner of a rectangular field of 40m length by a rope 14m long. Over how much area of the field can the horse graze?

- [1] 154 sq.m
- [2] 240 sq.m
- [3] 308 sq.m
- [4] 480 sq.m

Q.2) If α , β and γ are the zeroes of the cubic polynomial $x^3 + px^2 + qx + 2$ such that $\alpha\beta + 1 = 0$ then, the value of $2p + q + 5 =$ _____

- [1] 0
- [2] 2
- [3] -2
- [4] 1

Q.3) When a man travels equal distance at a speed of x kmph and y kmph, his average speed is 4 kmph. But when he travels at these speed for equal time, his average speed is 4.5 kmph. Find the values of x and y .

[1] $x=4, y=2$

[2] $x=6, y=2$

[3] $x=6, y=3$

[4] $x=3, y=2$

Q.4) Suppose the graphs of $15x + 20y = -2$ and $x - y = -2$ intersect at a point 'P'. If the graph of $2x + 3y = k^2$ passes through 'P' then 'k' is

[1] 0

[2] 1

[3] -1

[4] $\sqrt{2}$

Q.5) Find the sum of the following: $(1 - \frac{1}{n}) + (1 - \frac{2}{n}) + (1 - \frac{3}{n}) + \dots$ n terms

[1] $\frac{n-1}{2}$

[2] $\frac{2n-1}{2}$

[3] $\frac{3(n-1)}{2}$

[4] $\frac{3n-1}{2}$

Q.6) Let p, q, r and s be natural numbers such that $p - 3012 = q + 2013 = r + 3014 = s - 3015$ which of the following is the smallest?

[1] p

[2] q

[3] r

[4] s

Q.7) Levan and Kushan walk around a circular park. They start at 7 a.m. from the same point in opposite direction. Levan walks at a speed of 2 rounds per hour. Kushan walks at a speed of 3 rounds per hour. How many times shall they cross each other after 7 a.m. and before 8.30 a.m.?

[1] 7

[2] 6

[3] 5

[4] 4

Q.8) If one root of the equation $3x^2 - 10x + 3 = 0$ is $\frac{1}{3}$, then the other root is

[1] 3

[2] $\frac{2}{3}$

[3] -3

[4] $-\frac{1}{3}$

Q.9) In a certain coding system if $25 + 10 \times 4 = 19$ and $10 \div 3 - 3 = 10$, then the value of $16 \times 5 + 40 - 10 \div 2$ is

[1] 10

[2] 11

[3] 12

[4] 13

Q.10) If $\tan^2 \theta = 1 - e^2$, then the value of $\sec \theta + \tan^3 \theta \operatorname{cosec} \theta$ is equal to

[1] $(1 - e^2)^{\frac{1}{2}}$

[2] $(2 - e^2)^{\frac{1}{2}}$

[3] $(2 - e^2)^{\frac{3}{2}}$

[4] $(1 - e^2)^{\frac{3}{2}}$

Q.11) Let 'D' be a point on the side BC of a $\triangle ABC$ such that $\angle ADC = \angle BAC$. If AC = 21 cm, then the side of an equilateral triangle whose area is equal to the area of the rectangle with sides BC and DC is

[1] $14 \times 3^{\frac{1}{2}}$

[2] $42 \times 3^{\frac{-1}{2}}$

[3] $14 \times 3^{\frac{3}{4}}$

[4] $42 \times 3^{\frac{1}{2}}$

Q.12) A circle passes through the vertices of a $\triangle ABC$. If the vertices are A (-2,5) ; B (-2,-3); C (2, -3) then the centre of the circle is

[1] (0,0)

[2] (0,1)

[3] (-2,1)

[4] (0, -3)

Q.13) Which of the following digits is ruled out in the units place of $12^n + 1$ for every positive integer 'n'?

[1] 1

[2] 3

[3] 5

[4] 7

Q.14) The value(s) of 'k' so that the equation $2x^2 + kx - 5 = 0$ and $x^2 - 3x - 4 = 0$ have one root in common.

[1] $3, \frac{27}{2}$

[2] $9, \frac{27}{4}$

[3] $-3, \frac{-27}{4}$

[4] $-3, \frac{4}{27}$

Q.15) The mean of a group of eleven consecutive natural numbers is 'm'. What will be the percentage change in the mean when next six consecutive natural numbers are included in the group?

[1] m%

[2] $\frac{m}{3}\%$

[3] $\frac{m}{300}\%$

[4] $\frac{300}{m}\%$

Q.16) Let $p(x)$ be a polynomial of degree 3 and $p(n) = \frac{1}{n}$ for $n=1,2,3,4$. Then the value of $p(5)$ is

[1] 0

[2] $\frac{1}{5}$

[3] $\frac{2}{5}$

[4] $\frac{3}{5}$

Q.17) If 'A' be the area of a right triangle and 'b' one of the sides containing the right angle. Then the length of the altitude on the hypotenuse is

- [1] $\frac{2Ab}{b^4+4A^2}$
- [2] $\frac{2Ab}{\sqrt{b^4+4A^2}}$
- [3] $\frac{2A}{b^4+4A^2}$
- [4] $\frac{2b}{\sqrt{b^4+4A^2}}$

Q.18) The figure given below has a square of 1 unit and equal sector centred at each vertex. What is the diameter of the shaded circle?



- [1] $\sqrt{2} - 1$
- [2] $\sqrt{3} - 1$
- [3] $\sqrt{2}$
- [4] $2\sqrt{2}$

Q.19) If $\frac{2x}{3y} = \frac{1}{2}$, then find the value of $(x - y)(x + y) + \frac{1}{7}$

- [1] 1
- [2] 2
- [3] 0
- [4] -1

Q.20) The ratio of the areas of circumcircle and incircle of square is

- [1] $1:\sqrt{2}$
- [2] $\sqrt{2} : 1$
- [3] $\sqrt{3} : 2$
- [4] 2:1

SCIENCE

Q.1) ASSERTION: Amalgam is not considered as an alloy.

REASON: Amalgam is a mixture of a metal with mercury.

- [1] Both A and R are true but R is not the correct explanation of A
- [2] Both A and R are true and R is the correct explanation of A
- [3] A is true and R is false.
- [4] A is false and R is true.

Q.2) Which one of the following mammalian cells is not capable of metabolising glucose to carbon dioxide aerobically?

- [1] Liver cells
- [2] Red blood cells
- [3] White blood cells
- [4] Unstriated muscle cells

Q.3) What percentage of Sun's energy is utilized by green plants to prepare their food by the process of photosynthesis?

- [1] 1 percent
- [2] 10 percent
- [3] 20 percent
- [4] 99 percent

Q.4) The stool of a person is whitish-grey coloured. This occurs due to the malfunctioning of

- [1] Pancreas
- [2] Spleen
- [3] Kidney
- [4] Liver

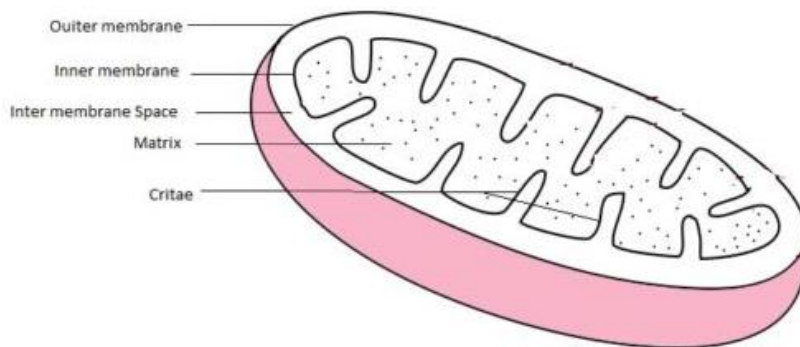
Q.5) Glycolysis is part of

- [1] Only aerobic respiration
- [2] Krebs cycle
- [3] Only anaerobic respiration
- [4] Both aerobic and anaerobic respiration

Q.6) The Sino-atrial node is the normal pacemaker of the human heart because

- [1] It is located in the right atrium
- [2] It is the only part of the conducting system that can generate impulse
- [3] It can generate the maximum number of action potentials in the conducting system
- [4] It produces action potential that are more in size than the other parts of the conducting system.

Q.7) In mitochondria ATP formation occurs



- [1] Over cristae
- [2] Over outer membrane
- [3] Inside matrix
- [4] Inter membrane space

Q.8) Which of the following may be a conclusion of the excessive exposure of humans to Sun's ultraviolet rays?

- i. Peptic ulcers
- ii. Eye disease like cataract
- iii. Damage to lungs
- iv. Skin cancer

- [1] (i) and (ii)
- [2] (ii) (iii) and (iv)
- [3] (ii) and (iv)
- [4] Only (iv)

Q.9) Which of the following is an organelle that helps the sperm to penetrate the ovum?

- [1] Acrosome
- [2] Zona pellucida
- [3] Megalis
- [4] None of the above

Q.10) Which of the following causes biomagnification?

- [1] SO_2
- [2] Mercury
- [3] DDT
- [4] both Mercury and DDT

Q.11) In a pond ecosystem, the food chain starts with

- [1] Zooplanktons
- [2] Phytoplanktons
- [3] Small insects
- [4] Small fishes

Q.12) Which of the following is formed along with ATP in glycolysis?

- [1] NADH
- [2] NADPH
- [3] FAD
- [4] FADH_2

Q.13) The resistance of a metallic wire becomes 8 times when

- [1] length is doubled
- [2] length is tripled
- [3] length is doubled and radius is halved
- [4] length is halved and radius is doubled

SOCIAL SCIENCE

Q.1) Which one of the following is an example of vertical power sharing?

- [1] Power sharing between the States.
- [2] Power Sharing between political parties
- [3] Power Sharing between different levels of government.
- [4] Power Sharing between the different organs of government.

Q.2) Which organisation does recognise the political parties in India?

- [1] Central Government
- [2] Election Commission
- [3] State Government
- [4] Judiciary

Q.3) The Service sector includes activities such as:

- [1] Agriculture, Dairy, Fishing
- [2] Making Steel, Cement, Sugar
- [3] Transport, Banking, Insurance
- [4] Mining, quarrying

Q.4) In the Local self –governments, atleast one third of all positions are reserved for

- [1] Scheduled Tribes
- [2] Women
- [3] Men
- [4] Backward communities.

Q.5) The process of rapid integration or interconnection between countries due to greater foreign investment is known as

- [1] Integration of markets
- [2] International trade
- [3] MNC
- [4] Globalization

Assertion - Reasoning based question. This consist of two statements – Assertion (A) and Reason (R). Answer the question selecting the appropriate option given below:

Q.6) Assertion: Decentralisation was made more powerful and effective in 1992 in our Country.

Reason: Two levels of government are not enough to run a vast country like India.

- [1] Both A and R are true and R is the correct explanation of A
- [2] Both A and R are true and R is not the correct explanation of A
- [3] A is true but R is false
- [4] A is False but R is true

Q.7) Political party started in the year 1999, became a member of UPA in 2004. This party wants high offices in government to be given only to the natural born Citizens of the country.

- [1] Nationalist Communist Party
- [2] Bharatiya Janata Party
- [3] Dravida Munnetra Kazhagam
- [4] Nationalist Congress Party

Q.8) Which one of the following is the most important mode of transport in India?

- [1] Roadways
- [2] Railways
- [3] Airways
- [4] Waterways

Q.9) The soil that is formed by intense leaching is called as

- [1] Alluvial soil
- [2] Black soil
- [3] Laterite soil
- [4] Red Soil

Q.10) Match the following:

- | | |
|-----------------------------|----------------------------------|
| a. Great Depression | 1. IMF and World Bank. |
| b. Canal colonies. | 2. Agricultural over production. |
| c. Bretton Wood Institution | 3. Group of developing countries |
| d. G-77 | 4. Punjab |

[1] a-2,b-4,c-1,d-3

[2] a-3,b-2,c-4,d-1

[3] a-4,b-1,c-3,d-4.

[4] a-1,b-3,c-2,d-4

General Knowledge

Q.1) A tourist was travelling across Indian states. He first visited Pykara hydroelectric power station, secondly Jawaharlal Nehru sea port, thirdly Bokaro steel plant station and lastly Govindha Vallaba Panth reservoir. Identify the proper sequence of the states the tourist travelled

- [1] Maharashtra, Andhra Pradesh, Chattisgarh, Gujarat
- [2] Andhra Pradesh, Maharashtra, Bihar, Karnataka
- [3] Kerala, Tamil Nadu, Odisha, Gujarat
- [4] Tamil Nadu, Maharashtra, Jharkhand, Uttar Pradesh

Q.2) The type of vegetation shown in the picture is found in which type of forests in India?



- [1] Mangrove Forest
- [2] Mountain Forest
- [3] Monsoon Forest
- [4] Evergreen Forest

Q.3) The Principles of Nazism are written in _____

- [1] Das Kapital
- [2] Mein Kampf
- [3] War and Peace
- [4] Social Contract

Q.4) Which two nations have decided to commemorate “ Maitri Diwas “ (Friendship day) on 6th December?

- [1] India and Nepal
- [2] India and Bangladesh
- [3] India and Pakistan
- [4] India and Sri Lanka

Q.5) What is PIL ?

- [1] Private India limited
- [2] Prime India litigation
- [3] Public Interest litigation
- [4] Public Interest limited

Q.6) Identify the state in which Asia’s oldest refinery and birthplace of crude oil ‘Digboi’ located.

- [1] Mizoram
- [2] Assam
- [3] Jharkhand
- [4] West Bengal

Q.7) Which organization is entrusted the task of constructing around 500 medical oxygen plants across our country?

- [1] The National Medicinal Plants Board
- [2] The National Research Centre
- [3] The National Highways Authority of India
- [4] The National Medical Commission

Section – B

MENTAL ABILITY (30X2=60)

Q.1) There are five men A, B, C, D and E and six women P, Q, R, S, T and U. A, B and R are advocates; C,D,P,Q and S are doctors and there stare teachers. Some teams are to be selected from amongst these eleven persons' subject to the following conditions:

- A,P and U have to be together
- B cannot go with D or R
- E and Q have to be together C and T have to be together
- D and P cannot go together
- C cannot go with Q

If the team is to consist of two advocates, two doctors, two teachers and not more than three ladies, the members of the team are

[1] AB CPTU

[2] ACPRTU

[3] AEPQRT

[4] DCEQRT

Q.2) Ravi travelled 4 km straight towards south. He turned left and travelled 6km straight, then turned right and travelled 4 km straight. How far is he from the starting point?

[1] 8 km

[2] 10km

[3] 12km

[4] 18km

Q.3) One evening before sunset two friends Amit and Sunit were talking to each other face to face. If Sunil's shadow was exactly to his left side, which direction was Amit facing?

[1] North

[2] South

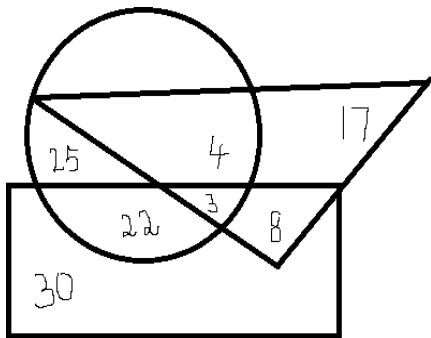
[3] West

[4] Data in adequate

Q.4) The time on the watch is quarter to three. If the minute-hand points to North-East, in which direction does the hour hand point?

- [1] South-West
- [2] South-East
- [3] North-West
- [4] North-East

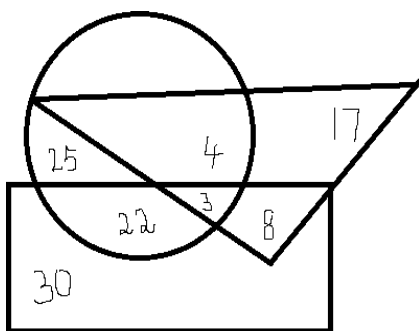
Q.5) The triangle represents doctors. The circle represents players and the rectangle represents artists. Study the following figure carefully and answer the questions.



How many doctors are both players and artists?

- [1] 6
- [2] 8
- [3] 4
- [4] 3

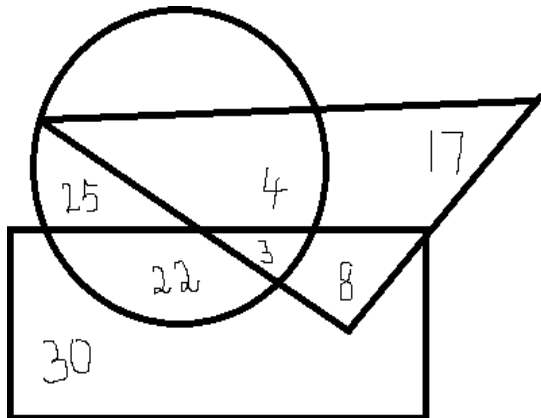
Q.6) The triangle represents doctors. The circle represents players and the rectangle represents artists. Study the following figure carefully and answer the questions



How many artists are players?

- [1] 30
- [2] 29
- [3] 25
- [4] 17

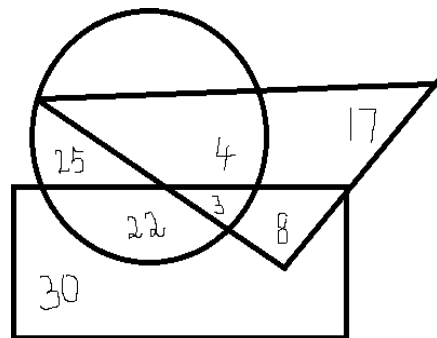
Q.7) The triangle represents doctors. The circle represents players and the rectangle represents artists. Study the following figure carefully and answer the questions:



How many artists are neither players nor doctors?

- [1] 29
- [2] 30
- [3] 22
- [4] 8

Q.8) The triangle represents doctors. The circle represents players and the rectangle represents artists. Study the following figure carefully and answer the questions.



How many doctors are neither players nor artists?

- [1] 17
- [2] 30
- [3] 8
- [4] 19

Q.9) How many pairs of letters are there in the word " CASTRAPHONE" which have as many letters between the min the word as in the alphabet?

- [1] 3
- [2] 4
- [3] 5
- [4] 6

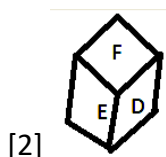
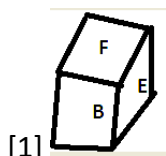
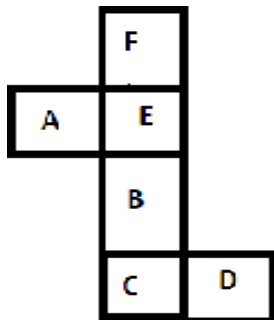
Q.10) Six friends P, Q, R, S, T and U are sitting around the hexagonal table each at one corner and are facing the centre of the hexagon

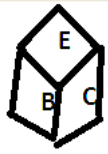
- (i) P is second to the left of U
- (ii) Q is the neighbour of R and S
- (iii) T is second to the left of S

Who is the neighbour of P?

- [1] T & R
- [2] U & P
- [3] U & R
- [4] data insufficient

Q.11) The following figure is converted into a cube. Its four positions [A], [B], [C]and [D] are shown. On the basis of these select the correct alternative





[3]



[4]

Q.12) A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is

- [1] 100 km/hr
- [2] 110 km/hr
- [3] 120 km/hr
- [4] 130 km/hr

Q.13) Pipe A can fill a tank in 5 hours, pipe B in 10 hours and pipe C in 30 hours. If all the pipes are open, in how many hours will the tank be filled?

- [1] 2
- [2] 2.5
- [3] 3
- [4] 3.5

Q.14) A lotus is seen 5cm above the water level of a lake, with the onset of the wind, it sinks in the water 10cm away from its place. How deep is the water in that place?

- [1] 5cm
- [2] 7.5cm
- [3] 10 cm
- [4] $5\sqrt{5}$ cm

Q.15) If the list price of a toy is reduced by 2, a person can buy 2 toys more for 360. Find the original price of the toy

- [1] Rs.18
- [2] Rs.36
- [3] Rs.40
- [4] Rs.20

Q.16) In a class of 60 students, where girls and boys are in the ratio 2:3, the boy 'Kartik' is ranked 17th from the top. If there are 9 girls ahead of Karthik what is the ratio of the number of girls and boys after the rank position of Karthik?

- [1] 9:27
- [2] 15:28
- [3] 16:27
- [4] 16:28

Q.17) Select the pair that has the same analogy as given pair 9876 : 12234567

- [1] 34562:89776
- [2] 1234 : 122345
- [3] 654321 : 922346
- [4] 9993 : 8886

Q.18) The salary of a worker is first increased by 10% and thereafter decreased by 10%
What is the change in his salary?

- [1] Increased by 1%
- [2] Increased by 2%
- [3] Decreased by 1%
- [4] Decreased by 2%

Q.19) Find the value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}}$

- [1] 4
- [2] 3
- [3] 2
- [4] $\frac{7}{2}$

Q.20) The ratio of the areas of circumcircle and in circle of square is

- [1] $1:\sqrt{2}$
- [2] $\sqrt{2} : 1$
- [3] $\sqrt{3} : 2$
- [4] $2:1$

Q.21) Given below are three statements followed by four alternatives, select the alternative which follows logically, from the given statements.

- I. Only boys can register for a competition.
- II. Many of the competitors are toppers.
- III. All the names of toppers are marked with green colour.

- [1] All toppers are competitors
- [2] Some of the competitors are boys.
- [3] Some of the competitors are marked with green colour.
- [4] Only the names of boys are marked with green colour.

Q.22) Which is the missing term of the following sequence?

002B, 009I, 028J, _____, 126I

- [1] 048 L
- [2] 065 K
- [3] 172 G
- [4] 186 N

Q.23) Gopu ranks sixth from the top and twenty seventh from the bottom in a class. How many students are there in the class?

- [1] 31
- [2] 32
- [3] 33
- [4] 34

Q.24) If the first September 2019 is Sunday, then first October 2019 will be:

- [1] Sunday
- [2] Monday
- [3] Tuesday
- [4] Wednesday

Q.25) If 'P' means division, 'T' means addition, 'M' means subtraction and 'D' means multiplication then what will be the value of the expression 12M12D28P7T15

- [1] -21
- [2] -15
- [3] 15
- [4] 45

Q.26) If in a certain code language MADRAS is written as NBESBT, how will BOMBAY be written in that code?

- [1] CPNCBX
- [2] CPNCBZ
- [3] CPOCBZ
- [4] CQOCBZ

Q.27) Select the correct combination of mathematical signs to replace * signs and to balance the following equation.

$$8 * 8 * 1 * 7 = 8$$

- [1] $X \div +$
- [2] $+ X \div$
- [3] $\div X +$
- [4] $+ X \div$

Q.28) Choose the correct alternatives from the given one that will complete the series.
CX, GT, JQ, LO, ?

- [1] NM
- [2] KP
- [3] MN
- [4] PK

Q.29) In a row where all are facing North, Priya is 15th from the left end and Garima is 19th from the right end. They interchange their positions, and Ram who sits 24th from the left end sits at the 5th place to the left of Priya's new position. How many persons were there in the row?

- [1] 36
- [2] 42
- [3] 47
- [4] 56

Q.30) If X is the brother of the son of Y's son, then how is X related to Y?

[1] Son

[2] Brother

[3] Grandson

[4] Uncle
