

$$(x+y)(x^2+xy+y^2) - [y^3-x^3] = (x+y)(x^2+xy+y^2) - [(y-x)(y^2+xy+x^2)]$$

30%  
18%  
6%  
6%  
6%  
6%

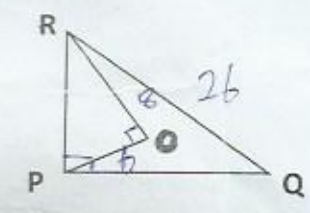
DAV PUBLIC SCHOOL (KAILASH HILLS)  
FIRST TERMINAL EXAMINATION (CLASS X)

Time : 3 hours  
MATHEMATICS  
Maximum Marks : 80

Instructions : All the questions are compulsory. Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each and Section D contains 8 questions of 4 marks each. Calculators are not allowed.

SECTION A

- 1 If the HCF of 22 and 46 is of the form  $22m - 20$ , then find  $m$ .
- 2 Find the zeroes of the polynomial  $x^2 - 3$ .
- 3 In the given figure O is a point inside  $\Delta PQR$ , such that  $\angle POR = 90^\circ$ ,  $OP = 6$  cm,  $OR = 8$  cm. If  $QR = 26$  cm and  $\angle QPR = 90^\circ$ , then find  $PQ$ .
- 4 If  $5 \tan \theta = 3$ , then evaluate  $(5 \sin \theta - 3 \cos \theta)$



- 5 Find the value of  $k$  for which the quadratic equation  $3x^2 + 2x + k = 0$  has real roots.
- 6 A die is thrown once. What is the probability that it shows a multiple of 3 greater than 4.

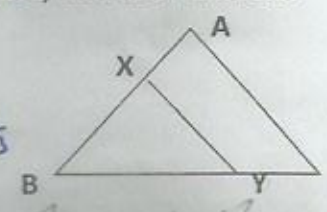
SECTION B

- 7 Evaluate :  $2 \cos^2 60^\circ + 3 \sin^2 45^\circ - 3 \sin^2 30^\circ + 2 \cos^2 90^\circ$ .
- 8 If  $\sin 3A = \cos (A - 10^\circ)$ , where  $3A$  is an acute angle, then find the value of  $A$ .
- 9 Solve:  $3\sqrt{7} x^2 + 4x - \sqrt{7} = 0$
- 10 If one zero of the polynomial  $x^2 - 9x + 6k$  is twice the other, then find the value of  $k$ .
- 11 If the height of a tree is  $3\sqrt{3} k$  metres and its shadow is of length  $9k$  metres, then find the angle of elevation of the Sun at that time of the day.
- 12 Show that every positive odd integer is of the form  $(4q + 1)$  or  $(4q + 3)$  for some integer  $q$ .

SECTION C

- 13 Prove that  $\sqrt{3}$  is an irrational number and hence  $5 + \sqrt{3}$  is also an irrational number.
- 14 Find the zeroes of the quadratic polynomial  $6x^2 - 7x - 3$  and verify relation between its zeroes and coefficients.
- 15 The sum of the squares of two odd positive numbers is 290, find the numbers.

- 16 In the given figure, the line segment  $XY \parallel AC$  of  $\Delta ABC$ , and it divides the triangle into two parts of equal area. Prove that  $AX : AB = (\sqrt{2} - 1) : \sqrt{2}$



Handwritten calculations and notes:

$290 = 2x^2 + 2y^2$   
 $145 = x^2 + y^2$   
 $x = 27, y = 11$   
 $x^2 = 729, y^2 = 121$   
 $729 + 121 = 850$   
 $850 - 290 = 560$   
 $560 = 2xy$   
 $280 = xy$   
 $x = 27, y = 11$

$x = \frac{27}{\sqrt{2}}, y = \frac{11}{\sqrt{2}}$   
 $x + y = \frac{27 + 11}{\sqrt{2}} = \frac{38}{\sqrt{2}}$   
 $x^2 + xy + y^2 = \frac{729 + 38\sqrt{2} + 121}{2} = \frac{850 + 38\sqrt{2}}{2} = 425 + 19\sqrt{2}$

$x^3 = 27, y^3 = 11$



$$L + \left[ \frac{b_1 - b_0}{2(b_1 - b_0 - b_2)} \right] \times h$$

- 17 Prove that the area of an equilateral triangle described on a side of a square is half the area of the equilateral triangle described on the diagonal of the same square.
- 18 From the top of a hill, the angles of depression of two consecutive km stones in the same direction are found to be  $30^\circ$  and  $45^\circ$ . Find the height of the hill. ( $\sqrt{3} = 1.72$ )
- 19 Prove that:  $\sec\theta (1 - \sin\theta) (\sec\theta + \tan\theta) = 1$
- 20 Two coins are tossed simultaneously. Find the probability of getting  
 (i) Exactly one tail (ii) at most one head (iii) no tail
- 21 A card is drawn at random from a well shuffled deck of cards. Find the probability that the card drawn is  
 (i) a card of spades or an ace (ii) a face card
- 22 Calculate the mode of the following frequency distribution:

Class	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55
frequency	25	34	50	42	38	14

SECTION D

- 23 Prove that:  $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$
- 24 If  $x = r \sin\alpha \cos\beta$ ,  $y = r \sin\alpha \sin\beta$  and  $z = r \cos\alpha$  then prove that  $r^2 = x^2 + y^2 + z^2$
- 25 In an equilateral  $\Delta ABC$ , D is a point on the side BC such that  $3BD = BC$ . Prove that  $9AD^2 = 7AB^2$ .
- 26 Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
- 27 Solve:  $\frac{1}{(a+b+x)} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$

- 28 The angles of depression of the top and bottom of a building from the top of a 60 m high tower are  $30^\circ$  and  $60^\circ$  respectively. Find the height of the building.

- 29 The following data gives production yield per hectare of wheat of 100 farms of a village. Draw a 'more than type ogive' and also find the median using it.

Production yield (kg/hectare)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70
Number of farms	5	7	14	19	30	25

- 30 The arithmetic mean of the following frequency distribution is 25. Find the value of p.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
frequency	5	18	15	p	6

HH, HT, TT, TH  
 7  
 6  
 5  
 4  
 3  
 2  
 1  
 0

416  
 1585  
 9014  
 1374  
 2709  
 55

\*\*\*\*\*  
 sin  $0, \frac{1}{2}, \frac{\sqrt{3}}{2}, 1$   
 cos  $1, \frac{\sqrt{3}}{2}, \frac{1}{2}, 0$   
 tan  $0, \frac{1}{\sqrt{3}}, 1, \sqrt{3}, 0$

$\frac{1}{2} \times \frac{2}{3}$   
 1990  
 35  
 1955  
 1350  
 1105