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HALF YEARLY EXAMINATION — 2013-14

Mathematics

Set-B

Class - IX

M.M. : 90

Time Allowed : 3 Hrs.

General Instructions :

- (i) All questions are compulsory.
- (ii) The question paper consists of 34 questions divided into four sections A, B, C and D. Section-A comprises of 8 questions of 1 mark each, Section-B comprises of 6 questions of 2 marks each, Section-C comprises of 10 questions of 3 marks each and Section-D comprises of 10 questions of 4 marks each.
- (iii) Question numbers 1 to 8 in Section-A are multiple choice questions where you are required to select one correct option out of the given four.
- (iv) Use of calculator is not permitted.

Section-A

Question numbers 1 to 8 carry 1 mark each. For each question four alternatives have been provided of which only 1 is correct. You have to select the correct choice.

1. Among the following, the rational number is :

(a)  $\sqrt{\frac{64}{8}}$

(b)  $\sqrt{98}$

(c)  $\frac{\sqrt{98}}{\sqrt{2}}$

(d)  $\sqrt{14}$

~~(b)~~

2. If  $p(x) = 5x^2 - 3x - 18$  then value of  $p\left(\frac{-1}{2}\right)$  is :

(a) -17

(b)  $\frac{4}{16}$

(c)  $\frac{61}{4}$

(d)  $\frac{-61}{4}$

$\frac{5}{4} + \frac{3}{2}$

$\frac{5+6}{4} = -1$

3. Maximum number of zeroes in a cubic polynomial are :

(a) 0

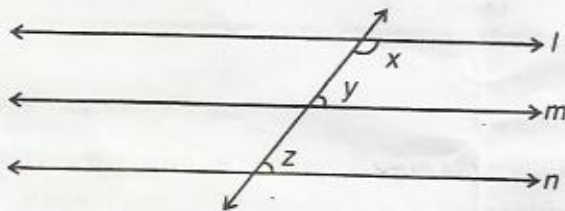
(b) 1

(c) 2

(d) 3

4. If  $a + b + c = 0$ , then  $a^3 + b^3 + c^3$  is equal to :
- (a)  $abc$  (b)  $-3abc$   
 (c)  $0$  (d)  $3abc$

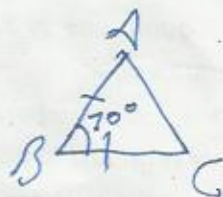
5. In the given figure  $l \parallel m$  and  $m \parallel n$ . If  $x : y = 3 : 2$  then the value of  $z$  is :



$$x = \frac{180}{5} = 36^\circ$$

$$3 \times 36 = 108$$

- (a)  $120^\circ$  (b)  $126^\circ$   
 (c)  $108^\circ$  (d)  $72^\circ$
6. In  $\triangle ABC$ ,  $BC = AB$ . If  $\angle B = 70^\circ$  then  $\angle A$  is :
- (a)  $55^\circ$  (b)  $70^\circ$   
 (c)  $110^\circ$  (d)  $45^\circ$
7. The perpendicular distance of a point  $P(5, 3)$  from y-axis is :
- (a) 3 units (b) 8 units  
 (c) 5 units (d) 2 units
8. A point both of whose co-ordinates are negative lies in the :
- (a) I Quadrant (b) II Quadrant  
 (c) III Quadrant (d) IV Quadrant

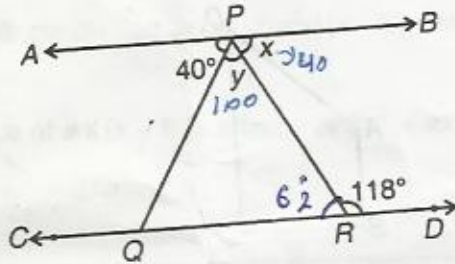


### Section-B

Question numbers 9 to 14 carry 2 marks each.

9. Represent  $0.\overline{237}$  in the form  $\frac{p}{q}$  where  $p$  and  $q$  are integers,  $q \neq 0$ .
10. Expand  $\left(3x - \frac{1}{2}y + 2z\right)^2$ .
11. Give possible expression for the length and breadth of a rectangle whose area is given by  $25a^2 - 35a + 12$ .
12. If  $A, B, C$  are three points on a line and  $B$  lies between  $A$  and  $C$ , then prove that  $AB + BC = AC$ . State the Euclid's Axiom/Postulate used to prove this.

13. In the given figure  $AB \parallel CD$ ,  $\angle APQ = 40^\circ$ ,  $\angle PRD = 118^\circ$ . Find  $x$  and  $y$ .



$$\begin{array}{r} 2. \\ 180 \\ 118 \\ \hline 62 \end{array}$$

14. Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32 cm.

$$32 - (8 + 11) = 13$$

$$\frac{13 + 8 + 11}{2} = 16$$

$$\sqrt{16(16-8)(16-11)(16-11)}$$

$$\sqrt{16 \times 8 \times 5 \times 5}$$

$$\sqrt{2 \times 2 \times 2 \times 2 \times 3 \times 2 \times 2 \times 2 \times 5}$$

$$8\sqrt{30}$$

Section-C

- Question numbers 15-24 carry 3 marks each.

15. If  $x = 5$  and  $y = 2$ , find the value of:

(i)  $(x^y + y^x)^{-1}$

(ii)  $(x^x + y^y)^{-1}$

16. Represent  $\sqrt{4.5}$  geometrically.

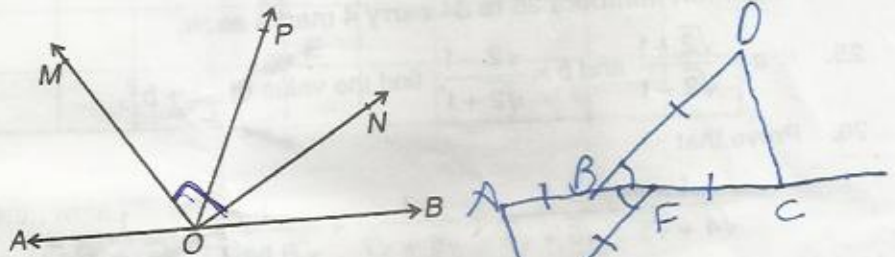
17. Factorize  $125x^3 - 27y^3 + 8 + 90xy$ .

$$(5x)^3 - (3y)^3 + (2)^3 + 3(5x)(3y)(2)$$

$$(5x - 3y)(5x - 3y)(5x - 3y) + 30xy$$

18. If  $2x + y = -5$ , prove  $8x^3 + y^3 - 30xy + 125 = 0$ .

19. In the given figure,  $AOB$  is a line,  $OM$  bisects  $\angle AOP$  and  $ON$  bisects  $\angle BOP$ . Prove that  $\angle MON = 90^\circ$ .



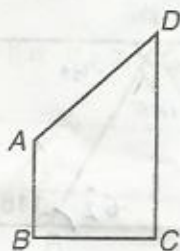
20. In the given figure  $AB = CF$ ,  $EF = BD$ ,  $\angle AFE = \angle CBD$ . Prove that:

(i)  $\triangle AFE \cong \triangle CBD$

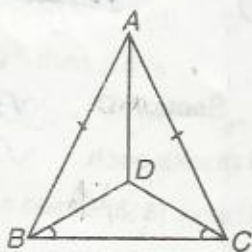
(ii)  $\angle D = \angle E$



- 21)  $AB$  and  $CD$  are respectively the smallest and the longest sides of a quadrilateral  $ABCD$ . Show that  $\angle A > \angle C$  and  $\angle B > \angle D$ .



22. In the given figure,  $AB = AC$ .  $D$  is the point in the interior of  $\triangle ABC$  such that  $\angle DBC = \angle DCB$ . Prove that  $AD$  bisects  $\angle BAC$  of  $\triangle ABC$ .



23.  $ABC$  is a triangle in which altitudes  $BE$  and  $CF$  are equal. Then show that :  
 (i)  $\triangle ABE \cong \triangle ACF$  (ii)  $AB = AC$
24. Trees are being planted in a park, in the shape of a quadrilateral  $ABCD$  having  $\angle C = 90^\circ$ ,  $AB = 9$  m,  $BC = 12$  m,  $CD = 5$  m and  $AD = 8$  m. How much area does it occupy? What value is depicted here?

#### Section-D

Question numbers 25 to 34 carry 4 marks each.

25. If  $a = \frac{\sqrt{2}+1}{\sqrt{2}-1}$  and  $b = \frac{\sqrt{2}-1}{\sqrt{2}+1}$ , find the value of  $a^2 + b^2$ .

26. Prove that :

$$\frac{1}{\sqrt{4} + \sqrt{5}} + \frac{1}{\sqrt{5} + \sqrt{6}} + \frac{1}{\sqrt{6} + \sqrt{7}} + \frac{1}{\sqrt{7} + \sqrt{8}} + \frac{1}{\sqrt{8} + \sqrt{9}} = 1$$

27. Factorise by using factor theorem :

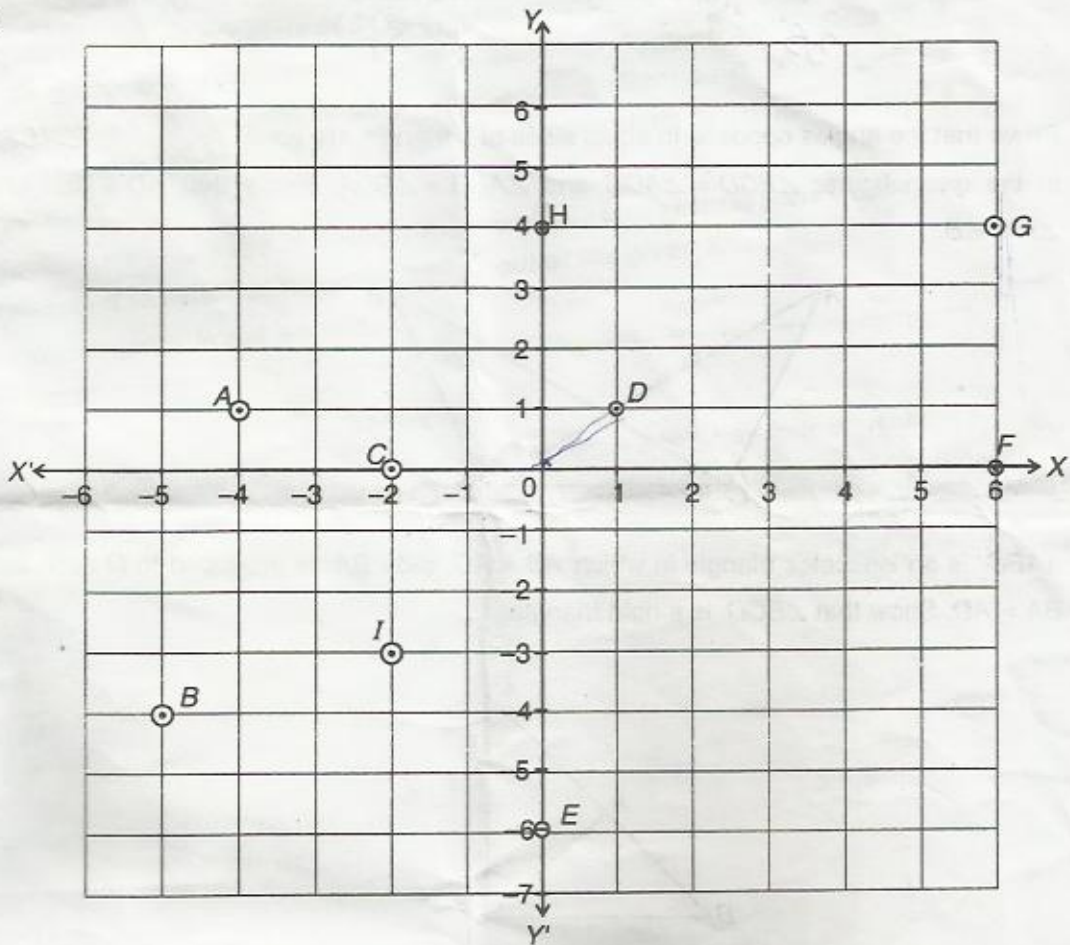
$$x^3 + 13x^2 + 32x + 20.$$

28. Let  $R_1$  and  $R_2$  be the remainders when the polynomials  $x^3 + 2x^2 - 5ax - 7$  and  $x^3 + ax^2 - 12x + 6$  are divided by  $(x + 1)$  and  $(x - 2)$  respectively. If  $2R_1 + R_2 = 6$ , find the value of  $a$ .

29. (a) Find the value of  $a$  if  $(x - 1)$  is a factor of  $2x^2 + ax + \sqrt{2}$ .

(b) Factorize  $64a^3 - 27b^3$ .

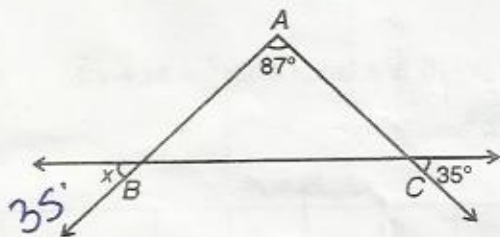
30.



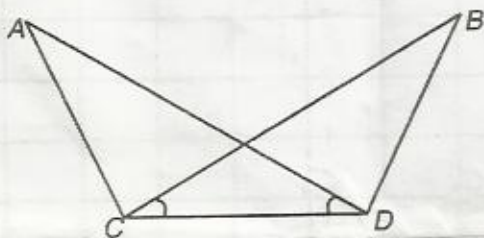
From the given graph, write :

- (i) The co-ordinates of the point  $B$  and  $F$ .
- (ii) The abscissa of the points  $D$  and  $H$ .
- (iii) The ordinate of the points  $A$  and  $C$ .
- (iv) The perpendicular distance of the point  $G$  from the  $x$ -axis.

31. If two lines intersect each other, then vertically opposite angles so formed are equal. Prove it. Using above, find the value of  $x$  in the given figure :



32. Prove that the angles opposite to equal sides of a triangle are equal.
33. In the given figure,  $\angle BCD = \angle ADC$  and  $\angle ACB = \angle BDA$ . Prove that  $AD = BC$  and  $\angle A = \angle B$ .



34.  $\triangle ABC$  is an isosceles triangle in which  $AB = AC$ . Side  $BA$  is produced to  $D$  such that  $BA = AD$ . Show that  $\angle BCD$  is a right triangle.

