Design of Sample Question Paper
Mathematics, SA-I
Class IX
(2010-2011)

Type of Question	Marks per question	Total No. of Questions	Total Marks
M.C.Q.	1	10	10
SA-I	2	8	16
SA-II	3	10	30
LA	4	6	24
TOTAL		**34**	**80**

Blue Print
Sample Question Paper-1
SA-1

I Term

Topic / Unit	MCQ	SA(I)	SA(II)	LA	Total
Number System	2(2)	2(4)	3(9)	-	7(15)
Algebra	2(2)	1(2)	2(6)	3(12)	8(22)
Geometry	6(6)	4(8)	3(9)	3(12)	16(35
Coordinate Geometry	-	1(2)	1(3)	-	2(5)
Mensuration	-	-	1(3)	-	1(3)
TOTAL	**10(10)**	**8(16)**	**10(30)**	**6(24)**	**34(80)**

Sample Question Paper
Mathematics
First Term (SA-I)
Class IX
2010-2011

Time: 3 to 3½ hours **M.M.: 80**

General Instructions

i) All questions are compulsory.

ii) The questions paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each, Section B comprises of 8 questions of 2 marks each section C comprises of 10 questions of 3 marks each and section D comprises of 6 questions of 4 marks each.

iii) Question numbers 1 to 10 in section A are multiple choice questions where you are to select one correct option out of the given four.

iv) There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.

v) Use of calculators is not permitted.

Section-A

Question numbers 1 to 10 carry 1 mark each.

1. Decimal expresion of a rational number cannot be

   (a) non-terminating (B) non-terminating and recurring

   (C) terminating (D) non-terminating and non-recurring

2. One of the factors of $(9x^2-1) - (1+3x)^2$ is

   (A) 3+x (B) 3-x (C) 3x-1 (D) 3x+1

3. Which of the following needs a proof?

   (A) Theorem (B) Axiom (C) Definition (D) Postulate

4. An exterior angle of a triangle is 110° and the two interior opposite angles are equal. Each of these angles is

   (A) 70° (B) 55° (C) 35° (D) 110°

5. In ΔPQR, if $\angle R > \angle Q$, then

   (A) QR>PR (B) PQ>PR (C) PQ<PR (D) QR<PR

6. Two sides of a triangle are of lengths 7 cm and 3.5 cm. The length of the third side of the triangle cannot be

   (A) 3.6 cm (B) 4.1 cm (C) 3.4 cm (D) 3.8 cm.

7. A rational number between 2 and 3 is

(A) 2.010010001... (B) $\sqrt{6}$ (C) 5/2 (D) $4-\sqrt{2}$

8. The coefficient of x^2 in $(2x^2-5)(4+3x^2)$ is

(A) 2 (B) 3 (C) 8 (D) -7

9. In triangles ABC and DEF, $\angle A = \angle D$, $\angle B = \angle E$ and AB=EF, then are the two triangles congruent? If yes, by which congruency criterion?

(A) Yes, by AAS (B) No (C) Yes, by ASA (D) Yes, by RHS

10. Two lines are respectively perpendicular to two parallel lines. Then these lines to each other are

(A) Perpendicular (B) Parallel

(C) Intersecting (D) incllined at some acute angle

SECTION - B

Question numbers 11 to 18 carry 2 marks each.

11. x is an irrational number. What can you say about the number x^2? Support your answer with examples.

12. Let OA, OB, OC and OD be the rays in the anticlock wise direction starting from OA, such that $\angle AOB = \angle COD = 100°$, $\angle BOC = 82°$ and $\angle AOD = 78°$. Is it true that AOC and BOD are straight lines? Justify your answer.

OR

In ΔPQR, $\angle P=70°$, $\angle R=30°$. Which side of this triangle is the longest? Give reasons for your answer.

13. In Fig. 2, it is given that $\angle 1=\angle 4$ and $\angle 3=\angle 2$. By which Euclid's axiom, it can be shown that if $\angle 2 = \angle 4$ then $\angle 1 = \angle 3$.

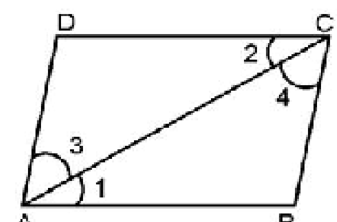


Fig. 2

14. Is $\left(\frac{8}{15}\right)^3 - \left(\frac{1}{3}\right)^3 - \left(\frac{1}{5}\right)^3 = \frac{8}{75}$?

How will you justify your answer, without actually calculating the cubes?

15. Evaluate $\left(\frac{-1}{27}\right)^{\frac{-2}{3}}$.

16. In Fig. 3, if AB||CD then find the measure of x.

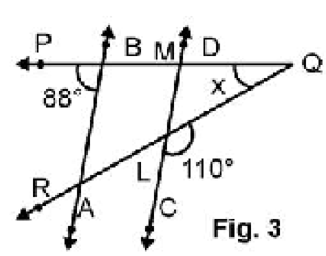


Fig. 3

17. In an isosceles triangle, prove that the altitude from the vertex bisects the base.

18. Write down the co-ordinates of the points A, B, C and D as shown in Fig. 4.

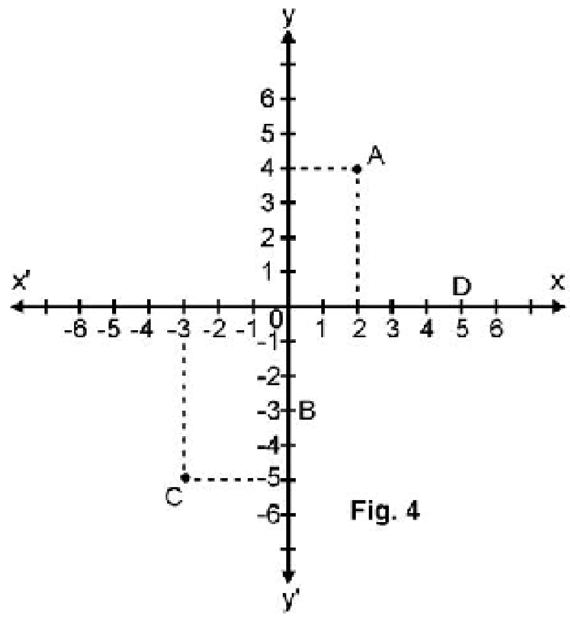


Fig. 4

SECTION C

Question numbers 19 to 28 carry 3 marks each.

19. Simplify the following by rationalising the denominators

$$\frac{2\sqrt{6}}{\sqrt{2}+\sqrt{3}}+\frac{6\sqrt{2}}{\sqrt{6}+\sqrt{3}}$$

OR

If $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} = a-\sqrt{15}b$, find the values of a and b.

20. If $a=9-4\sqrt{5}$, find the value of $a-\frac{1}{a}$.

OR

If $x = 3+2\sqrt{2}$, find the value of $x^2+\frac{1}{x^2}$

21. Represent $\sqrt{3.5}$ on the number line.

22. If (x-3) and $x-\frac{1}{3}$ are both factors of ax^2+5x+b, show that a=b.

23. Find the value of $x^3+y^3+15xy-125$ when x+y=5.

OR

If a+b+c=6, find the value of $(2-a)^3+(2-b)^3+(2-c)^3-3(2-a)(2-b)(2-c)$

24. In Fig. 5. ABC is an equilateral triangle with coordinates of B and C as B(-3, 0) and C (3, 0)
Find the coordinates of the vertex A.

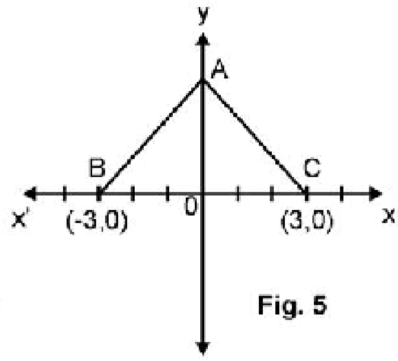


Fig. 5

25. In Fig. 6 QP||ML and other angles are shown . Find the values of x.

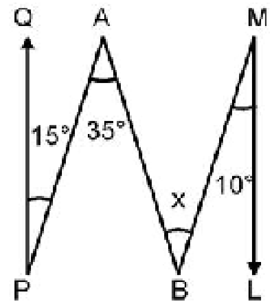


Fig. 6

26. In Fig. 7, QT ⊥ PR, ∠TQR=40° and ∠SPR=30°. Find the values of x and y.

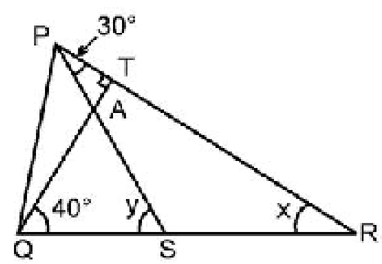


Fig. 7

27. In Fig. 8, D and E are points on the base BC of a ΔABC such that BD=CE and AD=AE. Prove that $\Delta ABC \cong \Delta ACD$.

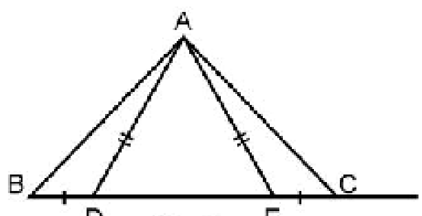


Fig. 8

28. Find the area of a triangle, two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

SECTION D

Question numbers 29 to 34 carry 4 marks each.

29. Let p and q 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 2p+q=6, find the value of a.

OR

Without actual division prove that $x^4-5x^3+8x^2-10x+12$ is divisible by x^2-5x+6.

30. Prove that :

$$(x+y)^3 + (y+z)^3 + (z+x)^3 - 3(x+y)(y+z)(z+x) = 2(x^3+y^3+z^3-3xyz)$$

31. Factorize $x^{12}-y^{12}$.

32. In Fig. 9, PS is bisector of ∠QPR; PT ⊥ RQ and ∠Q>∠R. Show that

$$\angle TPS = \frac{1}{2}(\angle Q - \angle R).$$

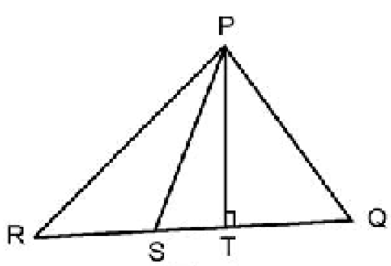


Fig. 9

OR

In ΔABC, right angled at A, (Fig. 10), AL is drawn perpendicular to BC. Prove that $\angle BAL = \angle ACB$.

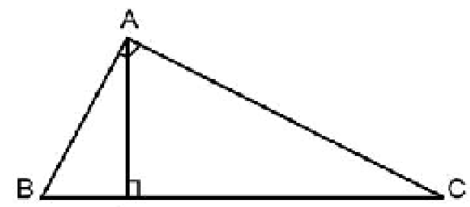


Fig. 10

33. In Fig. 11, AB=AD, AC=AE and $\angle BAD = \angle CAE$. Prove that BC = DE.

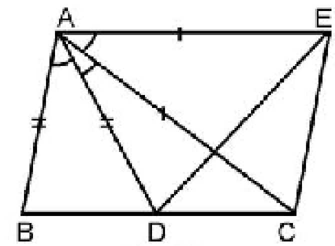


Fig. 11

34. In Fig. 12, if $\angle x = \angle y$ and AB = BC, prove that AE = CD.

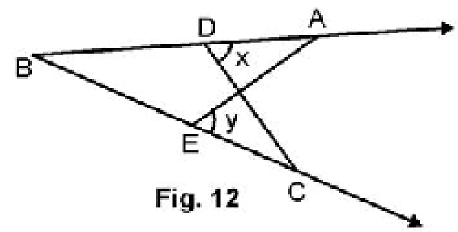


Fig. 12

Marking Scheme
Mathematics
First Term
Class IX
2010-2011

Section A

1.	(D)	2.	(D)	3.	(A)	4.	(B)	5.	(B)
6.	(C)	7.	(C)	8.	(D)	9.	(B)	10.	(B)

1x10=10

[There can be other answer also.]

SECTION B

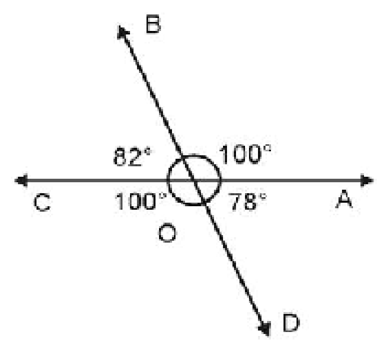
11. x^2 may be irrational or may not be. 1

For example ; if $x=\sqrt{3}$, $x^2=3 \rightarrow$ rational ; if $x=2+\sqrt{3}$, $x^2=7+4\sqrt{3} \rightarrow$ irrational ½

12. No, AOC and BOD are not straight lines

$\because$ i) $\angle AOC = 182° \neq 180°$ ½

ii) $\angle BOD = 178° \neq 180°$ ½



OR

$\angle Q=180°-[70°+30°]=80°$ which is largest 1

$\therefore$ Longest side is PR 1

13. By Euclid's I Axiom, which states. 2

["Things which are equal to the same thing are equal to one another"]

14. The LHS can be written as

$$\left(\frac{8}{15}\right)^3+\left(\frac{-1}{3}\right)^3+\left(\frac{-1}{5}\right)^3 \quad \text{------------(i)}$$ ½

$$\text{As } \frac{8}{15}-\frac{1}{3}-\frac{1}{5}=\frac{8-5-3}{15}=0$$ ½

$$\therefore \ (1) = 3\left(\frac{8}{15}\right)\left(\frac{1}{3}\right)\left(\frac{1}{5}\right)=\frac{8}{75}=\text{RHS}$$ ½

Justification : By the formula : If a+b+c=0, then $a^3+b^3+c^3=3abc$ ½

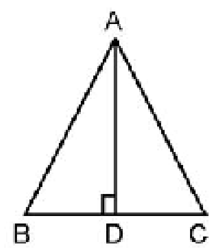
15. $\left[\left(\frac{-1}{27}\right)^{\frac{1}{3}}\right]^{-2} = \left(\frac{-1}{3}\right)^{-2}$ 1

$= \frac{1}{\left(\frac{-1}{3}\right)^2} = \frac{1}{\frac{1}{9}} = 9$ 1

16. $\angle x = -70° + 88° = 18°$ 1

$(\because \angle QLM = 180° - 110° = 70° \text{ and } AB \parallel CD \Rightarrow \angle PML = 88°)$ 1

17. Let ABC be isosceles Δ in which AB=AC



Draw $AD \perp BC$ ½

Δ's ADB and ADC are congruent by RHS ½

$\therefore$ BD=DC (cpct)

i.e, Altitude AD bisects the base BC 1

18. The coordinates of the points are :

A(2, 4), B(0, -3), C(-3, -5) and D(5, 0) ½+½+½+½

SECTON-C

19. $\frac{2\sqrt{6}}{\sqrt{2}+\sqrt{3}} + \frac{6\sqrt{2}}{\sqrt{6}+\sqrt{3}} = \frac{2\sqrt{6}\left(\sqrt{2}-\sqrt{3}\right)}{(2)-(3)} + \frac{6\sqrt{2}\left(\sqrt{6}-\sqrt{3}\right)}{6-3}$ 1+½

$= 2\sqrt{18} - 2\sqrt{12} + 2\sqrt{12} - 2\sqrt{6} = 6\sqrt{2} - 2\sqrt{6}$ 1+½

OR

LHS = $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} = \frac{\left(\sqrt{5}+\sqrt{3}\right)\left(\sqrt{5}+\sqrt{3}\right)}{5-3}$ 1

$= \frac{8+2\sqrt{15}}{2}$ = 4+$\sqrt{15}$ = a-$\sqrt{15}$b 1

$\Rightarrow$ a=4, b=-1 1

20. $a = 9 - 4\sqrt{5} \Rightarrow \frac{1}{a} = \frac{1}{9-4\sqrt{5}} = \frac{9+4\sqrt{5}}{81-80} = 9 + 4\sqrt{5}$ 2

$\therefore$ a-$\frac{1}{a} = 9 - 4\sqrt{5} - 9 - 4\sqrt{5} = -8\sqrt{5}$ 1

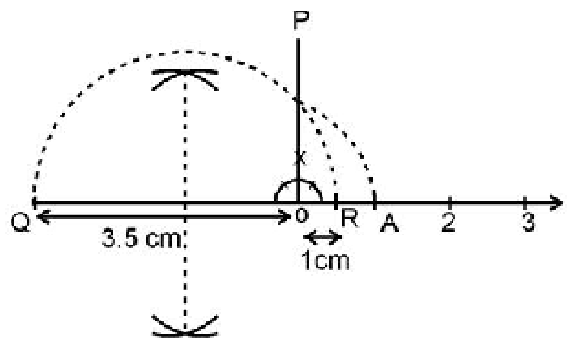
OR

$x=3+2\sqrt{2} \Rightarrow x^2=9+8+12\sqrt{2}=17+12\sqrt{2}$ 1

$\frac{1}{x^2}=\frac{1}{17+12\sqrt{2}}=\frac{17-12\sqrt{2}}{289-288}=17-12\sqrt{2}$ 1

$\therefore\ x^2+\frac{1}{x^2}=17+12\sqrt{2}+17-12\sqrt{2}=34$ 1

21. 'A' respresents $\sqrt{3\cdot 5}$ on the number line



3

22. Let $f(x) = ax^2+5x+b$

$f(3)=0 \Rightarrow 9a+15+b=0 \Rightarrow 9a+b=-15$ ----------(i) 1

$f\left(\frac{1}{3}\right)=0 \Rightarrow \frac{a}{9}+\frac{5}{3}+b=0 \Rightarrow a+9b=-15$ (ii) 1

(i) = (ii) $\Rightarrow$ a=b 1

23. If $x+y=5 \Rightarrow x+y+(-5)=0$ ½+½

$\therefore (x)^3+(y)^3+(-5)^3 = 3(x)(y)(-5)$ 1

$\Rightarrow \quad x^3+y^3+15xy = 125$

$\Rightarrow \quad x^3+y^3+15xy-125=0$ 1

OR $a+b+c=6 \Rightarrow (2-a)+(2-b)+(2-c)=0$ 1½

$\therefore (2-a)^3+(2-b)^3+(2-c)^3 = 3(2-a)(2-b)(2-c)$

$\therefore (2-a)^3+(2-b)^3+(2-c)^3-3(2-a)(2-b)(2-c)=0$ 1½

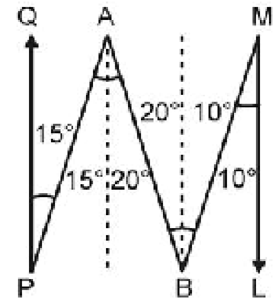
24. AB=BC=AC=6 units as ΔABC is equilateral ½

AO bisects base BC

$\Rightarrow$ OB=3 units 1

$\therefore OA^2=AB^2-OB^2=6^2-3^2=27 \Rightarrow OA=3\sqrt{3}$ 1

$\therefore$ Coordinates of A are $\left(0,\ 3\sqrt{3}\right)$ ½

25. Draw AD∥PQ, BE∥LM∥PQ  ½

$\Rightarrow \angle PAD=15^\circ \Rightarrow \angle DAB=20^\circ$ 1

$\Rightarrow \angle DAB=\angle ABE=20^\circ$ and $\angle EBM=\angle BML=10^\circ$ 1

$\Rightarrow x=30^\circ$ ½

26. In right triangle QTR, $x=90^\circ-40^\circ=50^\circ$ 1½

Again y is the exterior angle of ΔPSR

$\Rightarrow y=30^\circ+x=50^\circ+30^\circ=80^\circ$ 1½

27. $BD+DE = CE+DE \Rightarrow BE=CD$ 1

In Δ's ABE and ACD

$BE=CD$, $AE=AD$, $\angle ADE=\angle AED$

$\therefore \Delta ABE \cong \Delta ACD$ (SAS) 2

28. $S=\frac{42}{2}=21$, let a=18cm, b=10cm, c=42-(28)=14cm 1

$Ar(\Delta) = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{21(3)(11)(7)}$ 1

$= 21\sqrt{11}cm^2$ 1

SECTION-D

29. Let $P(x) = x^3+2x^2-5ax-7$ and $Q(x) = x^3+ax^2-12x+6$ 1

$P(-1) = p$ and $Q(2) = q$

$\therefore p=-1+2+5a-7 \Rightarrow p=5a-6$

$q=8+4a-24+6 \Rightarrow q=4a-10$ 1+½

$2p+q=6 \Rightarrow 10a-12+4a-10=6$

$\Rightarrow 14a=28 \Rightarrow a=2$ 1+½

OR

$x^2-5x+6 = (x-2)(x-3)$ ½+½

$P(x) = x^4-5x^3+8x-10x+12$

$P(2) = 16-40+32-20+12=0$ 1

$P(3) = 81-135+72-30+12=0$ 1

$\therefore (x-2)(x-3)$ divides P(x) completely 1

30. Let $x+y=p$, $y+z=q$, $z+x=r$

$\therefore LHS = p^3+q^3+r^3-3pqr$

$= (p+q+r)(p^2+q^2+r^2-pq-qr-rp)$ 1

Now $p+q+r=2(x+y+z)$ ½

$p^2+q^2+r^2-pq-qr-rp = (x+y)^2+(y+z)^2+(z+x)^2-(x+y)(y+z)-(y+z)(z+x)-(z+x)(x+y)$ ½

$$= \left[\begin{array}{l} x^2+y^2+2xy+z^2+2yz+2zx \\ x^2+y^2\ \ -xy\ +z^2\ \ \ -yz\ \ -xz \\ \ \ -y^2\ \ -xy\ \ -z^2\ \ \ -yz\ \ -xz \\ x^2\ \ \ \ \ \ -xy\ \ \ \ \ \ \ \ \ -yz\ \ -xz \end{array}\right] = x^2+y^2+z^2-xy-yz-zx$$ 1

$\therefore\ (p+q+r)\,(p^2+q^2+r^2-pq-qr-rp) = 2(x+y+z)\,(x^2+y^2+z^2-xy-yz-zx)$

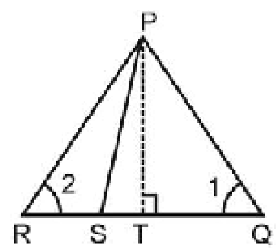
$= 2(x^3+y^3+z^3-3xyz)$ 1

31. $x^{12}-y^{12} = (x^6-y^6)(x^6+y^6)$ 1

$= (x^3-y^3)(x^3+y^3)(x^2+y^2)(x^4+y^4-x^2y^2)$ 1½

$= (x-y)(x^2+y^2+xy)(x+y)(x^2+y^2-xy)(x^2+y^2)(x^4+y^4-x^2y^2)$ 1½

32. $\angle Q+\angle R=180°-2\angle QPS=180°-2[\angle QPT+\angle TPS]$ 1



$=180° - 2[90° - \angle 1 + \angle TPS]$ 1

$\Rightarrow \angle 1 + \angle 2 = 2\angle 1 - 2\angle TPS$ 1

$\Rightarrow \angle TPS = \frac{1}{2}(\angle 1 - \angle 2) = \frac{1}{2}(\angle Q - \angle R)$ 1

OR

$\angle B+\angle C=90° \Rightarrow \angle B=90°-\angle C$ 1

$\angle BAL=90°-\angle B=90°-(90° - \angle C) = \angle C$ 1+1

$\therefore\ \angle BAL = \angle ACB$ 1

33. $\angle BAD+\angle DAC = \angle CAE+\angle CAD \Rightarrow \angle BAC=\angle DAE$ 1

In Δ's ABC and ADE

AB=AD, AC=AE and $\angle BAC=\angle DAE$

$\therefore$ Δ's are congruent 2

$\therefore$ BC = DE (cpct) 1

34. $\angle x=\angle y \Rightarrow \angle BDC=\angle AEB$ 1

In Δ's ABE and CBD 1

AB=BC, $\angle B=\angle B$, $\angle BDC=\angle AED$

$\therefore \Delta ABE \cong \Delta CBD$ [AAS] 2

$\therefore$ AE=CD 1