SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD (SIMO) 2013

SCREENING TEST

STANDARD X

X

MATHEMATICS

Time: 60 minutes | Maximum Marks : 85

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Real Numbers*	***5%***	***X***
2	*Polynomials*	***10%***	***X***
3	*Linear Equation in two variables*	***5%***	***X***
4	*Quadratic Equations*	***10%***	***X***
5	*Arithmetic Progressions*	***5%***	***X***
6	*Trigonometric Ratios*	***5%***	***X***
7	*Factorization and Identities*	***20%***	***IX***
8	*Congruent Triangles*	***10%***	***IX***
9	*Polygons*	***5%***	***IX***
10	*Circles*	***10%***	***IX***
11	*Solid Geometry (Sphere, Cuboid, Cube, Cylinder, Cone)*	***10%***	***IX***
12	*Triangles and its angles*	***5%***	***IX***

Instructions:

- The question paper contains 25 questions across two Sections to be answered in 60 minutes
- Section-A contains 10 questions. Each question carries **4** marks and may have MORE THAN ONE correct answer.
- Section-B contains 15 questions. Each question carries **3** marks and has ONLY ONE correct answer.
- One mark would be deducted for every wrong answer. No marks would be deducted for unattempted questions.
- You can retain the Question paper with you after the Olympiad.
- Fill the OMR sheet completely and carefully. Please leave space after initials in your name

SECTION – A

Consider the information below and answer the three questions that follow it

Consider a sequence $\{a_i\}$ of natural numbers $a_1, a_2, a_3, \ldots$ given by $a_k = 11^{k+2} + 12^{2k+1}$

1. When the product $a_1.a_2.a_3\ldots\ldots\ldots.a_{2012}.a_{2013}$ is divided by 11, the remainder is
   A) 0 B) 1 C) 5 D) None of these
2. If Highest Common Factor (HCF) of a_{2012} and a_{2013} is h. Then h is divisible by
   A) 19 B) 17 C) 133 D) 153
3. Which of the following statements is/true for all $k \in N$?
   A) a_k is never divisible by 5 B) a_k is always divisible by 7
   C) a_k is never divisible by 9 D) a_k is always divisible by 3

4. PA and PB are tangents to a circle with center O and with A and B on the circle. Another tangent is drawn at C on circle such that it cuts both PA and PB internally at Q and R respectively. Let incircle of triangle PQR meets sides QR, RP and PQ at K, L and M respectively. Then,
   A) PC cuts the triangle PQR into two triangles of equal perimeter
   B) QC = RK C) PK is internal angular bisector of $\angle QPR$ D) QC.CR=QK.RK

5. In a right angled triangle ABC (right angled at vertex C), incenter is equidistant from circumcenter and orthocenter. Then, it <u>always</u> happens that

A) $\frac{AB}{\sqrt{3}-1} = AC + BC$ B) Centroid coincides with incenter

C) AB=2BC D) One of the angles is 60^o

6. ABC is a triangle with $\angle A = 40^o$ and $\angle B = 60^o$. AD is internal angular bisector. BE is altitude and CF is diameter of circumcircle of triangle ABC with F on the circumcircle. AD and BE when extended meet the circumcircle at K and L. One of the angles of triangle KLF is/are

A) 80^o B) 20^o C) 40^o D) 70^o

7. ABC is a triangle. Semicircles are drawn on AB and BC as diameters. They cut at point P. D, E are midpoints AB and BC respectively. Also, area of triangle ABC is 60 sq units. Then, area of triangle PDE is _____ sq units.

A) 45 B) 30 C) 20 D) 15

8. p is a real number such that the equation in x, $(3-p^2)x^2+p(p+1)x=p+3$ has equal roots. Value of p is

A) 2 B) -2 C) -3 D) 3

9. $x=\frac{1}{2+\sqrt{3}}$ satisfies the equation $x^3+ax^2+bx+2=0$ where a and b are rational numbers. Then,

A) a=-2 B) b=-7 C) a=2 D) b=7

10. Consider the system of linear equations given by 3x+y=1 and k(2x+y-2)=x+y+1. Then the system will

A) never have infinite solutions for any value of k B) have no solutions for k=2

C) have no solutions for k=0 D) (0,0) satisfies the system for k=-1/2

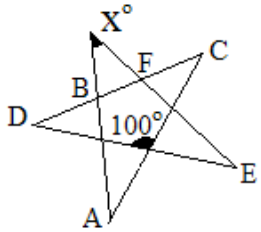
SECTION-B

11. Let $p = 2^{1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....+\frac{1}{2^{99}}}$, $q = 3^{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....+\frac{1}{2^{100}}}$

Then which of the following is true?

A) $4 > \frac{p}{q} > 3$ B) $3 > \frac{p}{q} > 2$ C) $2 > \frac{p}{q} > 1$ D) $1 > \frac{p}{q} > 0$

12. In the star given below, AB=BC and EF=DF, then value of x is



A) 20^o B) 30^o C) 40^o D) can not be determined

13. The number of solutions of the equation 20x+13y=2013 in positive integers x and y is

A) 7 B) 8 C) 99 D) None of these

14. Highest Common Factor (HCF) of 61^{2013} and 2011!+2012!+2013! is (n!=1x2x3x4x…..n)

A) 61^{32} B) 61^{33} C) 61^{34} D) None of these

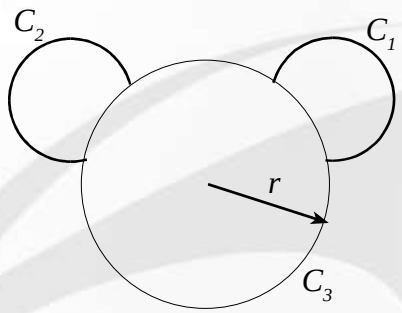
15. The number of positive integral solutions (in p and q) of equation $\frac{1}{p}+\frac{1}{q}=\frac{1}{2013}$ is

A) 0 B) 36 C) 27 D) None of these

16. Unit's digit of $\left(13^{20}+20^{13}\right)^{2013}$ is

A) 1 B) 3 C) 5 D) None of these

17.



A Mickey's face is given above. It consists of two semicircular arcs C_1 and C_2 each of radius 3.5. C_3 is a circle of radius 7. The area of the face is approximately equal to

A) 231sq. cm B) 184 cm^2 C) 176 sq. cm D) None of these

18. If $\frac{\sin A-\sin B}{\cos A+\cos B}=\sqrt{3}-2,$ value of $\frac{\cos A-\cos B}{\sin A+\sin B}$ is

A) √3+2 B) –(√3+2) C) 3-√3 D) 2-√3

19. Triangle ABC is formed by vertices A(p,q), B(q,r) and C(r,p) where p, q and r are distinct non-zero real numbers. If $\frac{p^2}{qr}+\frac{q^2}{pr}+\frac{r^2}{pq}=3,$ then it happens that

A) A, B and C lie on a circle with center at origin B) Origin is orthocenter of the triangle ABC
C) Centroid of the triangle is at origin D) All of the above

20. If $\left(x\frac{x^3-2y^3}{x^3+y^3}\right)^3+\left(y\frac{2x^3-y^3}{x^3+y^3}\right)^3=-1$ and x=√3, value of y is

A) √3+1 B) √3-1 C) √3+3 D) None of these

21. It takes 10 seconds to burn top 1 centimeter of the candle. Next one centimeter (cm) takes 20 seconds. Next cm takes 30 seconds and so on. If the average burn rate for the entire candle is 1 cm per minute, height of the candle is

A) 10 cm B) 11 cm C) 12 cm D) None of these

22. a,b are non-zero rational numbers such that a*b = $\frac{a+b}{ab}$ where * is a binary operation. Then consider the following statements.

I. * is associative for non zero rational numbers.

II. For any non-zero rational number a, there exist another non zero rational number b such that a*b=b*a=a

Which of the above statements is/are true?

A) Only I B) Only II C) Both I & II D) Neither I nor II

23. ABC is an equilateral triangle with D and E as midpoints of sides AB and AC respectively. DE when extended on both sides meet the circumcircle of triangle ABC at K and L. Then, $\angle KAL$ is

A) 90^o B) 120^o C) 135^o D) None of these

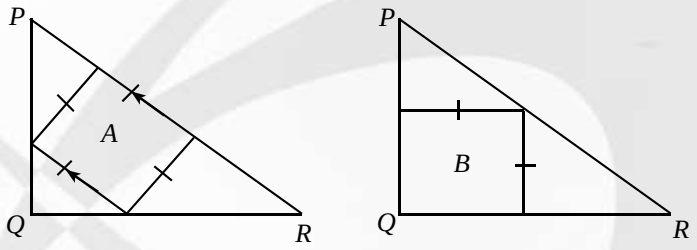
24. I. There is no isosceles triangle whose perimeter is 12 units and area is 6 sq. units

II. There is no right angled triangle whose perimeter is 30 units and area is 30 sq. units

Which of the above statements is/are true?

A) Only I B) Only II C) Both I and II D) Neither I nor II

25. Two squares A and B are drawn in a right angled isosceles triangle PQR as shown below.



Ratio of area of square A to that of square B is

A) 1:1 B) 4:5 C) 8:9 D) None

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	C,D	A,C	A,B,C	A,B,C,D	A,B,C,D	A,C	B	B,C,D	A,B,C	A,C
S.NO.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
KEY	C	A	D	A	C	B	B	C	D	C
S.NO.	**21**	**22**	**23**	**24**	**25**					
KEY	B	B	A	C	D					

SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD (SIMO) 2013

SCREENING TEST

STANDARD IX

IX

MATHEMATICS

Time: 60 minutes | Maximum Marks : 85

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Number system*	***10%***	***IX***
2	*Exponents of Real Numbers*	***10%***	***IX***
3	*Algebraic Identities & Factorization*	***25%***	***IX***
4	*Mensuration*	***25%***	***VIII***
5	*Polygons and Quadrilaterals*	***10%***	***VIII***
6	*Rational Numbers*	***10%***	***VIII***
7	*Squares & Cubes - Properties*	***10%***	***VIII***

Instructions:

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SECTION – A

Consider the information below and answer the three questions that follow it

Consider a sequence $\{a_i\}$ of natural numbers $a_1, a_2, a_3, \ldots$ given by $a_k = 11^{k+2} + 12^{2k+1}$

1. Unit's digit of a_{2013} is
   A) 3 B) 5 C) 7 D) 9

2. If Highest Common Factor (HCF) of a_{2012} and a_{2013} is h. Then h is divisible by
   A) 19 B) 17 C) 133 D) 153

3. Which of the following statements is/true for all $k \in N$?
   A) a_k is never divisible by 5 B) a_k is always divisible by 7
   C) a_k is never divisible by 9 D) a_k is always divisible by 3

4. D is midpoint of side BC of triangle ABC. Also, $\angle ADB : \angle ADC = 1:2$, Also known that triangles ABD and ADC are isosceles Then possible values of AC:BC is/are
   A) 3:2 B) $3:\sqrt{2}$ C) $\sqrt{3}:\sqrt{2}$ D) $\sqrt{3}:2$

5. P is a point inside square ABCD of side 1 unit. It is known that PA+PB+PC+PD is of integral length, i.e., an integer. The possible value(s) of PA+PB+PC+PD is/are
   A) 2 B) 3 C) 4 D) 5

6. x,y,z are distinct numbers such that $\frac{1}{x-y}+\frac{1}{y-z}+\frac{1}{z-x}=2$. Possible values of $\frac{(y-z)}{(x-y)(x-z)}+\frac{(z-x)}{(y-z)(y-x)}+\frac{(x-y)}{(z-x)(z-y)}$ is/are

A) 1 B) 2 C) 4 D) 8

7. x,y are real numbers such that $(3x-2)^{(y-3)}=(y-1)^{(x-4)}$. Then possible value(s) of x+y is/are

A) 7 B) 3 C) -1 D) None of these

8. Let n be a natural number which is given by

$n=\left\{\left(2^{512}+1\right)\left(2^{256}+1\right)\left(2^{128}+1\right)\left(2^{64}+1\right)\left(2^{32}+1\right)\left(2^{16}+1\right)\left(2^{8}+1\right)\left(2^{4}+1\right)\left(2^{2}+1\right)(2+1)\right\}+1$

Which of the following statements is/are true?

A) n is a perfect cube B) n is a perfect square

C) units digit of n is 6 D) Only two primes divide n perfectly

9. Consider the equation $x+y+xy=x^2+y^2$ where x, y are non-negative integers. Possible value of x+y is/are

A) 0 B) 1 C) 3 D) 4

10. In a right angled triangle ABC (right angled at vertex C), incenter is equidistant from circumcenter and orthocenter. Then, it <u>always</u> happens that

A) $\frac{AB}{\sqrt{3}-1}=AC+BC$ B) Centroid coincides with incenter

C) AB=2BC D) One of the angles is 60^o

SECTION-B

Consider the information below and answer the three questions that follow it

ABC is a right angled triangle with incircle C. C touches sides BC, AC and AB at D, E and F respectively.

11. If $\angle DEF:\angle EDF=3:4$, then $\angle EFD$ is equal to

A) 75^o B) 60^o C) 45^o D) None of these

12. If triangles FAE and DCE are congruent, then ratio of area of triangle ABC to that of BDF is

A) $4+3\sqrt{2}$ B) $3+4\sqrt{2}$ C) $6+4\sqrt{2}$ D) None of these

13. EF when extended cuts CB extended at G. Also, EGC is isosceles triangle. Then, $\angle EFD$ is equal to

A A) 75^o B) 60^o C) 45^o D) None of these

14. y,z are digits such that

p= 0.yzyzyzyz….. = $0.\overline{yz}$

q=0.yz

r=0.zyzyzy……. = $0.\overline{zy}$

If 275p=1+275q, possible value of r-p is/are equal to

A) $0.\overline{27}$ B) $0.\overline{72}$ C) $0.\overline{54}$ D) None of these

15. A number n is divisible by both 6 and 9. Which of the below statements is true?
I. n is always divisible by 18.
II. n is never divisible by 19.
A) Only I B) Only II C) Both I and II D) Neither I nor II

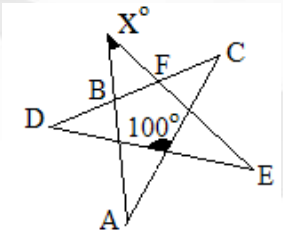
16. Three natural numbers p,q,r are is ratio 2:3:4. Sum of their cubes is 21ABC3 when A,B,C are distinct digits. Which of the following statements is/are true?
A) There are only 4 distinct primes that divide 21ABC3.
B) 21ABC3 leaves a remainder 4 when divided by 7.
C) p+r divides 21ABC3
D) q divides 21ABC3

17. Let X, Y, Z and W be any four digits. Let number A=2012XYZW201420152016 and number B is given by B=20112012201320142015. For any digits X, Y, Z and W, LCM of A and B is divisible by
A) 22 B) 25 C) 24 D) 27

18. LCM of two numbers a and b (a>b) is 169. Then which of the following should be true?
A) a=169 B) b=1 C) Both A and B D) Neither A nor B

19. Let $p = 2^{1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....+\frac{1}{2^{99}}}$, $q = 3^{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....+\frac{1}{2^{100}}}$
Then which of the following is true?
A) $4 > \frac{p}{q} > 3$ B) $3 > \frac{p}{q} > 2$ C) $2 > \frac{p}{q} > 1$ D) $1 > \frac{p}{q} > 0$

20. In the star given below, AB=BC and EF=DF, then value of x is



A) 20^o B) 30^o C) 40^o D) can not be determined

21. $x=\frac{1}{2+\sqrt{3}}$ satisfies the equation $x^3-2x^2+px+2=0$. Value of p is
A) 7 B) -7 C) 5 D) -5

22. a, b, c are numbers that satisfy $\frac{(2a+b)^3+(2b+\sqrt{2})^3+(a+2\sqrt{2})^3}{3\sqrt{2}} = (a+2\sqrt{2})(\sqrt{2}b+1)(2a+b)$.
Then, value of a+b is
A) $-2\sqrt{2}$ B) $2\sqrt{2}$ C) Either A or B D) Neither A nor B

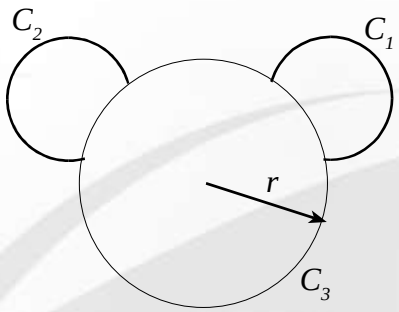
23. If $\left(x\frac{x^3-2y^3}{x^3+y^3}\right)^3+\left(y\frac{2x^3-y^3}{x^3+y^3}\right)^3=-1$ and x=√3, value of y is

A) √3+1 B) √3-1 C) √3+3 D) None of these

24. Consider sum of fractions $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+\frac{1}{30}+\frac{1}{42}=\frac{p}{q}\left(p,q\in N\right)$ and HCF(p,q)=1. Then value of p+q is

A) 11 B) 13 C) 15 D) None of these

25.



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A) 231sq. cm B) 184 cm^2 C) 176 sq. cm D) None of these

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	D	A,C	A,B,C	D	B	C	A,B,C	B,C	A,B,C,D	A,D
S.NO.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
KEY	A	C	A	A	A	D	C	A	C	A
S.NO.	**21**	**22**	**23**	**24**	**25**					
KEY	B	B	D	B	B					

SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD (SIMO) 2013
SCREENING TEST
STANDARD VIII

VIII

MATHEMATICS

Time: 60 minutes | Maximum Marks : 85

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Rational Numbers*	***10%***	***VIII***
2	*Squares & Cubes - Properties*	***10%***	***VIII***
3	*Algebraic Identities & Factorization*	***20%***	***VIII***
4	*Properties of Triangles*	***10%***	***VII***
5	*Lines and angles*	***10%***	***VII***
6	*Congruent Triangles – Basic Theorems*	***5%***	***VII***
7	*Divisibility of natural numbers by 2,3,4,5,6,7,8,9,10 & 11*	***10%***	***VII***
8	*Number system- Integers, Fractions, Decimals, Rationals*	***10%***	***VII***
9	*Ratio & Proportion, Percentages, Unitary Method*	***10%***	***VII***

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SECTION – A

1. ABCD is a quadrilateral such that AD=BC and also $\angle BCD = \angle ADC$. E is midpoint of CD. Then which of the following statements is/are always true?
   A) E lies on perpendicular bisector of AB
   B) ABCD is a trapezium
   C) $\angle CBA = \angle BAD$
   D) AD and BC when extended meet in a right angle.

2. Consider statements below. Only one of them is false. Choose the true statements.
   A) ABC is a obtuse angled triangle
   B) ABC is an isosceles triangle
   C) ABC is a right angled triangle
   D) $\angle A = 30^0$

3. ABC is a right angled triangle with $\angle B = 90^o$. Semicircles are drawn on AB and BC as diameters. They cut at point P. D,E are midpoints AB and BC respectively. If area of triangle ABC is 12 sq units, area of triangle PDE is _____ sq. units.

   A) 3 B) 4 C) 6 D) None

4. Let $(x-p)(x-p^2)(x-p^3) \equiv ax^3 + bx(x-2) + c$. Possible values of p is/are

A) $2^{1/4}$ B) $2^{1/8}$ C) $2^{3/8}$ D) $2^{1/2}$

5. An algebraic expression whose all terms have same degree is called homogenous (algebraic) expression. Which of the below statements is/are always true?

A) Sum of two homogenous expressions is also homogenous

B) $\left(x^2 - xy + 2y^2\right)^5$ is homogenous

C) Product of two homogenous expressions is also homogenous

D) A homogenous expression with three variables and of degree 3 can have a maximum of 10 terms.

6. y,z are digits such that

p= 0.yzyzyzyz….. = $0.\overline{yz}$

q=0.yz

r=0.zyzyzy……. = $0.\overline{zy}$

If 275p=1+275q, possible value of r-p is/are equal to

A) $0.\overline{27}$ B) $0.\overline{72}$ C) $0.\overline{54}$ D) None of these

7. There are no perfect squares which leave a remainder of p when divided by q. Which of the following can represent numbers (p,q)?

A) (8,2) B) (6,2) C) (8,5) D) (6,5)

8. The number N=2013 A2012B2010 is divisible by 66 where A and B are unknown digits. Then, which of the following is/are always true?

A) B>A

B) N cannot be divisible by 7

C) N cannot be divisible by 8

D) N cannot be divisible by 9

9. a is a natural number such that a^3 is a perfect square. b is another natural number such that 5a=4b. Then, it always happens that

A) b^2 is a perfect cube

B) b is a perfect square

C) a+b is a perfect cube

D) a+b is a perfect square

10. Three natural numbers p,q,r are is ratio 2:3:4. Sum of their cubes is 21ABC3 when A,B,C are distinct digits. Which of the following statements is/are true?

A) There are only 3 distinct primes that divide 21ABC3.

B) 21ABC3 leaves a remainder 4 when divided by 7.

C) p+r divides 21ABC3

D) q divides 21ABC3

SECTION-B

11. ABCD is a square. If AB and BC are reduced by 2 mts and 3 mts, its new area becomes 156 sq meters. Instead, if AB remains unchanged and BC in reduced by 5 mts, then its new area is

A) 132 sq. mts B) 144 sq. mts C) 150 sq. mts D) None

12. a,b,c,d are real number such that $a^b = \sqrt{c}$, ac= $d^{3/4}$ and $a^2+d^2=2ad$. Then value of b is

A) ½ B) – ¼ C) – 1/8 D) None of these

13. Let $p = 2^{1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....+\frac{1}{2^{99}}}$, $q = 3^{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....+\frac{1}{2^{100}}}$
Then which of the following is true?

A) $4 > \frac{p}{q} > 3$ B) $3 > \frac{p}{q} > 2$ C) $2 > \frac{p}{q} > 1$ D) $1 > \frac{p}{q} > 0$

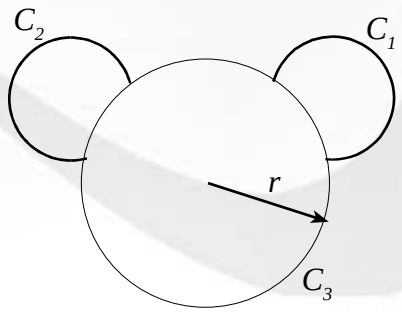
14. x and y are real numbers that satisfy $\frac{6x-2}{9} - \frac{3y}{18} = \frac{6y}{9} - \frac{(3x+5)}{18} + \frac{1}{3}$. If $y = \frac{7}{23}$, then value of x is

A) $\frac{16}{23}$ B) $\frac{27}{46}$ C) $\frac{44}{69}$ D) None

15. * is a commutative operation on real numbers a and b such that $a*b=2a+kb+3ab-ab^2+ma^2b$, where k and m are unknown fixed real numbers. If p+q=3 for real numbers p and q, then value of p*q is
A) 3 B) 6 C) 9 D) None

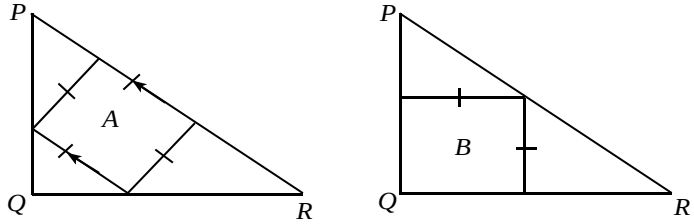
16. a,b are non-zero rational numbers such that $a*b = \frac{a+b}{ab}$ where * is a binary operation. Then consider the following statements.
I. * is associative for non zero rational numbers.
II. For any non-zero rational number a, there exist another non zero rational number b such that a*b=b*a=a
Which of the above statements is/are true?
A) Only I B) Only II C) Both I & II D) Neither I nor II

17.



A Mickey's face is given above. It consists of two semicircular arcs C_1 and C_2 each of radius 3.5. C_3 is a circle of radius 7. The area of the face is approximately equal to
A) 231sq. cm B) 184 cm^2 C) 176 sq. cm D) None of these

18. Two squares A and B are drawn in a right angled isosceles triangle PQR as shown below.



Ratio of area of square A to that of square B is
A) 1:1 B) 4:5 C) 8:9 D) None

19. Remove all even numbers and multiples of 5 from set of natural numbers. Order the elements of the set in ascending order like 1,3,7,9,11,13,17,……. The unit's digit of product 1x3x7x9x……. x2013 is
A) 1 B) 7 C) 3 D) 9

20. x,y,z, w are four odd natural numbers. Let $u=x^2+y^2+z^2+w^2$. Consider following statements
I. u is always divisible by 4 II. u is never divisible by 8.
Which of the above statements is/are true?
A) Only I B) Only II C) Both I and II D) Neither I nor II

21. A number n is divisible by both 6 and 9. Which of the below statements is true?
I. n is always divisible by 18.
II. n is never divisible by 19.
A) Only I B) Only II C) Both I and II D) Neither I nor II

22. $\dfrac{\left(\frac{1}{8}\right)^a \cdot \left(\frac{1}{4}\right)^{a/2} \left(\frac{1}{2}\right)^{a/3}}{\sqrt{2}} = 2^a$. Then, value of a is

A) $-\dfrac{3}{8}$ B) $\dfrac{3}{8}$ C) $+\dfrac{3}{32}$ D) $\dfrac{-3}{32}$

23. ABCD is a quadrilateral. Diagonal AC divides it into two congruent triangles. Diagonal BD cuts it into two triangles of equal area. The ABCD should be
A) rhombus B) square C) kite D) parallelogram

24. Two sets of data is given regarding a triangle ABC in statements I & II.
I. length of side AB, $\angle A$, Area of triangle ABC
II. Length of side AB, $\angle C$, Area of triangle ABC.
We can construct triangle ABC using data in
A) Only I B) Only II C) Either I or II D) Neither I nor II

25. Consider sum of fractions $\dfrac{1}{2}+\dfrac{1}{6}+\dfrac{1}{12}+\dfrac{1}{20}+\dfrac{1}{30}+\dfrac{1}{42}=\dfrac{p}{q}\left(p,q\in N\right)$ and HCF(p,q)=1. Then value of p+q is
A) 11 B) 13 C) 15 D) None of these

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	A,B,C	A,B,D	A	D	B,C,D	A	A,B,C,D	A,B,C,D	D	A,D
S.NO.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
KEY	C	C	C	C	B	A	B	C	B	A
S.NO.	**21**	**22**	**23**	**24**	**25**					
KEY	A	D	D	C	B					

SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD (SIMO) 2013

SCREENING TEST

STANDARD VII

VII

MATHEMATICS

Time: 60 minutes | Maximum Marks : 60

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Number system-Integers, Fractions, Decimals, Rationals*	***30%***	***VII***
2	*Algebraic Expressions*	***10%***	***VII***
3	*Divisibility of natural numbers by 2,3,4,5,6,7,8,9,10 & 11*	***10%***	***VII***
4	*Ratio & Proportion, Unitary Method*	***10%***	***VI***
5	*Triangles*	***20%***	***VI***
6	*Circles*	***10%***	***VI***
7	*Quadrilaterals*	***10%***	***VI***

Instructions:

- The question paper contains 20 questions to be answered in 60 minutes
- Each question carries **3** marks and has ONLY ONE correct answer.
- One mark would be deducted for every wrong answer. No marks would be deducted for unattempted questions.
- You can retain the Question paper with you after the Olympiad.
- Fill the OMR sheet completely and carefully. Please leave space after initials in your name

1. Consider the following statements

   I. Subtraction over integers satisfies associative property

   II. Under integers, multiplication distributes over subtraction. Also, it is both right and left distributive

   Which of the above statements is/are true?

   A) Only I B) Only II C) Both I & II D) Neither I nor II

2. a,b,c are three distinct integers such that a > b and $\frac{a}{c} < \frac{b}{c}$. Then, which of the following shall be true?

   A) a and b are negative B) c is negative C) Product abc is negative D) All the above

3. Dhoni and Raina have same pizzas. But Dhoni's pizza is cut into 8 equal pieces and Raina's pizza is cut into 6 equal pieces. After eating 3 pieces each, they exchanged the pizzas and ate the remaining pizza they got. What fraction of two pizzas combined is eaten by Dhoni?

   A) ½ B) 5/16 C) 3/8 D) 7/16

4. p and q are numbers that satisfy $1 \le p \le 2$ and $2 \le q \le 3$. Then, the fraction p/q can be equal to

   A) 1.2 B) 0.25 C) 0.30 D) 0.56

5. I went to a magic show. The magician asked me to choose a number. Multiply it by 2. Add 2 to the product and then subtract 5 from resulting number and then finally divide the result by 2. He asked me the final result I got. I said 8. The number I chose is

   A) 5 B) 7 C) 9 D) None of the above

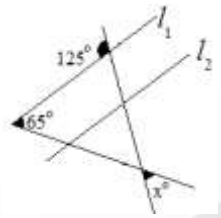
6. If –(-(x-3)+(x-4))-(3x-1)=5, then value of x is

   A) 0 B) 1 C) -1 D) None of these

7. In this question paper of 20 questions, each correct answer has 3 marks and one mark will be subtracted for every wrong answer. If you attempted all questions and got 8 marks, number of wrong answers is

   A) 7 B) 9 C) 11 D) 13

8. In the below figure, l_1 and l_2 are parallel. Transversals are inclined at 65^o and 125^o. Then, Value of x is

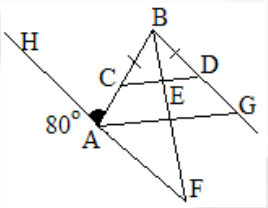


   A) 40^o B) 50^o C) 60^o D) None of the above

9. Triangle ABC and PQR can be joined along equal sides AB and PQ (AB=PQ). The resulting polygon is an equilateral triangle CAR. If $\angle PQR = 70^o$, then $\angle CAB$ equals

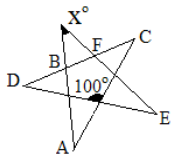
   A) 35^o B) 50^o C) 60^o D) 10^o

10. In isosceles triangle BCD, BE is median. Lines AF and BD are parallel. AG is median of triangle BAF.



   A)AC=GD B) BG=FG C) ABGF is parallelogram D) All the above are true

11. In the star given below, AB=BC and EF=DF, then value of x is



   A) 20^o B) 30^o C) 40^o D) can not be determined

12. A rectangular paper is eaten away by moths. Then the remaining paper when compared to original

   A) can have greater perimeter B) can have greater area C) Both A and B D) Neither A nor B

13. Rahul has a wire of length 2m. He has bent it in form of a rectangle. The maximum possible area of this rectangle is

   A0 0.15 m^2 B) 0.20 m^2 C) 0.25 m^2 D) 0.30 m^2

14. I. Every natural number is an integer II. Every whole number is a rational number.
Which of the above statements is/are true?
A) Only I B) Only II C) Both I & II D) Neither I nor II

15. Remove all multiples of 5 from natural numbers and multiply all the remaining numbers till 2014. Unit's digit of this product is
A) 2 B) 4 C) 6 D) 8

16. The number 2014201420142014201420142014 is divisible by
A) 27 B) 33 C) 24 D) None of these

17. The number 94A71B48, where A and B are digits is divisible by 66. Possible value of A is
A) 1 B) 5 C) 8 D) 0

18. LCM of two numbers a and b (a>b) is 169. Then which of the following should be true?
A) a=169 B) b=1 C) Both A and B D) Neither A nor B

19. Let X, Y, Z and W be any four digits. Let number A=2012XYZW201420152016 and number B is given by B=20112012201320142015. For any digits X, Y, Z and W, LCM of A and B is divisible by
A) 22 B) 25 C) 24 D) 27

20. The alphabets of word ABC can be arranged in six ways as ABC, ACB, BAC, BCA, CAB and CBA. Similarly the number of ways of arranging alphabets of word SONIA is
A) 24 B) 48 C) 60 D) 120

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	A,B,C	A,B,D	A	D	B,C,D	A	A,B,C,D	A,B,C,D	D	A,D
S.NO.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
KEY	C	C	C	C	B	A	B	C	B	A
S.NO.	**21**	**22**	**23**	**24**	**25**					
KEY	A	D	D	C	B					

SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD (SIMO) 2013

SCREENING TEST

STANDARD VI

VI

MATHEMATICS

Time: 60 minutes Maximum Marks: 60

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Number System*	***5%***	***VI***
2	*Factors and Multiples*	***20%***	***VI***
3	*Whole Numbers, Integers and Fractions*	***15%***	***VI***
4	*Decimals*	***5%***	***VI***
5	*Simplifications*	***10%***	***VI***
6	*Divisibility of natural numbers by 2,3,4,5,6,8,10*	***10%***	***VI***
7	*Simple word problems*	***20%***	***V***
8	*Clock and Time*	***5%***	***V***
9	*Basic Mathematical Operators - +, -, x, %*	***10%***	***V***

Instructions:

- The question paper contains 20 questions to be answered in 60 minutes
- Each question carries **3** marks and has ONLY ONE correct answer.
- One mark would be deducted for every wrong answer. No marks would be deducted for unattempted questions.
- You can retain the Question paper with you after the Olympiad.
- Fill the OMR sheet completely and carefully. Please leave space after initials in your name

1. I. Difference of any two whole numbers is also a whole number
   II. Product of any two whole numbers is also a whole number
   Which of the above statements is/are true?
   A) Only I B) Only II C) Both I & II D) Neither I nor II
2. I. Multiplication is commutative under whole numbers
   II. Subtraction is associative under whole numbers
   Which of the above statements is/are true?
   A) Only I B) Only II C) Both I & II D) Neither I nor II

3. My math teacher told me a trick to multiply a number with 9. She asked me to first multiply it with 10 and subtract the number from it. For example, 167x9=167x10-167=1670-167=1503. Which of the below properties of whole numbers is used in this trick?
   A) Multiplication is Commutative B) Distributive property over addition
   C) Associative property over multiplication D) All the above

4. Which of the following 8-digit numbers is divisible by 198?
   A) 27646920 B) 35816256 C) 14583184 D) 38619504

5. The number 170916AB (A, B are digits) is divisible by 66. Then value of digit A can be
   A) 9 B) 3 C) 7 D) 5

6. LCM of two numbers a and b (a > b) is 169. Then which of the below should be true?
   A) a=169 B) b=1 C) Both A and B D) Neither A nor B

7. Let X, Y, Z, W be any four digits. Let A=2012XYZW201420152016 and B=20112012201320142015 Then, for any values of digits X, Y, Z and W; LCM of A and B is divisible by
   A) 22 B) 25 C) 24 D) 27
8. At which of the following time, the angle between hours hand and minutes hand is an obtuse angle?
   A) 12:10 AM B) 03:45 PM C) 10:40 PM D) All the above
9. ABCD is a rectangle. Then which of the following statements is true?
   A) AB and CD are parallel B) AB and BC are perpendicular
   C) Both A and B are true D) Neither A nor B is true
10. A rectangular paper is eaten by moths. Then the resulting paper can
   A) have greater perimeter B) have greater area C) Both A and B D) Neither A nor B
11. Perimeter of a square is 12cms. Its area is
   A) 9 cm^2 B) 12 cm^2 C) 24 cm^2 D) 48 cm^2
12. Value of $\frac{37}{1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}}$ is
   A) 20 B) 30 C) 60 D) None of these
13. $\left\{1-\left(\frac{1}{2}+\left(\frac{1}{3}-\frac{1}{4}\right)\right)\right\}\div\frac{1}{6}$ is equal to
   A) 7/2 B) 5/2 C) 3/2 D) None of these
14. Let a, b, c,…… be factors of number 28. The value of $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+.....$ is equal to
   A) 13/7 B) 14/7 C) 27/13 D) None of these
15. Number of factors of number 60 is
   A) 6 B) 8 C) 10 D) 12
16. Sita has 20 pencils while Rita has 30 pencils. Arun took ½ of Sita's pencils and 1/3 of Rita's pencils and gave ¼ th of them to Salim. Number of pencils left with Arun is
   A) 10 B) 12 C) 14 D) 15
17. A = 1-2+3-4+5-6+…….+2013-2014 and B=1-2+3-4+5-6+…….-2014+2015. A+B equals
   A) 2014 B) 2015 C) 0 D) 1
18. The word CAT can be arranged as CAT, CTA, TAC, TCA, ACT and ATC. Number of ways of arranging the word CATS is
   A) 6 B) 12 C) 18 D) 24
19. If $\frac{\frac{1}{2}+\frac{1}{3}}{1+\frac{1}{A}}=\frac{1}{4}$, value of A is
   A)3/7 B) 7/3 C) 2/7 D) 7/2

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	B	A	B	D	A	A	C	B	C	A
S.NO.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
KEY	A	D	B	B	D	D	D	D	A	D

SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD (SIMO) 2013

SCREENING TEST

STANDARD V

V

MATHEMATICS

Time: 60 minutes Maximum Marks: 45

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Basic Mathematical Operators - +, -, x, %*	***20%***	***V***
2	*Factors and Multiples*	***10%***	***V***
3	*Divisibility by 2,3,4,5 and 6*	***20%***	***V***
4	*Simple word problems*	***20%***	***V***
5	*Identifying Geometric Shapes*	***10%***	***V***
6	*General Ability*	***20%***	***N/A***

Instructions:

- The question paper contains 15 questions to be answered in 60 minutes
- Each question carries **3** marks and has ONLY ONE correct answer.
- One mark would be deducted for every wrong answer. No marks would be deducted for unattempted questions.
- You can retain the Question paper with you after the Olympiad.
- Fill the OMR sheet completely and carefully. Please leave space after initials in your name

1. See the multiplication below where A, B are unknown digits

$$\begin{array}{r} 9A \\ \times B2 \\ \hline 3906 \end{array}$$

Value of digit B is

A) 5 B) 6 C) 3 D) 4

2. Value of 307-239+65-89 is

A) 44 B) 54 C) 46 D) 64

3. Ramu went to a shop and asked for 2 pens and 3 pencils. His friend Somu also came to shop. He asked for 3 pens and 1 pencil. Interestingly, both paid same amount to the shop keeper. If each pencil costs Rs.2, cost of each pen is

A) Rs.7 B) Rs.5 C) Rs.4 D) Rs.8

4. In England, height is measured in inches. Two inches is approximately equal to 5cms. Kevin is 76 inches tall while Mahesh is 185cms tall. Who is taller among the two?

A) Kevin B) Mahesh C) Both are equally tall D) None

5. James and Jimmy went for shopping. Each shirt costs $25. James has $365 and Jimmy has $610. Number of shirts they can buy with combined amount is

A) 40 B) 47 C) 43 D) 39

6. The distance between Hyderabad and Bangalore is 600kms. Cost of petrol is Rs. 75 per liter. Bus can travel 3 Kms for one liter. Cost of bus fare is Rs. 750. If bus has 42 seats, profit made in one trip is

A) Rs. 15,000 B) Rs. 17,500 C) Rs. 16,500 D) Rs. 18,000

7. Today Onions are sold at Rs. 80 per kg. Two years back, we used to get 11Kgs more for Rs. 400. Cost of 5 Kgs of Onions two years back is
   A) Rs. 100 B) Rs. 125 C) Rs. 150 D) Rs. 180

8. The geometric shape of book is
   A) cube B) cylinder C) sphere D) cuboid

10. 10^{th} November 2013 is Sunday. 14^{th} February 2014 is
   A) Thursday B) Saturday C) Sunday D) Friday

10. There are four routes from City A to City B. There are 3 routes from City B to City C. Number of different routes from City A to City C through City B is
   A) 7 B) 12 C) 8 D) 11

11. Which of the following numbers is divisible by 6?
   A) 2345 B) 3456 C) 4567 D) 5678

12. The largest number that can be made using digits 3,0,4,8 is
   A) 8403 B) 4830 C) 8430 D) 4830

13. An egg tray has 4 rown and 5 columns to hold eggs. Number of trays required to hold 160 eggs is
   A) 8 B) 9 C) 7 D) 6

14. Sita is 5 inches taller than Rita, but 2 inches shorter to Suman who is 70 inches tall. Height of Rita is
   A) 62 inches B) 63 inches C) 64 inches D) None of these

15. Look at this pattern 23x9=221, 233x9=2321, Observing the pattern, the value of quotient obtained when 23,333x9 – 2,333x9 is divided by 100 is
   A) 189 B) 199 C) 233 D) None of these

* * *

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	D	A	C	A	D	C	B	D	D	B
S.NO.	**11**	**12**	**13**	**14**	**15**					
KEY	B	C	A	B	A					

SIMO EDUCATION

INDIAN MATHEMATICS OLYMPIAD 2013

SCREENING TEST

STANDARDS III & IV

III&IV

MATHEMATICS

Time: 60 minutes | Maximum Marks: 45

Syllabus:

S.No.	*Topic*	*Weightage*	*Class*
1	*Basic Mathematical Operators - +, -, x, %*	***30%***	***IV***
2	*Divisibility by 2 and 3*	***10%***	***III***
3	*Simple word problems*	***20%***	***III***
4	*General Ability*	***40%***	***N/A***

Instructions:

- The question paper contains 15 questions to be answered in 60 minutes
- Each question carries **3** marks and has ONLY ONE correct answer.
- One mark would be deducted for every wrong answer. No marks would be deducted for unattempted questions.
- You can retain the Question paper with you after the Olympiad.
- Fill the OMR sheet completely and carefully. Please leave space after initials in your name
- Grades 3 and 4 will have different merit cut-off

1. We need three match sticks to build alphabet N. Number of match sticks needed to build M is
   A) 3 B) 4 C) 5 D) 6

2. I have 22 rupees. My dad gave me 35 more rupees. I bought a gift for my sister for Rs. 40. Now I have
   A)16 Rupees B) 19 Rupees C) 27 Rupees D) 17 Rupees

3. 275 + 128 + 109 = ?
   A) 512 B) 502 C) 492 D) 522

4. One pen costs 5 rupees. One pencil costs 2 rupees. Ram sold 10 pens and 20 pencils. Sham sold 14 pens and 10 pencils. Then who got more money?
   A) Ram B) Sham C) Both got equal amount D) None

5. Electricity reading is 360 units. Last month on the same day of billing, it was 237 units. If each unit costs 5 rupees, the electricity bill for this month is
   A) Rs. 535 B) Rs 615 C) Rs 725 D) None

6. 834 – 348 =?
   A) 438 B) 483 C) 496 D) 486

7. The next number in the pattern 3, 7, 11, 15, ……. is
   A) 21 B) 18 C) 27 D) 19

8. Tomatoes cost 8 rupees per kg. Potatoes cost 5 rupees per kg. Cost of 2kgs of tomatoes and 3kgs of potatoes is
   A) Rs. 30 B) Rs. 31 C) Rs. 35 D) Rs. 41

9. Sita is 5 inches taller than Rita, but 2 inches shorter to Suman who is 70 inches tall. Height of Rita is
   A) 62 inches B) 63 inches C) 64 inches D) None of these

10. The largest number that can be made using digits 3,0,4,8 is
   A) 8403 B) 4830 C) 8430 D) 4830

11. 10^{th} November 2013 is Sunday. 1^{st} January 2014 is
   A) Thursday B) Saturday C) Sunday D) Wednesday

12. There are three routes from City A to City B. There are two routes from City B to City C. Number of different routes from City A to City C through City B is
   A) 7 B) 6 C) 8 D) 11

13. The geometric shape of cricket ball is
   A) circle B) cylinder C) square D) sphere

14. Which of the following numbers is divisible by 6?
   A) 235 B) 346 C) 456 D) 679

15. 725 + 85 = 629 + N. Number N is
   A) 182 B) 162 C) 172 D) None of these

***

KEY										
S.NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
KEY	B	D	A	C	B	D	D	B	B	C
S.NO.	**11**	**12**	**13**	**14**	**15**					
KEY	D	B	D	C	A					

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