

NIVRITHI EDUCATION AND SOCIAL TRUST

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MATHEMATICS AND SCIENCE OLYMPIAD 2017-18

Date: 7th January 2018

Time: 3 Hrs

Venue: Sri Saradaniketan College of Arts for Women, Saradapuri, Karur.

.....
Name.....

M / F.....Age.....yrs Class

Father's Name

School.....

Mobile Number

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1. $\left(1 - \frac{1}{2}\right)\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\left(1 - \frac{1}{5}\right) \dots \left(1 - \frac{1}{n}\right)$ is

(a) 1 (b) $\left(1 - \frac{1}{n}\right)^2$

(c) $\frac{1}{n}$ (d) n

2. The number of composite numbers between 101 and 120 are

- (a) 11 (b) 12
(c) 13 (d) 14

3. A boy is 25 years younger than his father. Three years ago, the

boy's age was one sixth the age of his father, then the present age of the boy will be

- (a) 10 (b) 6
(c) 8 (d) 4

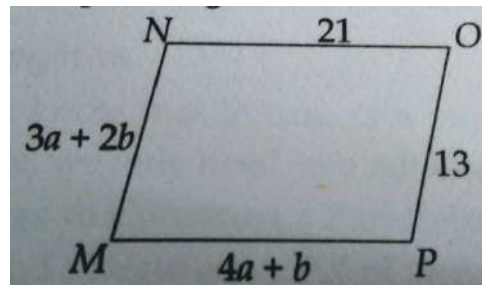
4. If $2(x - p) = 3(6p - x)$, then x is equal to

- (a) 5p (b) 3p (c) 4p (d) 6p

5. The sum of two numbers is 12 and their product is 35. What is the sum of the reciprocals of these numbers?

- (a) $\frac{12}{35}$ (b) $\frac{1}{35}$
(c) $\frac{35}{8}$ (d) $\frac{7}{32}$

6. What values of a and b make quadrilateral MNOP a parallelogram?



- (a) a=1, b=5
(b) a=5, b=1
(c) a= $\frac{11}{7}$ b= $\frac{34}{7}$
(d) a= $\frac{34}{7}$ b= $\frac{11}{7}$

7. In a rhombus ABCD, AB=10 cm, diagonal BP=16, then length of diagonal AC will be

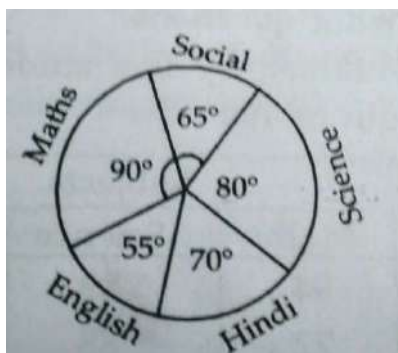
- (a) 12 (b) 16 (c) 8 (d) 6

8. Which shape is possible?
 (a) A rhombus with four acute angles
 (b) A parallelogram with 4 angles of equal measure
 (c) A rhombus with sides that measure 4 cm, 4cm,8cm,8cm.
 (d) A parallelogram with sides that measure 2 cm, 4 cm, 6cm and 8 cm

9. For the data 10, 8, 111, 6, 10, 8,6,7,6, which one of the following is correct?
 (a) Mean = median = mode
 (b) Mode < median < mean
 (c) Mode > mean > median
 (d) Mean = median > mode

10. The value of $\sqrt[2]{1\frac{1}{16}}$ is
 (a) $\frac{2}{3}$ (b) $\frac{2}{5}$
 (c) $1\frac{1}{4}$ (d) $\frac{3}{4}$

11. In the given pie chart, the marks obtained by a student in Hindi, English, Maths, social Science and Science is shown. If the student scores total 540 marks then the marks obtained in Maths exceeded marks in Hindi by –



- (a)15 (b) 20 (c) 25 (d) 30

12. In a survey of 500 ladies, it was found that 180 liked coffee while rest of the ladies dislike it. From these ladies, one is chosen at random. What is the probability that the chosen lady dislikes coffee?

- (a) $\frac{16}{25}$ (b) $\frac{9}{25}$
 (c) $\frac{7}{25}$ (d) $\frac{31}{50}$

13. The value of $\sqrt{19.36} + \sqrt{0.1936} + \sqrt{0.001936}$ is

- (a)488.4 (b) 48.84
 (b)(c) 4.884 (d) 0.4884

14. Between which two consecutive whole numbers $\sqrt{1000}$ lies?

- (a)29 and 30
 (b)30 and 31
 (c)31 and 32
 (d)32 and 33

15. By what least number should 9720 be multiplied to get a perfect cube?

- (a)15 (b) 25 (c) 5 (d) 75

16. What number will come in place of question mark?

- $(\sqrt[2]{8} \times \sqrt[2]{8})^{\frac{1}{2}} + (9)^{1/2} = (?)^3 + \sqrt{8} - 340$
 (a)7 (b)19 (c) 18 (d) 9

17. An article was sold at a loss of 20%. If it was sold to Rs.100 more, then there would have been a profit of 5%. What is the cost price of the article?

- (a) 300 (b) 400
(c) 450 (d) None

18. Three numbers are in the ratio of 1: 2: 3. The sum of their cubes is 98784. What is the biggest number?

- (a)128 (b)32 (c)38 (d)42

19. A sum of money invested at compound interest amounts to Rs. 800 in 3 years and to Rs.840 in 4 years. The rate of interest per annum is

- (a) $2\frac{1}{2}\%$ (b) 4% (c) 5% (d) $6\frac{2}{3}\%$

20. $1 - \frac{p}{2p-3q} - \frac{p}{2p+3q}$ is equal to

- (a) 0 (b) 1
(c) $\frac{-9q^2}{4p^2-9q^2}$ (d) $\frac{4p^2}{4p^2-9q^2}$

21. If $x^2 + y^2 = 25$ and $xy = 12$, then value of $x^{-1} + y^{-1}$ is

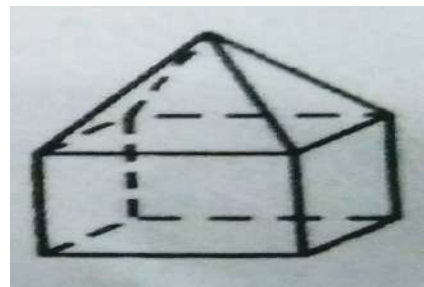
- (a) $\frac{12}{5}$ (b) $\frac{7}{12}$
(c) $\frac{-7}{12}$ (d) both b and c

22. Aisha had an original square with a side length of y units. She cut out a smaller square with a side length of x units from the original square.

Which of the following expressions represents the remaining area of the original square after the smaller square was cut out?

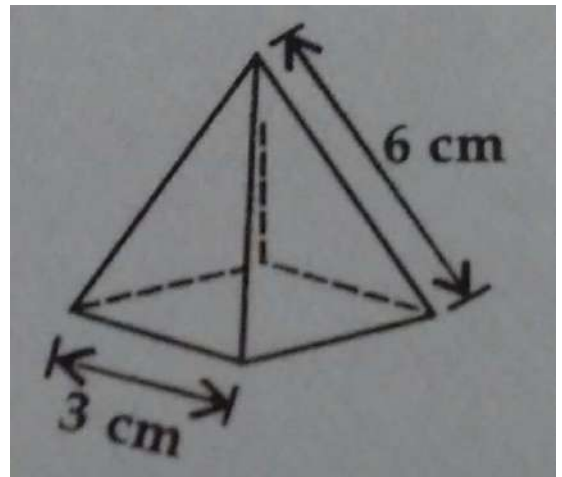
- (a) $y^2 - x^2$ sq.units
(b) $(y-x)(x)$ sq units
(c) $(y-x)(x-y)$ sq units
(d) $(y-x)^2$ sq units

23. How many faces, edges, and vertices does the solid shown here have?



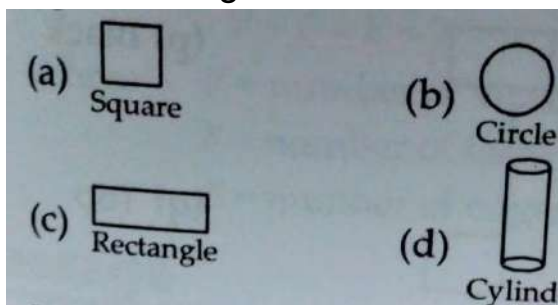
- (a) 4 faces, 10 edges, 7 vertices
(b) 9 faces, 10 edges, 8 vertices
(c) 10 face, 16 edges, 9 vertices
(d) 9 faces, 16 edges, 9 vertices

24. The given figure represents a right square pyramid crystal. Which best describes all faces of the pyramid.



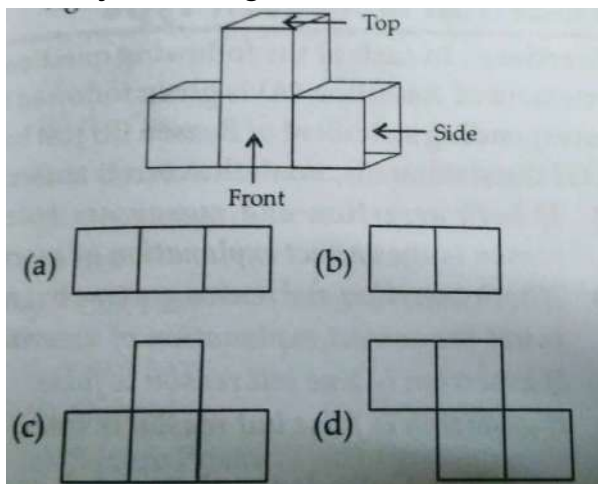
- a. 1 square & 4 equilateral triangle
- b. 1 square & 3 equilateral triangles
- c. 1 square & 4 isosceles triangles
- d. 1 square & 3 isosceles triangles.

25. Which of the following is a 3-dimensional figure?



- a. A
- b. B
- c. C
- d. D

26. Top view of the figure made up of cubes joined together is



- a. A
- b. B
- c. C
- d. D

27. Euler's formula is given by

- a. $F+V=E+2$
- b. $F+V+E=2$
- c. $E-F-V=-2$
- d. $F-V-E=2$

28. The height of a triangle is 4 inches greater than twice its base. The area of the triangle is 168 square inches. What is the base of the triangle?
 (a) 7 in (b) 8 in
 (c) 12 in (d) 14 in

29. A cubical cardboard box has the inner dimensions of 30 cm, 9 cm and 4 cm. How many cubes of 3 cm can be fit inside the box?
 (a) 35 (b) 38 (c) 39 (d) 40

30. Dev wants to enlarge a photograph that measures 3 inches by 5 inches. If both dimensions are doubled, what happens to the area of the photograph?
 (a) It is doubled
 (b) It is multiplied by 4
 (c) It remains the same
 (d) It is multiplied by 8.

31. 25, 50, 100, 89
 Of these numbers which is not a sum of two squares?
 a. 25 b. 50
 c. 100 d. 89

32. The value of $(51)^2 - (49)^2$ will be
 a. 300 b. 200
 c. 100 d. 50

33. The number to be multiplied by -7^{-1} so as to get 10^{-1} as the product is

(a) $\frac{-7}{10}$ (b) $\frac{-10}{7}$
 (c) $\frac{7}{10}$ (d) $\frac{10}{7}$

(a) $\frac{2n}{m^3}$ (b) $\frac{2}{m^3n}$
 (c) $\frac{2m^3}{n}$ (d) $\frac{1}{2m^3n}$

34. The total area of Alaska is 591000 square miles. Which of the following is 591000 expressed in scientific notation?

- a. 591×10^4
- b. 5.91×10^5
- c. 59.1×10^5
- d. 5.91×10^6

35. A person travels at a speed of 24 km/hr and reaches a town in 32 hours. How much time does he take to cover the same distance if his speed is 32 km/hr?

- a. 18 b. 12
- c. 24 d. 28

36. A girl 1.2 m tall casts a shadow 1.1 m at the time when a building casts a shadow 6.6 m long. The height of building is

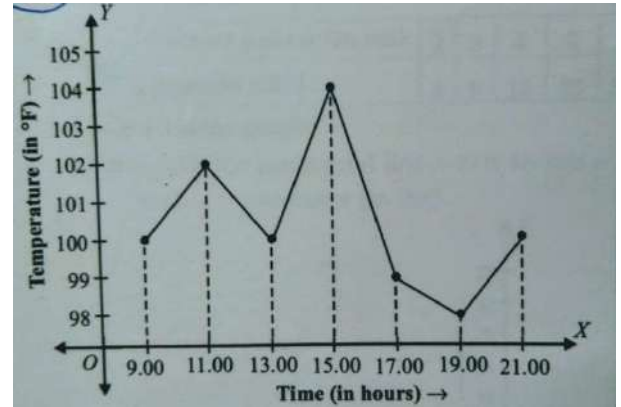
- a. 2.7 m b. 7.2 m
- c. 6.0 m d. 5.5 m

37. The LCM of $(2x^2 - 3x - 2)$ and $(x^3 - 4x^2 + 4x)$ is

- (a) $x(2x^2+1)(x^2+2)$
- (b) $x(2x+1)(x-2)^2$
- (c) $x(2x^2+1)(x-1)^2$
- (d) $x(2x+1)(x^2-1)$

38. Write $\frac{120m^2n^{-3}}{60m^5n^{-2}}$ in simplest form using only positive exponents. Assume that $m \neq 0$ and $n \neq 0$

39. Observe the graph and answer the following questions:



The information given by the graph is

- (a) Time-temperature graph
- (b) Velocity-time graph
- (c) Pressure-volume graph
- (d) Temperature-time graph

40. The temperature of the patient at 11.00 hours is

- a. 99 b. 102
- c. 98 d. 106

41. The temperature is maximum at

- a. 11.00 b. 13.00
- c. 15.00 d. 19.00

42. The temperature is minimum at

- a. 19.00 b. 15.00
- c. 16.00 d. 9.00

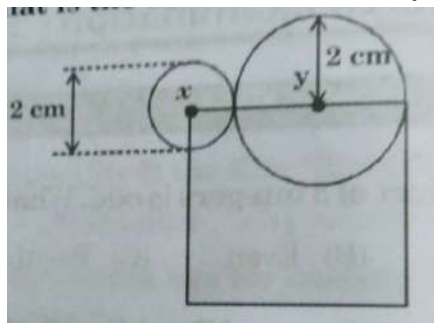
43. If 'a3b5' is a digit divisible by 55, then possible value of a+b is

- a. 11 b. 29
- c. 41 d. 55

44. Which of the following is exactly divisible by 99?

- a. 114345 b. 135792
c. 3572404 d. 913464

45. X and Y are centres of 2 circles as shown in the figure. What is the area of the shaded square?



- a. 5cm^2 b. 9cm^2
c. 16cm^2 d. 25cm^2

46. Pankaj has 96 marbles and Arun has 63 marbles. How many marbles should Arun give to Pankaj so that Pankaj will have twice as many marbles as Arun?

- a. 9 b. 12 c. 7 d. 10

47. Which of the following represents the largest area?

- a. $\frac{1}{4}$ of a circle of radius 3 cm
b. A square of side 2 cm
c. A rectangle of dimensions 3 cm by 1 cm
d. A triangle of base 3cm and height 4 cm.

48. A pudding is made of 200g sugar, 800 g eggs, 600 g flour and 200g dry fruits. What percent of sugar is present in the pudding?

- a. $11\frac{1}{9}\%$ b. $16\frac{2}{3}\%$
c. $6\frac{1}{4}\%$ d. $3\frac{1}{2}\%$

49. A wire bent in the form of a circle of radius 42 cm is again bent in the form of a square. What is the ratio of regions enclosed by the circle and the square?

- a. 11:12 b. 22:28
c. 22:33 d. 14:11

50. If the selling price of 10 pencils is equal to the cost price of 12 pencils, then the gain percentage is

- a. 16% b. 18%
c. 20% d. 25%

SCIENCE OLYMPIAD

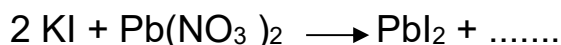
1. No energy is absorbed or emitted as a result of mixture formation except in dissolution process because

- (a) There is no interaction between the particles of the mixture
(b) The particles make a separate phase
(c) There will be change in the state of components of the mixture
(d) The constituents of the mixture will be of the same state.

2. Gram molecular mass of Calcium Carbonate (CaCO_3) is

- (a) 98 g (b) 89 g
(c) 100 g (d) 102 g

3. Fill in the blank in the given chemical equation



(a) KPb (b) K₂Pb

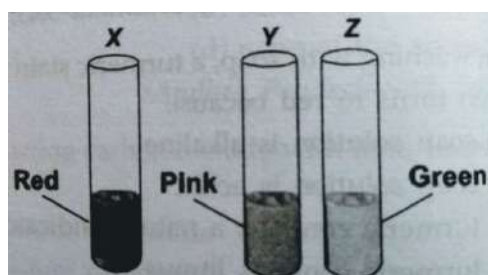
(c) 3KNO₃ (d) 2KNO₃

4. The chemical formula of Potassium Permanganate is

a) KMNO₄ (b) KMnO₄

c) K₂MnO₄ (d) K₄MnO₄

5. Smita carried out some experiments with china rose petals. She placed china rose petals in a beaker and added some hot water. She divided the solution into three test tubes and added acid to one, base to another, and left third one as such. But she forgot to label these test tubes. Identify the correct match for the solution in each test tube.



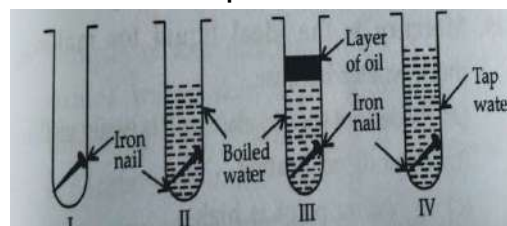
a. X – base Y-indicator Z-acid

b. X-indicator, Y-acid, Z-base

c. X –acid, Y-base, Z-indicator

d. X-acid, Y-indicator, Z-base

6. In which test tube, rusting of iron nails will take place?



a. I and IV

b. I, II and IV

c. II and III

d. II, III and IV

7. Metals can be drawn into thin wire. This property is called

a) Conductivity b) Ductility

c) Malleability d) Tensile Strength

8. Coal is a fossil fuel and it cannot be prepared in laboratory or industry because, formation of coal

a. Is a very slow process

b. Needs very low pressure and low temperature

c. Need very high pressure and high temperature

d. Causes air pollution

9. The combustible substance burnt for releasing (and using) its heat energy is known as 'fuel'. A fuel can exist in the following states:

a. Solid only

b. Liquid only

c. Solid and liquid

d. Solid, liquid or gas