



NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

CLASS - 8

Question Paper Code : 1P214

KEY

1. A	2. A	3. D	4. B	5. A	6. A	7. A	8. B	9. C	10. B
11. D	12. D	13. B	14. C	15. A	16. D	17. D	18. D	19. B	20. C
21. A	22. A	23. A	24. A	25. C	26. C	27. C	28. C	29. B	30. A
31. B	32. B	33. A	34. B	35. B	36. D	37. D	38. A	39. D	40. C
41. C	42. C	43. D	44. C	45. D	46. D	47. B	48. B	49. B	50. B
51. C	52. C	53. B	54. A	55. B	56. C	57. B	58. A	59. B	60. B

SOLUTIONS

MATHEMATICS

$$\begin{aligned}
 01. \text{ (A)} \quad & \frac{243^{0.13} \times 243^{0.07}}{7^{0.25} \times 49^{0.075} \times 343^{0.2}} \\
 &= \frac{(243)^{0.13 + 0.07}}{(7)^{0.25} \times (7^2)^{0.075} \times (7^3)^{0.2}} \\
 &= \frac{(3^5)^{0.2}}{7^{0.25} \times 7^{0.15} \times 7^{0.6}} = \frac{3^{5 \times 0.2}}{7^{0.25+0.15+0.6}} \\
 &= \frac{3}{7}
 \end{aligned}$$

$$02. \text{ (A)} \quad \text{Given } \pi r^2 = 38.5 \text{ cm}^2$$

$$\frac{22}{7} \times r^2 = 28.5 \text{ cm}^2$$

$$r^2 = \frac{38.5}{\cancel{22}} \text{ cm}^2 \times \frac{\cancel{7}^{3.5}}{\cancel{7}^1}$$

$$r^2 = (3.5 \text{ cm})^2$$

$$r = 3.5 \text{ cm}$$

$$\text{Given } 2\pi rh = 143 \text{ cm}^2$$

$$2 \times \frac{22}{7} \times 3.5 \text{ cm} \times h = 143 \text{ cm}^2$$

$$h = \frac{143}{22} \text{ cm}$$

$$h = 6.5 \text{ cm}^2$$

$$TSA = 2\pi r(h+r)$$

$$= 22 \times 10 \text{ cm}^2 = 220 \text{ cm}^2$$

03. (D)
$$\left(\frac{1}{a^3 + b^3} \right) \left(\frac{2}{a^3 - a^3 b^3 + b^3} \right)$$

$$= a^3 \left(\frac{2}{a^3 - a^3 b^3 + b^3} \right) + b^3 \left(\frac{2}{a^3 - a^3 b^3 + b^3} \right)$$

$$= \left(\frac{1}{a^3 \times a^3 - a^3 \times a^3 \times b^3 + a^3 b^3} + \frac{1}{a^3 b^3 - a^3 \times b^3 \times b^3 + b^3 b^3} \right)$$

$$= \left(\frac{1+2}{a^3 \times 3} - \frac{2}{a^3 b^3} + \frac{1}{a^3 b^3} - \frac{1}{a^3 b^3} + \frac{1+2}{b^3 \times 3} \right)$$

$$= a^{\frac{1+2}{3}} + b^{\frac{1+2}{3}} = a^{\frac{3}{3}} + b^{\frac{3}{3}} = (a+b)$$

04. (B) In $\triangle ABC$, $\angle A + \angle B + \angle C = 180^\circ$
 $\angle B + 120^\circ = 180^\circ$
 $\angle B = 180^\circ - 120^\circ = 60^\circ$

05. (A) $2\sqrt{3}x^2 - x - 5\sqrt{3}$
 $= 2\sqrt{3}x^2 - 6x + 5x - 5\sqrt{3}$
 $= 2\sqrt{3}x(x - \sqrt{3}) + 5(x - \sqrt{3})$
 $= (x - \sqrt{3})(2\sqrt{3}x + 5)$

06. (A) Rate of interest per quarter = $\frac{10\%}{4}$ &
'n' is number of quarters
Given

$$\text{Rs. } 3,362 = \text{Rs. } 3200 \left(1 + \frac{10}{4 \times 100} \right)^n$$

$$\frac{\text{Rs. } 3362}{\text{Rs. } 3200} = \left(\frac{41}{40} \right)^n$$

$$\left(\frac{41}{40} \right)^2 = \left(\frac{41}{40} \right)^n$$

$$\therefore n = 2$$

$$\text{Time} = 2 \text{ quarters} = 6 \text{ months}$$

07. (A) Given

$$\left(\frac{3x+1}{16} \right) - \left(\frac{x+3}{8} \right) = \left(\frac{3x-1}{14} \right) - \left(\frac{2x-3}{7} \right)$$

$$\frac{(3x+1) - 2(x+3)}{16} = \frac{(3x-1) - 2(2x-3)}{14}$$

$$\frac{3x+1 - 2x - 6}{16} = \frac{3x-1 - 4x+6}{14}$$

$$\frac{(x-5)14}{16} = -x + 5$$

$$x - 35 = -8x + 40$$

$$7x + 8x = 40 + 35$$

$$15x = 75$$

$$x = \frac{75}{15} = 5$$

08. (B) $(-14) \times (-14) \times (-14) = -2744$

$$x^3 = (-14)^3$$

$$\therefore x = -14$$

09. (C) Area of rectangle = $l \times b$

$$= (x^3 + x^2y + xy^2 + y^3)(x - y) \text{ cm}^2$$

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

$$= x^4 - \cancel{x^3y} + \cancel{x^3y} - \cancel{x^2y^2}$$

$$+ \cancel{x^2y^2} - \cancel{xy^3} + \cancel{xy^3} - y^4$$

$$= (x^4 - y^4) \text{ cm}^2$$

10. (B) Given $3^{x-y} = 3^3 \Rightarrow x - y = 3 \rightarrow (1)$

$$\text{Given } 3^{x+y} = 243 = 3^5$$

$$\Rightarrow x + y = 5 \rightarrow (2)$$

$$\text{eg}(2) - (1) (x + y) - (x - y) = 5 - 3$$

$$\cancel{x} + y - \cancel{x} + y = 2$$

$$2y = 2$$

$$y = \frac{\cancel{2}^1}{\cancel{2}} = 1$$

$$\begin{aligned}
 11. \quad (D) \quad & \sqrt{1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3} \\
 & = \sqrt{1 + 8 + 27 + 64 + 125 + 216} \\
 & = \sqrt{441} = 21
 \end{aligned}$$

12. (D) Given $xy = 45$ & $x - y = 4$
 squaring on both sides
 $x^2 + y^2 - 2yx = 16$
 $x^2 + y^2 - 90 = 16$
 $x^2 + y^2 = 106$

13. (B) Sum of length of edges = $12a$
 $12 \times 5 \text{ cm} = 60 \text{ cm}$

14. (C) Number of families having more than 4 children = $8 + 6$
Total families = $4 + 10 + 7 + 8 + 6 = 35$
Percentage of families having more than 4 children = $\frac{14}{35} \times 100\%$

$$15. \quad (A) \quad \frac{1}{x-3} - \frac{6}{x^2-9} = \frac{x+3-6}{x^2-9}$$

$$= \frac{\cancel{(x-3)}}{\cancel{(x-3)}(x+3)} = \frac{1}{(x+3)}$$

16. (D) The three consecutive numbers be x , $x + 1$ & $x + 2$

Given $2x + 3(x + 1) + 4(x + 2) = 191$

$2x + 3x + 3 + 4x + 8 = 191$

$9x + 11 = 191$

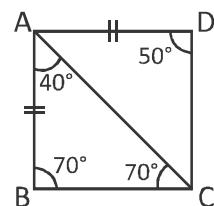
$9x = 191 - 11 = 180$

$$\begin{aligned}
 17. \quad (D) \quad & \text{Volume of tank} = \text{Volume of cylinder} \\
 & 66 \text{ cm} \times 28 \text{ cm} \times h \\
 & = \pi \left(\frac{84}{2} \text{ cm} \right)^2 \times 28 \text{ cm} \\
 h & = \frac{22}{7} \text{ cm} \times 42^2 \times 42 \times 28 \times \frac{1}{66} \times \frac{1}{28} \\
 & = 84 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 18. \quad (D) \quad & 3^{25} + 3^{26} + 3^{27} + 3^{28} = 3^{25} (1 + 3 + 3^2 + 3^3) \\
 & = 3^{25} (4 + 9 + 27) \\
 & = 3^{25} \times 40 \\
 & = 3 \times 3^{24} \times 10 \times 4
 \end{aligned}$$

19. (B) $\angle BDA = \angle DBC = q$
 [Alternative angles]
 $\angle ACB = \angle DAC = p$
 $\therefore p + q + r + s + t$
 $= p + t + q + s + r$
 $\angle BCA + \angle ACB + \angle ADB + \angle BDC + \angle ADC$
 $+ 90^\circ$
 $= 180^\circ + 90^\circ$
 [adjacent angles of a parallelogram are supplementary]

20. (C) In $\triangle ABC$, $\angle BAC = 40^\circ$, $\angle B = 70^\circ$



$$\therefore 40 + 70^\circ + \angle BCA = 180^\circ$$

$$\angle BCA = 180^\circ - 110^\circ = 70^\circ$$

In $\triangle ABC$, $\angle B = \angle C$

$$AC = AB$$

But given $AB = AD$

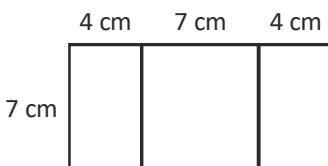
$$AC = AD$$

$$\therefore \angle D = \angle DCA = 50^\circ$$

$$\text{In } \triangle ACD, \quad 50^\circ + 50^\circ + \angle DAC = 180^\circ$$

$$\angle DAC = 180^\circ - 100^\circ = 80^\circ$$

$$\begin{aligned} 21. (A) \quad \text{length of new object} &= 4\text{cm} + 7\text{cm} + 4\text{cm} \\ &= 15\text{cm} \end{aligned}$$



Breadth of new object = 7cm

Area of new object = 15cm \times 7cm

$$= 105 \text{ cm}^3$$

22. (A) $LHS = a^2 - b^2 + b^2 - c^2 + c^2 - a^2 = 0$.

23. (A) It is in inverse proportion

$$\therefore x_1 y_1 = x_2 y_2$$

$$52 \times 35 = 28 \times y_2$$

$$\frac{52^{13} \times 35^5}{28^{A_1}} = y_2$$

$$y_2 = 65$$

24. (A) Let the cost price be ₹ x

Given profit percentage = 20%

$$\therefore \frac{\text{Profit}}{\text{CP}} \times 100 = 20$$

$$\frac{\text{Profit}}{x} \times 100 = 20$$

$$\therefore \text{Profit} = \frac{20x}{100} = \frac{x}{5}$$

$$\text{Given profit} = ₹ 240 = \frac{x}{5}$$

$$\therefore x = ₹ 240 \times 5 = ₹ 1200$$

$$\therefore \text{SP} = \text{CP} + \text{Profit} = ₹ 1200 + 240 \\ = ₹ 1440.$$

25. (C) $P \left(1 + \frac{10}{100}\right)^2 - P = \text{Rs. } 630$

$$P \times \frac{11}{10} \times \frac{11}{10} - P = \text{Rs. } 630$$

$$\frac{121P - 100P}{100} = \text{Rs. } 630$$

$$\frac{21P}{100} = \text{Rs. } 630$$

$$P = \frac{\text{Rs. } 630^{30}}{21} \times 100$$

$$P = \text{Rs. } 3000$$

$$SI = \frac{PTR}{100} = \frac{\text{Rs. } 3000 \times 10 \times 2}{100}$$

$$SI = \text{Rs. } 600$$

PHYSICS

26. (C) Snails move using static friction, which prevents slipping. Their muscular contraction exerts a force that is always less than the limiting static friction.

27. (C) Sinusoidal patterns offer minimal energy loss, continuous particle motion, and represent natural oscillation behavior, especially in longitudinal waves.

28. (C) Lemon juice (acid) and tap water (contains dissolved salts) ionize and conduct electricity. Distilled water lacks ions, so the bulb doesn't glow

29. (B) The correct answer is (B) Ali.

Ali is safer inside a car because the car acts as a Faraday cage, conducting lightning safely around the vehicle and protecting its occupants. In contrast, hiding under a tree is dangerous due to:

- Lightning attraction : Trees are tall and more likely to be struck.
- Side flashes : Lightning can jump from the tree to a person nearby.
- Falling debris : Branches can break and cause injury.
- Ground current : Electricity can travel through the ground, shocking anyone near the tree

30. (A) The problem describes an earthquake caused by pressure buildup inside a chamber, which is a process directly related to volcanic activity and the movement of magma. Magma ejection (A) is the only diagram that depicts a volcano and the associated release of material, supporting the alternate cause proposed by the volcanologist. The other options show general geological processes (cracks, plate movement, mountain formation) that do not specifically illustrate the internal pressure release mechanism described.

31. (B) A butterfly's compound eyes consist of numerous ommatidia, each receiving a small fraction of light. This diffused entry prevents overexposure. In contrast, human eyes focus light through a single lens and pupil, making them more sensitive to sudden brightness.

32. (B) Worn pads have less material to grip the rim, reducing contact area and friction. This forces the rider to squeeze harder for the same stopping power.

33. (A) Infrasonic waves travel thousands of kilometers through water with minimal energy loss, enabling long-range communication, while ultrasonic waves provide sharp echo feedback for precise detection of nearby objects — giving whales a dual sensory advantage in vast and variable ocean conditions.

34. (B) The soles of a sprinter's shoes are designed with zig-zag or block patterns to improve traction and grip during running. This pattern helps to :

- Enhance grip : The design maximizes friction between the shoe and the surface, especially when running on different types of terrain.
- Provide controlled friction : The pattern allows for better traction in specific directions, improving the sprinter's ability to accelerate and maintain balance.

35. (B) In case (a), the ball is on a smooth (frictionless) surface, so the horizontal force at its side produces only linear acceleration of the center of mass; no torque acts about the center (no friction), so it slides without rotation.

In case (b), the wheel is pivoted at its center, so the same horizontal force applied at the rim produces a torque about the pivot, making it rotate about the pivot.

CHEMISTRY

36. (D) Diesel, Fuel oil, Heavy oil, Kerosene
Diesel for vehicles, fuel oil for ships/factories, heavy oil for lubricants, kerosene for domestic fuel.

37. (D) All of the above
For combustion to take place, three conditions must be met: a combustible substance, the right environment and the ignition temperature of the substance. All of these conditions are necessary for a successful combustion process.

38. (A) Earlier coal gas was used for street lighting and now it is used as a source of heat rather than light.

39. (D) Carbon dioxide and global warming.
Complete combustion of most fuels produces carbon dioxide (CO_2) as a byproduct. CO_2 is a major greenhouse gas that contributes to global warming by trapping heat in the Earth's atmosphere.

40. (C) Petroleum gas (LPG) has the lowest boiling point around -42°C to 0°C .
Kerosene is 150°C to 250°C
Diesel is 200°C to 350°C
Lubricating oil is 200°C to 300°C

41. (C) Cow dung cakes, wood, kerosene oil, LPG, Hydrogen.
Calorific values in kJ/kg of five fuels in the increasing order are given below.
P : Cow dung cakes = 6000 - 8000
Q : Wood = 17000 - 22000
R : Kerosene oil = 45000
S : LPG = 55000
T : Hydrogen = 150000

42. (C) Bees wax is not a petroleum product.

43. (D) Baking soda and sulphuric acid.
A soda acid fire extinguisher uses baking soda (sodium bicarbonate) and sulphuric acid. When mixed, they produce carbon dioxide gas, which helps to extinguish the fire by displacing oxygen and reducing the fire's ability to continue combustion.

<p>44. (C) I and III only Coal forms slowly under high pressure and high temperature over millions of years, so it cannot be prepared in the laboratory.</p>	<p>53. (B) Indirect transmission involves touching a contaminated surface (fomite) and then touching the face/mouth, allowing germs to enter the body.</p>
<p>45. (D) All of the above The fire brigades pour water on fire because it cools the substance, lowers its ignition temperature, and forms vapours or steam, which cuts off the oxygen supply. This multifaceted approach effectively stops the fire from spreading.</p>	<p>54. (A) 1-s, 2-r, 3-p, 4-q Cell membrane controls entry/exit (s), cytoplasm hosts life processes (r), nucleus regulates activities (p), cell wall supports plant shape (q).</p>
<p>BIOLOGY</p> <p>46. (D) In an ecosystem, energy flows from the sun to producers (plants), then to herbivores, and finally to carnivores.</p>	<p>55. (B) Standing water is a breeding ground for mosquitoes that transmit dengue, malaria, etc., increasing the risk of disease outbreaks.</p>
<p>47. (B) Holes in leaves due to insect damage are not inherited; they are an acquired trait and do not affect the genetic makeup passed through seeds.</p>	<p>CRITICAL THINKING</p>
<p>48. (B) Both plant and animal cells have a nucleus (control center) and Golgi apparatus (modifies and packages proteins); centrioles and chloroplasts are animal and plant-specific respectively.</p>	<p>56. (C) The paper strip is folded in half three times, creating 7 creases when unfolded. The pattern of mountain (M) and valley (V) folds must satisfy specific conditions derived from the folding process:</p>
<p>49. (B) Diarrhoea and typhoid are often spread via contaminated food/water (fecal-oral route), while others are vector-borne or airborne.</p>	<p>crease 1 and crease 5 are identical. crease 3 and crease 7 are identical. crease 2 and crease 6 are opposites (one M, one V).</p>
<p>50. (B) Yeast reproduces asexually by forming a small bud that grows and detaches; ferns reproduce by spores, Rhizopus by sporangia, and roses by cuttings/seeds.</p>	<p>crease 4 can be either M or V independently.</p>
<p>51. (C) HIV (AIDS) and hepatitis B are transmitted through contact with infected blood or body fluids (e.g., during unsafe injections, unprotected sex), not through air/water.</p>	<p>Among common patterns, an alternating sequence like MVMVMVM violates the condition that creases 2 and 6 must be opposites (here both are V). Thus, such a pattern is impossible.</p>
<p>52. (C) The structure shown is a sporangium that produces spores; these airborne spores germinate in warm, moist conditions to form new mould.</p>	<p>Based on typical multiple-choice options, the alternating pattern is often listed as choice (C). Therefore, the incorrect option is (C).</p>
	<p>57. (B) In options A, C, and D, the dots are placed such that each shape has its own dot(s), and there is one dot common that overlaps all the shapes.</p> <p>Option B is different because the circle in it does not contain any dot, breaking the pattern seen in the other three options.</p>

58. (A) The paragraph states some states want to ban calculators before sixth grade, while other states require graphing calculators for every middle-school student.

That directly shows at least two differing opinions about calculator use in schools, so (A) is supported.

59. (B)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21

60. (B)

Person	Statement	Truth or Lie ?	Stolen Item
Vidhika	Vaidik stole the painting	Lie	Antique
Pratik	Vaidik stole the Chinese vase	Truth	Painting
Vaidik	I neither stole the painting nor the vase	Lie	Chinese Vase

Only the person who stole the painting tells the truth. By evaluating the statements, we find that Pratik must be the one who stole the painting. This makes Pratik's statement true (Vaidik stole the Chinese vase) and the others false. Therefore, Vidhika stole the antique.

===== The End =====