

PGIMER B.SC PARAMEDICAL SAMPLE PAPER 10

A) Time Allowed: 1 Hour 30 Minutes.

B) Maximum Marks: 100

C) Total Questions: 100

General Instructions:

- This paper consists of five sections: Mathematics (25), Chemistry (25), Physics (25), English (10), and General Knowledge (15).
- Each question has four options (A, B, C, D), with only one correct answer.
- +1 mark is awarded for each correct answer and 0.25 marks are deducted for each incorrect answer.
- The question paper is available in English language only.

SECTION 1 : PHYSICS

Q1. A particle moves along the x-axis with velocity

$$v = kx^n.$$

For the acceleration to be independent of position, n must be:

- A) 1
 - B) 0
 - C) 2
 - D) -1
- Q2. Two bodies of masses m and $2m$ are dropped from the same height. The ratio of their times to reach the ground is:
- A) 1:1
 - B) 1:2
 - C) 1:4
 - D) 2:1
- Q3. The rotational kinetic energy of a solid sphere rolling without slipping is what fraction of total energy?
- A) $2/7$
 - B) $2/5$
 - C) $1/2$
 - D) $5/7$
- Q4. A planet orbits the Sun in an elliptical orbit. The physical quantity that remains constant is:
- A) Angular momentum
 - B) Linear momentum
 - C) Kinetic energy
 - D) Speed
- Q5. For an ideal gas, the ratio of adiabatic bulk modulus to isothermal bulk modulus is:
- A) γ
 - B) $1/\gamma$
 - C) $\gamma - 1$
 - D) 1
- Q6. A thin lens of refractive index n in a medium of index n_m . If $n_m > n$, the lens:
- A) Changes its nature
 - B) Becomes opaque
 - C) Remains same
 - D) Becomes a mirror
- Q7. In Young's double-slit experiment, the fringe width β is independent of:
- A) Width of the slits
 - B) Wavelength
 - C) Distance D
 - D) Distance d

- Q8. The energy stored in an inductor L carrying current I is:
- A) $\frac{1}{2}LI^2$
 - B) LI^2
 - C) L^2I
 - D) $\frac{1}{2}L^2I$
- Q9. The magnetic field inside a long ideal solenoid is:
- A) Uniform
 - B) Zero
 - C) Increases with distance
 - D) Decreases with distance
- Q10. In a semiconductor, the forbidden energy gap is largest in:
- A) Insulators
 - B) Conductors
 - C) Semiconductors
 - D) Superconductors
- Q11. The half-life of a radioactive isotope is 5 years. The fraction remaining after 20 years is:
- A) $1/16$
 - B) $1/8$
 - C) $1/4$
 - D) $1/32$
- Q12. The logic operation for a NAND gate followed by a NOT gate is:
- A) AND
 - B) OR
 - C) NOR
 - D) XOR
- Q13. The de-Broglie wavelength of a neutron at temperature T is:
- A) $h\sqrt{3mkT}$
 - B) $h\sqrt{2mkT}$
 - C) hkT
 - D) $h\sqrt{mkT}$
- Q14. Diamagnetism is a property of:
- A) All materials
 - B) Only gases
 - C) Only metals
 - D) Only insulators
- Q15. The coefficient of linear expansion α relates to volume expansion γ as:
- A) $\gamma = 3\alpha$
 - B) $\gamma = 2\alpha$
 - C) $\gamma = \alpha$
 - D) $\alpha = 3\gamma$
- Q16. Electromagnetic waves are produced by:
- A) Accelerated charges
 - B) Static charges

- C) Constant current
D) Neutrons
- Q17. A ray of light traveling from denser to rarer medium at critical angle:
A) Skims the surface
B) Reflects back
C) Refracts normally
D) Disappears
- Q18. The potential at the center of a uniformly charged thin spherical shell is:
A) Same as the surface
B) Zero
C) Infinite
D) Double the surface
- Q19. Simple pendulum period in a free-falling lift is:
A) Infinite
B) Zero
C) $2\pi\sqrt{Lg}$
D) $2\pi\sqrt{L2g}$
- Q20. Which particle has the highest specific charge (e/m)?
A) Electron
B) Proton
C) Alpha particle
D) Neutron
- Q21. In an LCR circuit, resonance frequency is given by:
A) $12\pi\sqrt{LC}$
B) $2\pi\sqrt{LC}$
C) $\sqrt{LC}$
D) LC
- Q22. Intensity of sound I at distance r from a point source follows:
A) Inverse square law
B) Inverse law
C) Linear law
D) No law
- Q23. Work done by a central force in a closed loop is:
A) Zero
B) Positive
C) Negative
D) Path dependent
- Q24. Faraday's Law of induction is a direct consequence of:
A) Conservation of energy
B) Conservation of charge
C) Conservation of momentum
D) Ampere's law

Q25. The rest mass of a photon is:

- A) Zero
- B) $9.1 \times 10^{-31} \text{ kg}$
- C) $1.67 \times 10^{-27} \text{ kg}$
- D) Non-zero

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SECTION 2 : CHEMISTRY

Q26. The number of spherical nodes in a $3d$ orbital is:

- A) 0
- B) 1
- C) 2
- D) 3

Q27. The bond order of He_2^+ ion is:

- A) 0.5
- B) 1
- C) 0
- D) 1.5

Q28. Shape of SF_4 molecule is:

- A) Seesaw
- B) Square planar
- C) Tetrahedral
- D) Trigonal bipyramidal

Q29. Which defect in crystals increases electrical conductivity?

- A) Metal excess defect
- B) Schottky defect
- C) Frenkel defect
- D) Stoichiometric defect

Q30. Reaction



is first order in A and zero order in B . The rate law is:

- A) $k[A]$
- B) $k[A][B]$
- C) $k[B]$
- D) k

Q31. The osmotic pressure of a solution is determined by:

- A) Van't Hoff equation
- B) Raoult's law
- C) Henry's law
- D) Nernst equation

Q32. The conjugate acid of HSO_4^- is:

- A) H_2SO_4
- B) SO_4^{2-}
- C) H_3O^+
- D) OH^-

Q33. The IUPAC name of



is:

- A) Butan-2-one

- B) Butanal
- C) Butan-1-ol
- D) Butanoic acid

Q34. Williamson synthesis is used to prepare:

- A) Ethers
- B) Alcohols
- C) Esters
- D) Ketones

Q35. Tollens' reagent is:

- A) Ammoniacal silver nitrate
- B) $CuSO_4$
- C) $NaOH$
- D) $KMnO_4$

Q36. Which polymer is used in non-stick cookware?

- A) PTFE
- B) PVC
- C) Bakelite
- D) Nylon

Q37. Magnetic moment of Cr^{3+} ($Z = 24$) is:

- A) 3.87 BM
- B) 1.73 BM
- C) 2.83 BM
- D) 4.90 BM

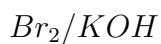
Q38. Which complex is octahedral?

- A) $[Co(NH_3)_6]^{3+}$
- B) $[Ni(CN)_4]^{2-}$
- C) $[PtCl_4]^{2-}$
- D) $[Zn(NH_3)_4]^{2+}$

Q39. Reaction of



with



gives:

- A) RNH_2
- B) ROH
- C) RCN
- D) $RCOOH$

Q40. Which is the most basic amine in aqueous solution?

- A) $(CH_3)_2NH$
- B) CH_3NH_2
- C) $(CH_3)_3N$
- D) NH_3

- Q41. Bond angle in H_2O is approximately:
A) 104.5°
B) 109.5°
C) 120°
D) 90°
- Q42. Lanthanoids exhibit primarily which oxidation state?
A) +3
B) +2
C) +4
D) +1
- Q43. Catalyst used in Contact Process is:
A) V_2O_5
B) Fe_2O_3
C) Ni
D) Pt
- Q44. Which is the strongest acid among hydrogen halides?
A) HI
B) HCl
C) HBr
D) HF
- Q45. Number of structural isomers of C_6H_{14} is:
A) 5
B) 3
C) 4
D) 6
- Q46. Diels–Alder reaction is a type of:
A) Cycloaddition
B) Substitution
C) Elimination
D) Rearrangement
- Q47. Kohlrausch's law applies to:
A) Molar conductivity at infinite dilution
B) Solubility
C) pH
D) Vapor pressure
- Q48. Lyophilic sols are:
A) Reversible
B) Irreversible
C) Unstable
D) Precipitation prone
- Q49. Lewis base is:
A) NH_3
B) BF_3

C) $AlCl_3$

D) Fe^{3+}

Q50. Mg reacts with cold water to give:

A) $Mg(OH)_2 + H_2$

B) MgO

C) $MgCl_2$

D) No reaction

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SECTION 3 : MATHEMATICS

Q51. Derivative of

$$\tan^{-1} x$$

is:

- A) $11 + x^2$
- B) $11 - x^2$
- C) $1x$
- D) $1\sqrt{1 - x^2}$

Q52. Value of

$$\int_0^1 x^2 dx$$

is:

- A) 13
- B) 1
- C) 12
- D) 0

Q53. Slope of tangent to

$$y = x^3$$

at $x = 1$ is:

- A) 3
- B) 1
- C) 0
- D) 2

Q54. Sum of the series

$$1 + \frac{1}{2} + \frac{1}{4} + \dots$$

is:

- A) 2
- B) 1
- C) 1.5
- D) ∞

Q55. Roots of

$$x^2 - 4x + 4 = 0$$

are:

- A) 2, 2
- B) 1, 3
- C) 0, 4
- D) -2, -2

Q56. Number of permutations of n distinct objects is:

- A) $n!$
- B) n
- C) n^2
- D) 1

Q57. If matrix A is singular, then:

- A) $\det(A) = 0$
- B) $\det(A) = 1$
- C) A^{-1} exists
- D) $A = I$

Q58. Cross product

$$\vec{i} \times \vec{i}$$

is:

- A) 0
- B) 1
- C) $\vec{k}$
- D) $\vec{j}$

Q59.

$$P(A \cap B)$$

for independent events is:

- A) $P(A) \cdot P(B)$
- B) $P(A) + P(B)$
- C) $P(A)P(B)$
- D) $P(A)$

Q60. Value of

$$\sin(2\theta)$$

is:

- A) $2 \sin \theta \cos \theta$
- B) $\sin^2 \theta$
- C) $\cos^2 \theta$
- D) $\tan \theta$

Q61. Distance between points $(0, 0)$ and $(5, 12)$ is:

- A) 13
- B) 7
- C) 17
- D) 5

Q62. Rank of a 3×3 zero matrix is:

- A) 0
- B) 3
- C) 1
- D) 2

Q63.

$$\log_e(e)$$

is:

- A) 1
- B) 0
- C) e
- D) ∞

Q64. Value of

$$i^2$$

is:

- A) -1
- B) 1
- C) i
- D) $-i$

Q65. Slope of normal to

$$y = x^2$$

at $x = 1$ is:

- A) $-\frac{1}{2}$
- B) 2
- C) 1
- D) -2

Q66.

$$\int e^x dx$$

is:

- A) $e^x + C$
- B) $e^x x$
- C) $\ln x$
- D) xe^x

Q67. Eccentricity of a circle is:

- A) 0
- B) 1
- C) 0.5
- D) ∞

Q68. Number of subsets of

$$\{a, b\}$$

is:

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

Q69.

$$\sin(90^\circ - \theta)$$

is:

- A) $\cos \theta$
- B) $-\cos \theta$
- C) $\sin \theta$
- D) $-\sin \theta$

Q70. Mean of

1, 2, 3, 4, 5

is:

- A) 3
- B) 2
- C) 4
- D) 2.5

Q71. Derivative of

 $\ln(x)$

is:

- A) $1/x$
- B) x
- C) e^x
- D) 1

Q72. Points

(1, 1), (2, 2), (3, 3)

are:

- A) Collinear
- B) Forming triangle
- C) Forming square
- D) Random

Q73.

$$\int_0^{\infty} e^{-x} dx$$

is:

- A) 1
- B) 0
- C) e
- D) ∞

Q74. Determinant of

 $\begin{pmatrix} 1 & 0 & 0 & 1 \end{pmatrix}$

is:

- A) 1
- B) 0
- C) 2
- D) -1

Q75. Intersection of

$$x + y = 2$$

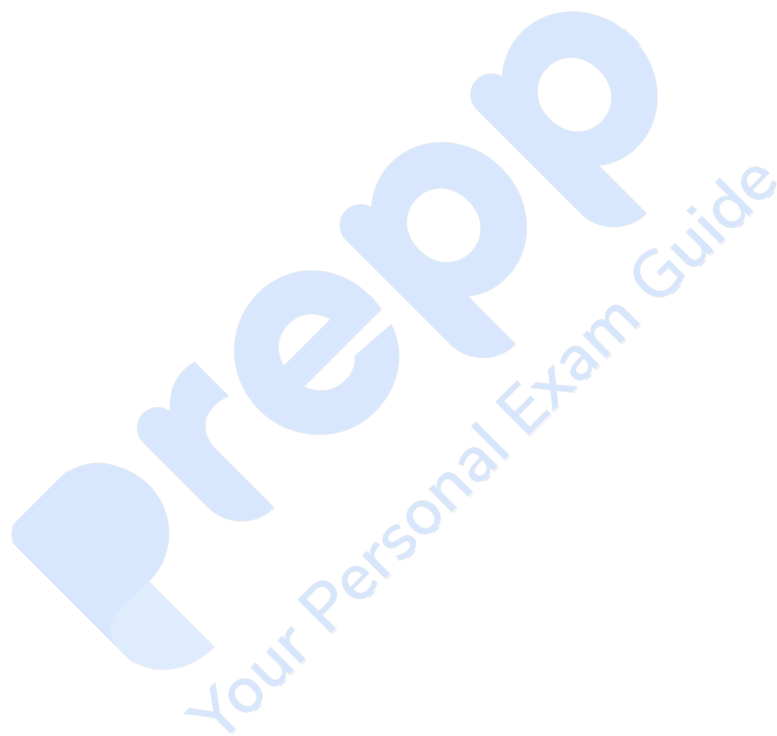
and

$$x - y = 0$$

is:

- A) (1, 1)

- B) $(0, 0)$
- C) $(2, 2)$
- D) $(2, 0)$



SECTION 4 : ENGLISH

- Q76. Synonym of “Abundant”:
A) Plentiful
B) Scanty
C) Lack
D) Few
- Q77. He is fond _____ music.
A) of
B) for
C) at
D) with
- Q78. Choose the correct spelling:
A) Accommodate
B) Acomodate
C) Accomodate
D) Acommodate
- Q79. “Fast” in “Run fast” is:
A) Adverb
B) Adjective
C) Verb
D) Noun
- Q80. Antonym of “Vigorous”:
A) Weak
B) Strong
C) Active
D) Energetic
- Q81. If I _____ you, I would do it.
A) were
B) was
C) am
D) had been
- Q82. Passive voice of “The boy broke the glass” is:
A) Glass was broken.
B) Glass is broken.
C) Glass has been broken.
D) Glass breaks.
- Q83. The plural of “Phenomenon” is:
A) Phenomena
B) Phenomenons
C) Phenomenes
D) Phenomenas

- Q84. Antonym of “Concise”:
A) Wordy
B) Brief
C) Short
D) Quick
- Q85. The idiom “Piece of cake” means:
A) Easy
B) Hard
C) Food
D) Sweet
- Q86. “Hardly” is paired with:
A) When
B) Than
C) Then
D) Before
- Q87. Synonym of “Enthusiastic”:
A) Eager
B) Bored
C) Sad
D) Calm
- Q88. Choose the correct sentence:
A) Neither of them is coming.
B) Neither of them are coming.
C) Neither of them is come.
D) Neither of them come.
- Q89. Prefer tea _____ coffee.
A) to
B) than
C) over
D) with
- Q90. Meaning of “Bonafide”:
A) Genuine
B) Fake
C) New
D) Old

SECTION 5 : GENERAL KNOWLEDGE

- Q91. Capital of New Zealand:
A) Wellington
B) Auckland
C) Christchurch
D) Hamilton
- Q92. Yellow Revolution relates to:
A) Oilseeds
B) Fish
C) Milk
D) Egg
- Q93. World Habitat Day is observed on:
A) First Monday of October
B) March 2
C) June 5
D) December 10
- Q94. The Parliament of Sweden is called:
A) Riksdag
B) Diet
C) Duma
D) Congress
- Q95. The first Nobel Prize in Physiology or Medicine was awarded to:
A) Emil von Behring
B) Albert Einstein
C) Marie Curie
D) Niels Bohr
- Q96. The Welland Canal connects:
A) Lake Erie and Lake Ontario
B) Pacific and Atlantic Oceans
C) Mediterranean and Red Seas
D) Atlantic and Indian Oceans
- Q97. Fundamental Rights are enshrined in:
A) Part III
B) Part IV
C) Part I
D) Part II
- Q98. The hardest mineral is:
A) Diamond
B) Quartz
C) Talc
D) Calcite

Q99. The first woman Governor of an Indian State was:

- A) Sarojini Naidu
- B) Indira Gandhi
- C) Pratibha Patil
- D) Golda Meir

Q100. United Nations Headquarters is located in:

- A) New York
- B) Geneva
- C) London
- D) Paris



SOLUTIONS

Q1. **Answer: A**

$$\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$$

Q2. **Answer: A**

$$\int_0^1 x^2 dx = \left[\frac{x^3}{3} \right]_0^1 = \frac{1}{3}$$

Q3. **Answer: A**

$$y = x^3$$

$$\frac{dy}{dx} = 3x^2$$

At $x = 1$:

$$\frac{dy}{dx} = 3$$

Q4. **Answer: A**

For GP:

$$S = \frac{a}{1-r} = \frac{1}{1-\frac{1}{2}} = 2$$

Q5. **Answer: A**

$$x^2 - 4x + 4 = (x-2)^2$$

Roots are:

$$2, 2$$

Q6. **Answer: A**

Number of permutations of n distinct objects:

$$n!$$

Q7. **Answer: A**

A singular matrix satisfies:

$$\det(A) = 0$$

Q8. **Answer: A**

Cross product of a vector with itself:

$$\vec{i} \times \vec{i} = 0$$

Q9. **Answer: A**

For independent events:

$$P(A \cap B) = P(A)P(B)$$

Q10. **Answer: A**

$$\sin(2\theta) = 2 \sin \theta \cos \theta$$

Q11. **Answer: A**

Distance:

$$\sqrt{(5 - 0)^2 + (12 - 0)^2} = \sqrt{169} = 13$$

Q12. **Answer: A**

All elements are zero. Hence rank:

$$0$$

Q13. **Answer: A**

$$\log_e(e) = 1$$

Q14. **Answer: A**

$$i^2 = -1$$

Q15. **Answer: A**

$$y = x^2$$

$$\frac{dy}{dx} = 2x$$

At $x = 1$:

$$m_t = 2$$

Slope of normal:

$$m_n = -\frac{1}{2}$$

Q16. **Answer: A**

$$\int e^x dx = e^x + C$$

Q17. **Answer: A**

A circle has eccentricity:

$$e = 0$$

Q18. **Answer: A**

Number of subsets:

$$2^n = 2^2 = 4$$

Q19. **Answer: A**

$$\sin(90^\circ - \theta) = \cos \theta$$

Q20. **Answer: A**

Mean:

$$\frac{1 + 2 + 3 + 4 + 5}{5} = \frac{15}{5} = 3$$

Q21. **Answer: A**

$$\frac{d}{dx}(\ln x) = \frac{1}{x}$$

Q22. **Answer: A**

All points satisfy:

$$y = x$$

Hence they are collinear.

Q23. **Answer: A**

$$\int_0^{\infty} e^{-x} dx = [-e^{-x}]_0^{\infty} = 1$$

Q24. **Answer: A**

$$1001 = 1$$

Q25. **Answer: A**

Solving:

$$x + y = 2$$

$$x - y = 0$$

Adding:

$$2x = 2$$

$$x = 1, \quad y = 1$$

Q26. **Answer: A**

Abundant means plentiful.

Q27. **Answer: A**

Correct phrase:

fond of music

Q28. **Answer: A**

Correct spelling:

Accommodate

Q29. **Answer: A**

In "Run fast", fast modifies the verb. Hence it is an adverb.

Q30. **Answer: A**

Vigorous means energetic. Its antonym is weak.

Q31. **Answer: A**

Correct subjunctive:

If I were you

Q32. **Answer: A**

Passive:

The glass was broken.

Q33. **Answer: A**

Plural:

Phenomenon → Phenomena

Q34. **Answer: A**

Concise means brief. Its antonym is wordy.

Q35. **Answer: A**

"Piece of cake" means very easy.

Q36. **Answer: A**

Standard construction:

Hardly...when

Q37. **Answer: A**

Enthusiastic means eager.

Q38. **Answer: A**

Correct sentence:

Neither of them is coming.

Q39. **Answer: A**

Correct usage:

Prefer tea to coffee

Q40. **Answer: A**

Bonafide means genuine.

Q41. **Answer: A**

Wellington is the capital of New Zealand.

Q42. **Answer: A**

Yellow Revolution is associated with oilseed production.

Q43. **Answer: A**

World Habitat Day is observed on the first Monday of October.

Q44. **Answer: A**

The Parliament of Sweden is called the Riksdag.

Q45. **Answer: A**

The first Nobel Prize in Physiology or Medicine was awarded to Emil von Behring.

Q46. **Answer: A**

The Welland Canal connects Lake Erie and Lake Ontario.

Q47. **Answer: A**

Fundamental Rights are contained in Part III of the Constitution.

Q48. **Answer: A**

Diamond is the hardest naturally occurring mineral.

Q49. **Answer: A**

Sarojini Naidu became the first woman Governor of an Indian state.

Q50. **Answer: A**

The headquarters of the United Nations is located in New York.

Q51. **Answer: A**

The derivative of

$$\tan^{-1} x$$

is:

$$\frac{1}{1+x^2}$$

Q52. **Answer: A**

$$\int_0^1 x^2 dx = \left[\frac{x^3}{3} \right]_0^1 = \frac{1}{3}$$

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$$y = x^3$$

$$\frac{dy}{dx} = 3x^2$$

At $x = 1$,

$$\frac{dy}{dx} = 3$$

Q54. **Answer: A**

Sum of infinite GP:

$$S = \frac{1}{1 - \frac{1}{2}} = 2$$

Q55. **Answer: A**

$$x^2 - 4x + 4 = (x - 2)^2$$

Hence both roots are 2.

Q56. **Answer: A**

Number of permutations of n distinct objects:

$$n!$$

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A singular matrix has:

$$\det(A) = 0$$

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For independent events:

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Distance:

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A zero matrix has rank:

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Q63. **Answer: A**

$$\log_e(e) = 1$$

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$$i^2 = -1$$

Q65. **Answer: A**

At $x = 1$:

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Normal slope:

$$-\frac{1}{2}$$

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$$\int e^x dx = e^x + C$$

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The eccentricity of a circle is:

$$0$$

Q68. **Answer: A**

Number of subsets:

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All points lie on:

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Hence they are collinear.

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$$\int_0^{\infty} e^{-x} dx = 1$$

Q74. **Answer: A**

$$1001 = 1$$

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Solving

$$x + y = 2, \quad x - y = 0$$

gives:

$$(1, 1)$$

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Abundant means plentiful.

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