

SAMPLE PAPER — HAT ENGINEERING

Fully Solved with Answer Explanations

VERBAL REASONING

1. You mean you've been waiting _____ an hour.

A. before

✓ B. for (Correct Answer)

C. just

D. since

Explanation: The present perfect continuous tense ("have been waiting") is paired with "for" when referring to a duration or length of time (e.g., for an hour). "Since" would instead be used with a specific starting point in time (e.g., since 2 o'clock).

2. You should always lock the door when _____ your room.

A. leave

✓ B. leaving (Correct Answer)

C. left

D. to leave

Explanation: After the conjunction "when" introducing a reduced clause referring to the same subject as the main clause, the gerund/present participle form "leaving" is used (short for "when you are leaving").

Four lettered pairs (A to D) follow a related pair of words given in the question. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair in capital letters.

3. BEE : HONEY ::

✓ **A. cow : milk (Correct Answer)**

B. frog : leap

C. rabbit : hare

D. spider : web

Explanation: A bee produces honey, just as a cow produces milk — both pairs express a "producer : product" relationship. (Option D is a near-miss because a spider makes a web, but a web is a trap/structure, not a consumable product the way honey and milk are — the intended analogy is producer-to-food-product.)

4. CROW : CAW ::

A. ape : monkey

B. cat : kitten

C. dog : kennel

✓ **D. monkey : chatter (Correct Answer)**

Explanation: A crow makes the sound "caw," just as a monkey makes the sound "chatter" — both pairs express an "animal : characteristic sound" relationship.

Each of the following questions consists of a sentence with all or part of the sentence underlined. Select (A) if the original is best; otherwise choose the best phrase from the options.

5. When the cat's away the mice will play.

✓ A. When the cat's away the mice will play (Correct Answer)

B. As the cat's away the mice will play

C. If the cat's away the mice will play

D. Whenever the cat's away the mice will play

Explanation: This is a well-known, fixed idiomatic proverb. Its standard, correct wording uses "When," so the original sentence is already best; substituting "As," "If," or "Whenever" alters the fixed idiom and sounds unnatural.

Choose the lettered word or phrase that is MOST NEARLY OPPOSITE in meaning to the word in capital letters.

6. The rules of this organization are too STRINGENT and not _____.

✓ A. flexible (Correct Answer)

B. impractical

C. realistic

D. strict

Explanation: STRINGENT means strict, rigorous, or leaving little room for flexibility. Its opposite is "flexible." Option D ("strict") is a synonym, not an antonym, and B and C do not express the opposite meaning either.

7. The scientist declared that he found an EXOTIC flower which _____.

A. had a sweet smell

✓ B. he did not see or read about earlier (Correct Answer)

C. was gigantic in size

D. was poisonous

Explanation: EXOTIC means unusual, foreign, or not native/familiar. The phrase that best completes the meaning is one describing something never seen or encountered before, i.e., "he did not see or read about earlier."

Choose the lettered word or phrase that is MOST NEARLY SIMILAR in meaning to the word in capital letters.

8. If you BROOD over something you _____ it.

A. desire

B. feel afraid of

C. prepare for

✓ D. think about (Correct Answer)

Explanation: To BROOD over something means to think deeply and often anxiously about it. "Think about" is the closest match in meaning.

9. We expect a VERACIOUS account from you. So please be _____.

A. careful

B. confident

✓ C. honest (Correct Answer)

D. precise

Explanation: VERACIOUS means truthful or honest. A "veracious account" is a truthful account, so the word that completes the sentence with the same meaning is "honest."

Read the following passage carefully, then answer Question 10.

In 1606, two years after peace with Spain, the hands of destiny beckoned toward Virginia. A joint-stock company, known as the Virginia Company, of London received a charter from King James I of England for a settlement in the New World. The main attractions were the promise of gold and the hope of finding a passage through America to the Indies. Like most joint-stock companies of the day, the Virginia Company was intended to endure for only a few years, after which its stockholders intended to liquidate it for a profit. The arrangement put severe pressure on the luckless colonists, who were threatened with abandonment in the wilderness if they did not quickly strike it rich on the company's behalf. Few of the investors thought in terms of long-term colonization. Apparently, no one even faintly suspected that the seeds of a mighty nation were being

planted.

The charter of the Virginia Company is a significant document in American history. It guaranteed to the overseas settlers the same rights of Englishmen that they would have enjoyed if they had stayed at home. The precious boon was gradually extended to the other English colonies and became a foundation stone of American liberties.

Setting sail from England in 1606, the colonists arrived in Virginia and chose a site for their settlement on the wooded but malarial banks of the James River. There, on May 24, 1607, about a hundred English settlers, all men, disembarked. They called the place Jamestown.

The early years of Jamestown proved to be a nightmare for all concerned — except the buzzards. Once ashore, the settlers died by the dozens from disease, malnutrition, and starvation. Ironically, the woods rustled with game and the river flopped with fish, but the greenhorn settlers — many of them gentlemen unaccustomed to fending for themselves — wasted valuable time grubbing for nonexistent gold when they should have been gathering provisions.

Virginia was saved from utter collapse at the start largely by the leadership and resourcefulness of an intrepid young adventurer, Captain John Smith. Taking over in 1608, he whipped the gold-hungry colonists into line with the rule, "He

who shall not work shall not eat." He was subjected to a mock execution by the Indian chieftain Powhatan, whose daughter Pocahontas "saved" Smith by dramatically interposing her head between his and the war clubs of his captors. Pocahontas became an intermediary between the Indians and the settlers, helping to preserve a shaky peace and provide needed food.

10. In the sentence "The early years of Jamestown proved to be a nightmare for all concerned except the buzzards," the word 'buzzards' refers to the

✓ A. birds of prey (Correct Answer)

- B. investors of Virginia company
- C. local people
- D. the king and his courtiers

Explanation: Buzzards are literally scavenger birds of prey. The author uses them literally (and ironically) — while the human settlers suffered and died from disease and starvation, the buzzards (real birds that fed on the dead) were the only ones who did not suffer. The word is not a metaphor for any group of people here; it refers to the actual birds of prey.

ANALYTICAL REASONING

Questions 11–16 are based on the following passage.

In a large factory there are exactly seven supervisors of operations F, G, H, J, K, M, and N. These supervisors communicate with each other in two ways: through a message circuit and by two-way radio. Messages can be sent in only one direction along the message circuit: from F to G, from G to J, from J to M, from M to N, and from N to F. Messages can be sent in either direction by two-way radio between G and H, between H and N, and between J and K. No other routes of communication are available for sending messages among the seven supervisors. Messages that cannot be sent directly to the intended supervisor are sent through one or more intermediaries, who pass the messages along a possible route. Any supervisor, but only a supervisor, can be an intermediary.

One-way circuit: $F \rightarrow G \rightarrow J \rightarrow M \rightarrow N \rightarrow F$ (forming a closed loop)

Two-way radio links: $G \leftrightarrow H$, $H \leftrightarrow N$, $J \leftrightarrow K$

11. A message from the first to the second supervisor in which of the following pairs can be sent using exactly one intermediary?

A. F to M

✓ B. H to F (Correct Answer)

C. K to H

D. N to K

Explanation: H to F: $H \rightarrow N$ (two-way radio) then $N \rightarrow F$ (circuit) — this uses exactly one intermediary, N. (F to M needs two intermediaries, G and J; K to H and N to K both require three intermediaries by the shortest available route.)

12. Sending a message from the first to the second supervisor in which of the following pairs requires using both the message circuit and the two-way radio?

A. F to M

✓ B. J to H (Correct Answer)

C. K to J

D. N to G

Explanation: J to H: the only way to reach H from J is via the circuit ($J \rightarrow M \rightarrow N$) followed by the radio link $N \leftrightarrow H$ — so both the circuit and radio must be used. (F to M can be sent purely on the circuit; K to J is a direct radio link; N to G can be completed purely on the circuit via $N \rightarrow F \rightarrow G$.)

13. Sending a message from the first to the second supervisor in which of the following pairs requires a minimum of two intermediaries?

✓ A. F to K (Correct Answer)

B. G to N

C. H to J

D. M to H

Explanation: *F to K: the only route is $F \rightarrow G \rightarrow J \rightarrow K$, which passes through two intermediaries, G and J. The other options can each be completed with just one intermediary using a radio shortcut (G to N via $G \leftrightarrow H \leftrightarrow N$; H to J via $H \leftrightarrow G \rightarrow J$; M to H via $M \rightarrow N \leftrightarrow H$).*

14. A message from G to F must be sent through

_____.

A. H

B. K

C. M

✓ D. N (Correct Answer)

Explanation: *The only connection leading directly into F is the one-way circuit link $N \rightarrow F$. Since F can only be reached through N (whether via the long circuit route $G \rightarrow J \rightarrow M \rightarrow N \rightarrow F$ or the shorter radio shortcut $G \leftrightarrow H \leftrightarrow N \rightarrow F$), every possible route from G to F must pass through N.*

15. A message originating from which of the following supervisors requires the use of both the message circuit and the two-way radio if the message is to reach more than one supervisor?

A. F

✓ B. K (Correct Answer)

C. M

D. N

Explanation: K only has one connection — the two-way radio link to J. To reach any supervisor beyond J, the message must then continue along the one-way circuit (J→M→N→F→G). So any message from K reaching more than one other supervisor must necessarily use both the radio (to first reach J) and the circuit (to go further).

16. A message sent through the fewest possible intermediaries from the first to the second supervisor in which of the following pairs requires exactly three intermediaries?

- A. F to N
- B. J to H
- C. K to G

✓ D. N to K (Correct Answer)

Explanation: N to K: the shortest route is $N \rightarrow F \rightarrow G \rightarrow J \rightarrow K$ (or equivalently $N \leftrightarrow H \leftrightarrow G \rightarrow J \leftrightarrow K$), each requiring exactly three intermediaries. (F to N and J to H can each be completed with just two intermediaries via a radio shortcut, so they do not qualify.)

Imran is not going to Lahore and Shahid is not going to Islamabad. Imran and Saad go to different cities. Feroz alone goes to Karachi.

17. Which city is Saad going to, if all four of them are going to different cities?

- A. Islamabad
- B. Karachi
- C. Lahore

✓ D. Can't say (Correct Answer)

Explanation: Since Feroz alone goes to Karachi, Saad cannot go there. Imran cannot go to Lahore, and Shahid cannot go to Islamabad, but these constraints only restrict Imran and Shahid — they don't pin down which of the remaining cities (Islamabad, Lahore, or any other city) Saad specifically takes. The given clues are insufficient to determine Saad's exact destination, so the answer cannot be determined — "Can't say."

If oven cleaner is added to household bleach, the mixture emits chlorine gas. A mixture of bathtub cleanser and household bleach also emits chlorine gas. If ordinary soap is added to household bleach, no gases are emitted. When an unidentified cleaning agent was added to household bleach, no chlorine gas was emitted.

18. If the statements above are all true, which of the following can be determined conclusively on the basis of them about the unidentified cleaning agent?

- A. It contained ordinary soap and either oven cleaner or bathtub cleanser
- B. It contained ordinary soap and neither oven cleaner nor bathtub cleanser

✓ C. It was neither oven cleaner nor bathtub cleanser
(Correct Answer)

- D. It was ordinary soap

Explanation: Both oven cleaner and bathtub cleanser are stated to produce chlorine gas when mixed with bleach. Since the unidentified agent produced no gas, it logically cannot be either of those two substances. However, we cannot conclude it was specifically ordinary soap (D), since other, unmentioned substances might also produce no gas. The only conclusion fully supported by the statements is that it was neither oven cleaner nor bathtub cleanser.

Seven offices in an office building are to be painted. The offices, which are on one side of a hallway, are numbered consecutively, 1 to 7, from the front of the building to the back. Each office is painted one color only, according to the following conditions:

- Two offices must be painted white; two must be painted blue; two must be painted green; one must be painted yellow.

- The two green offices must be next to each other.
- The two blue offices cannot be next to each other.
- The yellow office cannot be next to a white office.
- Office 3 must be painted white.

19. If office 2 is painted green, which of the following offices must also be painted green?

A. 3

B. 2

✓ C. 1 (Correct Answer)

D. 4

Explanation: Green offices must be adjacent to each other. If office 2 is green, its green partner must be office 1 or office 3. Office 3 is fixed as white, so it cannot be green. Therefore office 1 must be the second green office.

20. If office 5 is painted white, which of the following could be true?

- A. Office 4 is painted yellow
- B. Office 4 is painted green
- C. Office 2 is painted yellow

✓ D. Office 6 is painted blue (Correct Answer)

Explanation: With offices 3 and 5 both white, office 4 sits between two white offices, so it can be neither yellow (yellow cannot be adjacent to white) nor green (its only neighbors, 3 and 5, are white, so it would have no possible adjacent green partner). Office 2 is adjacent to white office 3, so it cannot be yellow either. Office 6, however, is adjacent only to office 5 (white) and office 7, and there is no rule against blue being adjacent to white — so office 6 can validly be painted blue, as long as the second blue office is placed elsewhere non-adjacent to it.

QUANTITATIVE REASONING

21. The sum of the 4th and 8th term of an A.P. is 24, and the sum of its 6th and 10th terms is 44. Find the first term.

A. -9

B. -11

✓ C. -13 (Correct Answer)

D. -15

Explanation: Let the first term be a and common difference d .

$$a_4 + a_8 = (a+3d) + (a+7d) = 2a + 10d = 24 \Rightarrow a + 5d = 12$$

$$a_6 + a_{10} = (a+5d) + (a+9d) = 2a + 14d = 44 \Rightarrow a + 7d = 22$$

$$\text{Subtracting: } 2d = 10 \Rightarrow d = 5. \text{ Then } a = 12 - 5(5) = -13.$$

22. $\frac{5}{3} + \frac{7}{6} + \frac{9}{3} + \frac{7}{2} =$ _____.

A. $11\frac{2}{3}$

✓ B. $28/3$ (Correct Answer)

C. $14/6$

D. $28/6$

Explanation: Using LCD = 6: $\frac{10}{6} + \frac{7}{6} + \frac{18}{6} + \frac{21}{6} = \frac{56}{6} = 28/3$.

23. Find the value of x and y , where $3x + y = 20$ and $x/3 + 10 = y$.

A. $x = -3, y = -11$

✓ B. $x = 3, y = 11$ (Correct Answer)

C. $x = 3, y = 12$

D. $x = 11, y = 3$

Explanation: Substitute $y = x/3 + 10$ into $3x + y = 20$: $3x + x/3 + 10 = 20 \Rightarrow (9x + x)/3 = 10 \Rightarrow 10x/3 = 10 \Rightarrow x = 3$.
Then $y = 3/3 + 10 = 1 + 10 = 11$.

24. Find the smaller number, when the sum of two numbers is 184 and one-third of one number exceeds one-seventh of the other by 8.

A. 62

✓ B. 72 (Correct Answer)

C. 82

D. 112

Explanation: Let the numbers be x and y with $x + y = 184$ and $x/3 - y/7 = 8$. Multiplying the second equation by 21: $7x - 3y = 168$. Substituting $y = 184 - x$: $7x - 3(184 - x) = 168 \Rightarrow 7x - 552 + 3x = 168 \Rightarrow 10x = 720 \Rightarrow x = 72, y = 112$. The smaller number is 72.

25. Two isosceles triangles have equal vertical angles, and their areas are in the ratio 9 : 16. What is the ratio of their corresponding altitudes?

A. 2 : 3

✓ B. 3 : 4 (Correct Answer)

C. 9 : 16

D. 16 : 9

Explanation: For similar triangles (equal vertical angle with isosceles sides makes them similar), the ratio of areas equals the square of the ratio of corresponding linear measurements (including altitudes). So the ratio of altitudes $= \sqrt{(9:16)} = 3 : 4$.

26. A man covers some distance in 4 hours. Had he moved slower by 2 km/h, he would have covered the same distance in 8 hours. The distance covered by the man is _____.

A. 4km

B. 6km

C. 12km

✓ D. 16km (Correct Answer)

Explanation: Let his speed be v km/h, so distance $d = 4v$. At the slower speed $(v-2)$, the same distance takes 8 hours: $d = 8(v-2)$. Setting them equal: $4v = 8v - 16 \Rightarrow 4v = 16 \Rightarrow v = 4$ km/h. Distance $= 4 \times 4 = 16$ km.

27. When the clock shows time 25 minutes past 2, the angle between the hands is _____.

✓ A. $77\frac{1}{2}^\circ$ (Correct Answer)

B. 88°

C. $89\frac{1}{2}^\circ$

D. 90°

Explanation: Hour hand position = $2 \times 30 + 25 \times 0.5 = 60 + 12.5 = 72.5^\circ$. Minute hand position = $25 \times 6 = 150^\circ$. The angle between them = $150 - 72.5 = 77.5^\circ = 77\frac{1}{2}^\circ$.

28. If $(5a + 3b) / (2a - 3b) = 23/5$, then the value of $a : b$ is

A. $1 : 2$

B. $1 : 4$

C. $3 : 1$

✓ D. $4 : 1$ (Correct Answer)

Explanation: Cross-multiplying: $5(5a + 3b) = 23(2a - 3b) \Rightarrow 25a + 15b = 46a - 69b \Rightarrow 15b + 69b = 46a - 25a \Rightarrow 84b = 21a \Rightarrow a/b = 84/21 = 4$. So $a : b = 4 : 1$.

29. The average of 5 numbers is 12.6. If four of the numbers are 9, 12, 15 and 20, what is the 5th number?

✓ A. 07 (Correct Answer)

B. 09

C. 10

D. 11

Explanation: Total sum of 5 numbers = $12.6 \times 5 = 63$. Sum of the four given numbers = $9 + 12 + 15 + 20 = 56$. 5th number = $63 - 56 = 7$.

30. The last (units) digit of the number 333^{444} is

_____.

✓ A. 1 (Correct Answer)

B. 3

C. 7

D. 9

Explanation: The units digit of 333 is 3, and the units digits of powers of 3 cycle every 4 terms: 3, 9, 7, 1, 3, 9, 7, 1, ... Since $444 \div 4 = 111$ exactly (remainder 0), 333^{444} corresponds to the 4th position in the cycle, whose units digit is 1.

— End of Solved Paper —