# BRILLIANT GROUP OF INSTITUTIONS DOHA, QATAR

**SAMPLE QUESTION PAPER**

**Class-X (2017–18)**

**Mathematics**

**Time allowed: 3 Hours** **Max. Marks: 80**

**General Instructions:**

*(i)* *All questions are compulsory.*

*(ii)* *The question paper consists of 30 questions divided into four sections A, B, C and D.*

*(iii)* *Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.*

*(iv)* *There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.*

*(v)* *Use of calculators is not permitted.*

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## Section A

(**Question numbers 1 to 6 carry 1 mark each**)

1. Check whether the following is a quadratic equations: $(x + 2)^3 = x^3 – 4$.
2. Express 5050 as product of its prime factors. Is it unique?
3. Which term of the AP : 3, 8, 13, 18, . . . ,is 78?
4. A ladder 10 m long reaches a window 8 m above the ground. Find the distance of the foot of the ladder from base of the wall.
5. The vertices of a triangle are (2, 1), (5, 2) and (3, 4). Find the coordinates of the centroid.
6. Find the value of: $4\cot^2 45 – \sec^2 60 + \sin^2 60 + \cos^2 90$.

## Section B

**(Question numbers 7 to 12 carry 2 marks each)**

7. Find the probability that a number selected at random from the numbers 1, 2, 3,…., 35 is a
   i) prime number ii) multiple of 7 iii) multiple of 3 or 5.
8. Prove that $n^2 – n$ is divisible by 2 for every positive integer $n$.
9. Find the sum of first seven numbers which are multiples of 2 as well as of 9.
10. Find the point on the x-axis which is equidistant from (2, –5) and (–2, 9).
11. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, find the number of blue balls in the bag

12. Solve by using cross multiplication method: x – 3y – 3 = 0 and 3x – 9y – 2 = 0.

## Section C

**(Question numbers 13 to 22 carry 3 marks each)**

13. HCF of 126 and 35 is $H$. If $H$ is expressed as $H = 126 \times A + 35 \times B$, then prove that: $\frac{A \times B}{H} = -2$

14. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.

15. Derive section formula.

**OR**

Prove that the area of the triangle with vertices $(t, t-2)$, $(t+2, t+2)$ and $(t+3, t)$ is independent of $t$.

16. A right triangle having sides 15cm and 20cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. $(\pi = 3.14)$.

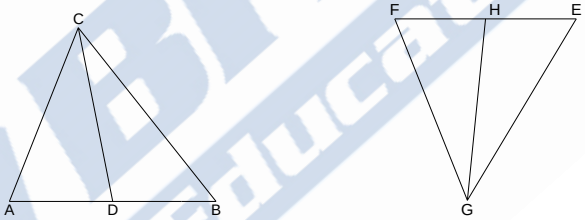
**OR**

A swimming pool in a school is cuboidal which is 50m long and 44m wide. It is connected with a pipe of diameter 14cm from where water is flowing in to the pool at the rate of 15km/h. in what time will the level of water in the rise by 21cm?

17. State and prove Pythagoras theorem.

**OR**

In figure, CD and GH are respectively the medians of $\Delta ABC$ and $\Delta EFG$. If $\Delta ABC \sim \Delta FEG$, Prove that




(i) $\Delta ADC \sim \Delta FHG$ (ii) $\frac{CD}{GH} = \frac{AB}{FE}$ (iii) $\Delta CDB \sim \Delta GHE$

18. If $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $p(x) = x^2 + 12x + 35$, form a quadratic polynomial whose zeroes are $2\alpha$, $2\beta$.

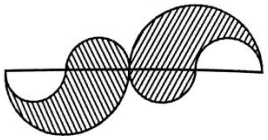
19. Without using trigonometric table. Evaluate: $\frac{\cos^2 35 - \cos^2 55}{\operatorname{cosec}^2 15 - \tan^2 75} + \sqrt{3}(\tan 13 \tan 23 \tan 30 \tan 67 \tan 77)$.

**OR**

The altitude AD of a $\Delta ABC$, in which $\angle A$ obtuse and, AD = 10 cm. If BD = 10 cm and $CD = 10\sqrt{3}\ cm$, determine $\angle A$

20. The students of a class are made to stand in rows. If 4 students are extra in each row, there would be 2 rows less. If 4 students are less in each row, there would be 4 rows more. Find the number of students in the class.

21. The given figure consists of four semicircle of equal radii and two big semicircles of equal radii (each 42cm). Find the area and perimeter of the shaded region.



22. The following distribution gives the daily income of 50 workers of a factory

| Daily income (in Rs) | 100 – 120 | 120 – 140 | 140 – 160 | 160 – 180 | 180 – 200 |
|---|---|---|---|---|---|
| Number of workers | 12 | 14 | 8 | 6 | 10 |

Convert the above distribution to a less than type cumulative frequency distribution and draw its ogive.

## Section D

**(Question numbers 23 to 30 carry 4 marks each)**

23. The roots of the quadratic equation $(a^2+b^2)x^2-2(ac+bd)x+(c^2+d^2)=0$ are equal. Prove that: $\frac{a}{b}=\frac{c}{d}$.

**OR**

One-fourth of a herd of camels was seen in a forest. Twice the square root of the herd had gone to mountains and remaining 15 camels were seen on the bank of a river. Find the total number of camels.

24. Sum of the first $p,q$ and $r$ terms of an A.P. are $a,b$ and $c$ respectively. Prove that: $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$.

25. Let ABC be a right triangle in which AB = 6 cm, BC = 8 cm and <B = 90°. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle. Write steps of construction.

26. The angle of elevation of a cloud from a point $h$ meters above a lake is $\alpha$ and the angle of depression of its reflection in the lake be $\beta$, prove that the height of the cloud from the lake is $\frac{h(\tan\alpha+\tan\beta)}{\tan\beta-\tan\alpha}$.

27. Prove that: $\frac{1+\sec\theta-\tan\theta}{1+\sec\theta+\tan\theta}=\frac{1-\sin\theta}{\cos\theta}$.

28. A life insurance agent found the following data for distribution of ages of 100 policy holders. Calculate the median age, if policies are only given to persons having age 18 years onwards but less than 60 years

| Age in years | Number of policy holders |
|---|---|
| Below 20 | 2 |
| Below 25 | 6 |
| Below 30 | 24 |
| Below 35 | 45 |
| Below 40 | 78 |
| Below 45 | 89 |
| Below 50 | 92 |
| Below 55 | 98 |
| Below 60 | 100 |

**OR**

The following distribution shows the daily pocket allowance given to the children of a multistory building. The average pocket allowance is Rs. 18.00. Find out the missing frequency

| Class interval : ( $x_i$ ) | 11 – 13 | 13 – 15 | 15 – 17 | 17 – 19 | 19 – 21 | 21 – 23 | 23-25 |
|---|---|---|---|---|---|---|---|
| Frequency : ( $f_i$ ) | 7 | 6 | 9 | 13 | - | 5 | 4 |

29. Two poles of height $a$ meters and $b$ meters are $p$ meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ meters.

**OR**

$\Delta$ABC is right triangle with $\angle$B=$90^0$. P and Q are mid-points of AB and BC. Then prove that:

(i) $4PC^2=4BC^2+AB^2$.

(ii) $4AQ^2=4AB^2+BC^2$.

(iii) $4PC^2+4AQ^2=5AC^2$.

30. A metallic right circular cone 20 cm high and whose vertical angle is 60° is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm, find the length of the wire.

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