Subject Code : 041

COMMON PRE – BOARD EXAMINATION 2017 -2018

MATHEMATICS

CLASS X

Time Allowed : 3 hours   Maximum Marks : 80

General Instructions :

1.   ***All questions are compulsory***.

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

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

4.   *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.*

5.   *Use of calculator is not permitted.*

SECTION – A
Question numbers 1 to 6 carry 1 mark each .

1. Write the product of x and y in terms of a and b if LCM (x, y) = $a^4\, b^3$ and HCF (x, y) = $a\, b^2$.

2. If the root of $3\, x^2\, -\, 2\,k\, x -\, 2 = 0$ is 2,   find the value of k.

3. Is 302 a term of the A.P. 8,   13,   18, … ?

4. Find the distance between the points $(a \cos \theta\,, a\sin \theta)$ and $(-b \sin \theta\, ,b \cos \theta)$.

5. In the given figure below $DE \parallel BC$, if AD : DB   = 1 : 2 and AE = 2.4 cm , find AC.
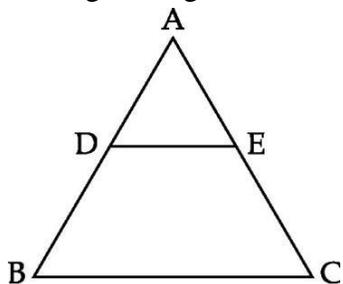
6. If $\sin A = \cos(25 + B),\ 0 < A + B < 90,$ What is $A + B$?

SECTION – B

Question numbers 7 to   12 carry 2 marks each .

7. Is $7 \times 11 \times 13 + 11$ a composite number ? Justify your answer.

8. For what value of k will the following pair of linear equations has no solution.

$3\, x\ + y\ =\ 1$
$(\ 2k - 1\ )\, x + (\, k - 1)\, y\ =\ 2\,k + 1$

9. If the 9th term of an A. P is zero, prove that its   29th term is double the 19th term.

10. Find the ratio, the line $3x + 2y = 10$ divides the line segment joining the points $(2, 1)$ and $(4, 7)$.

11. Three coins are tossed once. Find the probability of

    (i)   Three heads
    (ii) Exactly two heads
    (iii) At least two heads

12. A box contains 24 balls, some are green and others are blue. If a ball is drawn at random from the box, the probability that it is green is $\frac{2}{3}$. Find the number of blue balls in the box.

SECTION –C

Question numbers 13 to 22 carry 3 marks each.

13. Prove that $\sqrt{6} + \sqrt{2}$ is irrational.

14. If the two zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$, find the zeroes.

15. Determine graphically the vertices of a trapezium, the equations of whose sides are $x = 0$, $y = 0$, $y = 4$ and $2x + y = 6$. Also, Find its area.

16. Show that the points $(-4, -1)$, $(-2, -4)$, $(4,0)$ and $(2,3)$ are the vertices of a rectangle.

OR

Find the relation between x and y, if the point $P(x, y)$ lies on the perpendicular bisector of line joining the points $(7, 1)$ and $(3, 5)$.
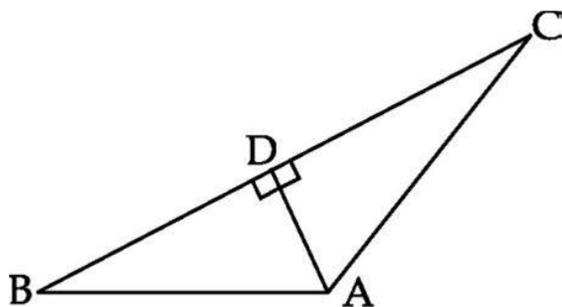
17. In the given figure, ABCD is a trapezium in which AB ∥DC. The diagonals AC and DB intersect at O.
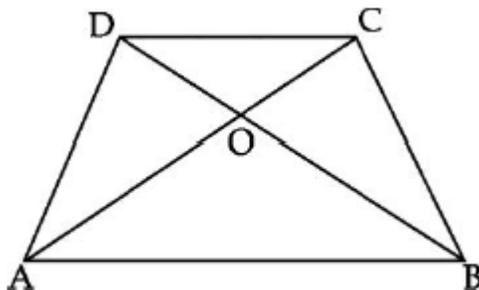
Prove that $\dfrac{OA}{OC} = \dfrac{OB}{OD}$

OR

In the figure given below, AD ⊥BC. Prove that $AB^2 + CD^2 = BD^2 + AC^2$


18. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

19. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, show that $(m^2 - n^2)^2 = 16\,mn$.

OR

Evaluate :
$$\frac{2\sin 68^0}{\cos 22^0} - \frac{2\tan(90^0 - 15^0)}{5\cot 15^0} - \frac{3\tan 45^0 \tan 20^0 \tan 40^0 \tan 50^0 \tan 70^0}{5(sin^2 70^0 + sin^2 20^0)}.$$
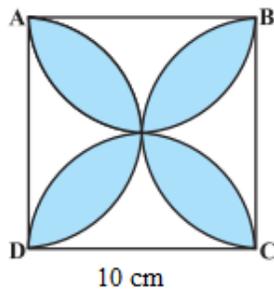
20. Calculate the area of the designed region in figure give below common between the two quadrants of circles of radius 8 cm each.
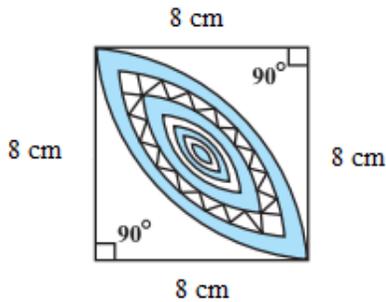
OR

Find the area of the shaded design in figure given below, where ABCD is a square of side 10cm and semicircles are drawn with each side of the square as diameter.
(Use $\pi = 3.14$)

21. A cylindrical container is filled with ice- cream. Its diameter is 12 cm and height is 15 cm . The whole ice cream is to be filled into equal cones having hemispherical tops and is to be distributed to 10 children. Find the diameter of the ice –cream cone ,if the height of the conical portion is twice the diameter of its base

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

Daily income	100-120	120 -140	140 - 160	160 - 180	180 - 200
Number of Workers	12	14	8	6	10

Convert the distribution above to a "less than" type cumulative frequency distribution and draw its ogive. Also, find the median from this ogive.

Question numbers 23 to 30 carry 4 marks each .

23. Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one pipe takes three minutes more than the other to fill the cistern pipe, find the time in which each pipe would fill the cistern.

OR

The speed of a boat in still water is 11km/h. it can go 12 km upstream and 12 km down stream to the original point in 2 hours and 45 minutes. Find the speed of the stream.

24. (a) In school , students thought of planting trees in and around the school to reduce air pollution.it was decided that the number of trees, that each section of each class will plant, will be the same as the class, in which they are studying, example , a section of class I will plant 1 tree ,a section of class II will plant 2 trees and so on till class XII. There are three sections of each class. How many trees will be planted by the students?

(b) What values are shown by the students, namely, by planting trees to reduce air pollution

25. Prove that the ratio of the areas of similar triangles is equal to the square of the ratio of their corresponding sides

26. Draw a triangle ABC with side BC= 7cm, $\angle B = 45^0, \angle A = 105^0$. Then construct a triangle whose sides are $\dfrac{4}{3}$ times the corresponding sides of the given triangle.

27. Prove that $\dfrac{\tan A}{1-\cot A} + \dfrac{\cot A}{1-\tan A} = 1 + \sec A \; cosec \, A$

28. The angles of elevation and depression of the top and bottom of a tower from the top of a building 60m high, are $30^0 and 60^0$ respectively. Find the difference between the heights of the building and the tower and the distance between them.

OR

The angle elevation of a cloud from a point 60 m above a lake is 30^0 and the angle of depression of the reflection of the cloud in the lake is 60^0. Find the height of the cloud from the surface of the lake.

29. A bucket is in the form of a frustum of a cone of height 30cm with radii of its lower and upper ends 10cm and 20 cm respectively. Find the capacity and surface area of the bucket. Also, find the cost of milk which can completely fill the container, at the rate of Rs 25 per litre. ($\pi = 3.14$).

30. Find the mean of the following distribution:

Marks	Frequency
Greater than or equal to 80	0
Greater than or equal to 75	4
Greater than or equal to 70	11
Greater than or equal to 65	22
Greater than or equal to 60	37
Greater than or equal to 55	45
Greater than or equal to 50	50

OR

The mean of the following data is 38.7. Find the missing frequencies f_1 and f_2.

classes	Number of Workers
$0 - 10$	5
$10 - 20$	7
$20 - 30$	f_1
$30 - 40$	3
$40 - 50$	f_2
$50 - 60$	9
$60 - 70$	6
Total	100