ORANGE GLOBAL OLYMPIAD

MATHEMATICS

GRADE 10

School Level Examination

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED TO DO SO

* All questions are compulsory.

* Read the instructions on the **ANSWER SHEET** and fill in your **NAME, CLASS and OTHER INFORMATION**.

To mark your choice of answer by darkening the circles in the Answer Sheet, use an **HB Pencil** only.

* You **MUST** record your answers on the **ANSWER SHEET**.

* There are 50 **MULTIPLE CHOICE QUESTIONS**. Use the information provided to choose the **BEST** answer among the four possible options.

On your **ANSWER SHEET** fill in the oval that matches your answer.

* Marks are **NOT** deducted for incorrect answers.

* Return the **Answer Sheet** to the invigilator at the end of the examination.

* Write your Roll No. on the Question Paper too and take it home for future reference.

* You are **NOT** allowed to use a calculator.

You may use a ruler and spare paper for rough work.

Section - A

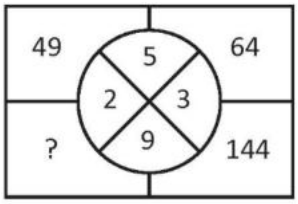
(This section contains 10 multiple choice questions. Each question has four choices (A), (B), (C) and (D), out of which only ONE is correct).

1. One man, two women or three boys can do a piece of work in 44 days. One man, one woman and one boy will do it in _____.

   (A) 20 days (B) 24 days

   (C) 44 days (D) 48 days

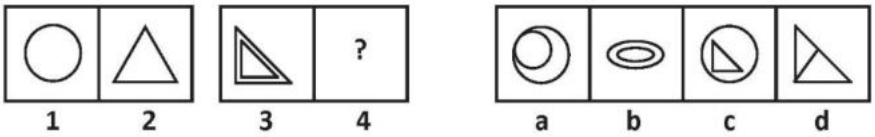
2. The numbers in the circle are according to some order. Identify the missing number.



   (A) 121 (B) 125

   (C) 144 (D) 196

3. There is some relationship between the figures 1 and 2. The same relationship exists between the figures 3 and one of the alternatives a, b, c and d. Which is the correct option?



   (A) a (B) b

   (C) c (D) d

4. **Statement:** Can pollution be controlled?

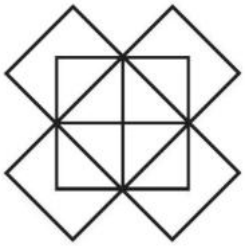
   Arguments: 1. Yes. If everyone realises the hazards of pollution and cooperated to get rid of it, pollution may be controlled.

   2. No. The crowded highways, factories and industries and an ever-growing population eager to acquire more and more land for constructing houses are beyond control.

   (A) Only argument 1 is strong (B) Only argument 2 is strong

   (C) Either 1 or 2 is strong (D) Neither 1 nor 2 is strong

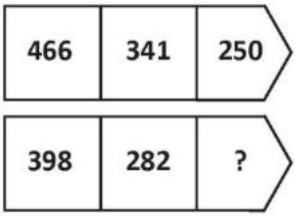
5. How many squares and rectangles are there in the given figure?



(A) 6, 14 (B) 5, 8

(C) 4, 18 (D) 6, 10

6. Find the missing number in the given figure.



(A) 222 (B) 232

(C) 248 (D) 262

7. Rohan is taller than Anand but shorter than Seema. Krishna is taller than Pushpa but shorter than Anand. Dhiraj is taller than Krishna but shorter than Seema. Who among them is the tallest?

(A) Rohan (B) Pushpa

(C) Krishna (D) Seema

8. Anita drives 7 km to the South, turns left and drives 5 km. Again, she turns left and drives 7 km. How far is she from her starting point?

(A) 2 km (B) 5 km

(C) 7 km (D) 12 km

9. Find the missing term in the number series.

125, 236, 347, _____, 569, 680

(A) 457 (B) 455

(C) 458 (D) 466

10. If 5 + 7 = 24 and 5 + 3 = 16, then 7 + 4 is

(A) 16 (B) 20

(C) 22 (D) 25

Section - B

(This section contains 25 multiple choice questions. Each question has four choices (A), (B), (C) and (D), out of which only ONE is correct).

11. Which of the following rational numbers has a decimal representation of the type of non-terminating but repeated?

(A) $\frac{189}{125}$ (B) $\frac{2069}{50}$

(C) $\frac{9}{32}$ (D) $\frac{3611}{333}$

12. What is the common difference of an AP in which $a_{11} - a_4 = 14$

(A) 7 (B) 2

(C) –7 (D) –2

13. If α, β be the zeroes of the quadratic polynomial $x^2 - 13x + 42$, then the value of $\frac{\alpha\beta}{\alpha^2+\beta^2}$=

(A) $\frac{42}{143}$ (B) 0

(C) $\frac{42}{85}$ (D) $\frac{85}{42}$

14. In a parking space, a total of 20 bikes and cars were parked. If the total number of tyres were found to be 70, then the number of cars in the parking place was

(A) 10 (B) 15

(C) 20 (D) 25

15. One equation of a pair of inconsistent linear equations is $x - 4y = 8$. The second equation can be

(A) $3x + 12y = 8$ (B) $x + 4y = 8$

(C) $2x - 8y = 16$ (D) $-3x + 12y = 8$

16. The value of $\sqrt{6+\sqrt{6+\sqrt{6+\ldots}}}$ is

(A) –2 (B) 3 and 2

(C) 3 (D) 6

17. The number of terms of AP 7, 5, 3… that must be added to get the sum equal to zero is

(A) 6 (B) 7

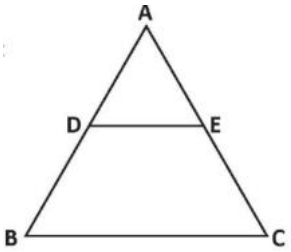
(C) 8 (D) 9

18. If 0.323232..... = $\frac{p}{q}$ where p and q are co-prime, then prime factorization of q is given as

(A) $2^6 \times 5^6$ (B) $3^2 \times 11$

(C) $3^2 \times 5 \times 5$ (D) $2^2 \times 11$

19. In triangle ABC, D and E are points on the sides AB and AC respectively, such that DE || BC. If AD = 2.5, BD = 3 cm and AE = 3.75 cm, then the length of AC is



(A) 5.25 cm (B) 7.25 cm

(C) 8.25 cm (D) 10.25 cm

20. Find the value of $3y + 5x$, if $4x - 9y = 3$ and $-9x + 4y = -23$.

(A) 3 (B) 15

(C) 18 (D) 20

21. If the centroid of the triangle formed by the points (a, b), (b, c) and (c, a) is at the origin, then $a^3 + b^3 + c^3$

(A) $a - b - c$ (B) $3abc$

(C) $a + b + c$ (D) abc

22. Find the value of k for which the given system of equations has infinitely many solutions.

$2x + 3y = 4$

$(k + 2)x + 6y = 3k + 2$

(A) 1 (B) 2

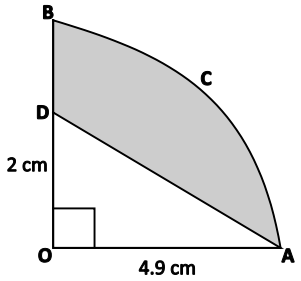
(C) 3 (D) 4

23. If $\tan\theta = \frac{a-b}{a+b}$, then the value of $\cos\theta$ is

(A) $\frac{a+b}{\sqrt{a^2-b^2}}$ (B) $\frac{a-b}{\sqrt{2(a^2-b^2)}}$

(C) $\frac{a+b}{\sqrt{2(a^2+b^2)}}$ (D) $\frac{a-b}{\sqrt{a^2+b^2}}$

24. In a given figure, OBCA represents a quadrant of a circle radius 4.9 cm with centre O. The area of the shaded portion is



(A) 13.96 cm^2 (B) 70.56 cm^2

(C) 9.06 cm^2 (D) 13 cm^2

25. If two numbers are *p* and *q*, then HCF of *p* and *q* CANNOT be

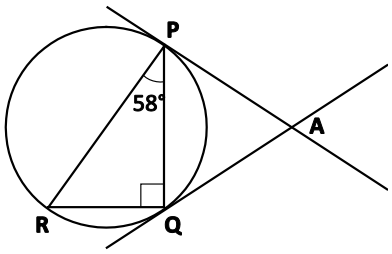
(A) Smaller than the difference between *p* and *q*

(B) Larger than the difference between *p* and *q*

(C) Smaller than the sum of *p* and *q*

(D) Larger than the sum of *p* and *q*

26. AP and AQ are tangents at P and Q given respectively, to the circle. If $\angle QPR = 58°$ and $\angle PQR = 90°$, then the measure of $\angle A$ is



(A) 116° (B) 112°

(C) 58° (D) 32°

27. The value of $\frac{\cos^2 32° + \cos^2 58°}{\sin^2 57° + \sin^2 33°}$ + sin 35° sec 55°

(A) 0 (B) 1

(C) 2 (D) 3

28. To draw tangents to a circle of radius '*l*' from a point on the concentric circle of radius '*m*' the first step is to find _____.

(A) mid point of *l* (B) mid point of *m*

(C) mid point of *l* + *m* (D) mid point of *l* – *m*

29. The roots of $3x^2 - 10x + 3 = 0$ are _____.

(A) real and equal
(B) real, unequal and rational
(C) imaginary
(D) real, irrational and unequal

30. An aeroplane flying horizontally 800 m above the ground is observed at an angle of elevation of 60°. After 10 seconds, the angle of elevation from the same becomes 30°. The approximate speed of the aeroplane (in m/s) is _____.

(A) 84
(B) 92
(C) 100
(D) 105

31. The expression $2x^2 + 10x + p$ is divisible by $(x + 4)$. Then, p is a divisor of

(A) 4
(B) 8
(C) 12
(D) 20

32. The ratio of the areas of a circle and an equilateral triangle, whose diameter and a side are respectively equal is

(A) $\pi : \sqrt{3}$
(B) $\sqrt{3} : \pi$
(C) $\sqrt{2} : \pi$
(D) $\pi : \sqrt{2}$

33. The mean and median of the numbers 1, 2, 3, 4, *y*, 8, 9, 10, 12 and *x*, written in increasing order, are both 7. Then *x* and *y* are

(A) $x = 20, y = 10$
(B) $x = 6, y = 15$
(C) $x = 8, y = 15$
(D) $x = 15, y = 6$

34. Three unbiased coins are tossed. The probability that the head and tail appears alternately is

(A) $\frac{1}{2}$
(B) $\frac{1}{4}$
(C) $-\frac{3}{4}$
(D) $\frac{2}{5}$

35. A cylinder circumscribes a sphere. The ratio of their volumes is

(A) 2 : 3
(B) 5 : 6
(C) 2 : 1
(D) 4 : 3

Section - C

(This section contains 15 multiple choice questions. Each question has four choices (A), (B), (C) and (D), out of which TWO are correct).

36. The square of any positive integer is of the form

(A) $3m$ (B) $7m$

(C) $5m^2$ (D) $3m + 1$

37. If the zeroes of the polynomial $f(x) = x^3 - 3x^2 + x + 1$ are $\alpha - \beta$, α, $\alpha + \beta$, then values of β are

(A) 2 (B) $\sqrt{2}$

(C) –2 (D) $-\sqrt{2}$

38. The zeroes of the polynomial $x^2 - 3x + 2$ are

(A) –2 (B) 1

(C) –1 (D) 2

39. If the sum of two numbers is 13 and their product is 30, then the numbers are

(A) 10 (B) 8

(C) 3 (D) 5

40. In an AP, if the 3rd term is 7 and 7th term is two more than thrice of its 3rd term. Then,

(A) $d = 3$ (B) $d = 4$

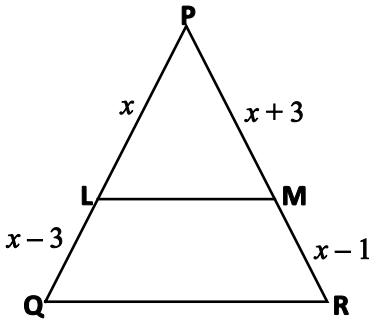
(C) $S_{20} = 740$ (D) $S_{20} = 750$

41. The perimeter of two triangles PQR and XYZ are 32 cm and 24 cm respectively. If PR = 8 cm and XY = 12 cm, then PQ and XZ are

(A) PQ = 12 cm (B) PQ = 16 cm

(C) XZ = 8 cm (D) XZ = 6 cm

42. In the given figure, if LM || QR, then PL and PM are



(A) 3 (B) 6

(C) 9 (D) 12

43. If θ = 60°, then find the value of $\frac{1+\cos\theta}{\sin\theta}$.

(A) tan 60° (B) cot 60°

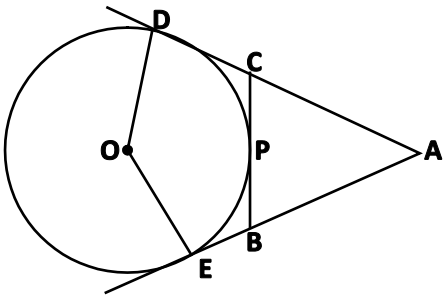
(C) tan 30° (D) cot 30°

44. The graphical solution of linear equations $kx + 3y = 10$ and $4x + 6y = 20$, for _____.

(A) $k \neq 0$, lines are parallel (B) $k = 2$, lines are coincident

(C) $k = -2$, lines intersect at one point (D) $k = 4$, lines overlap each other

45. In the given figure, O is the centre of the circle and AD, AE and BC are three tangents. Then,



(A) AE = AB + BC + AC (B) 2AE = AB + BC + AC

(C) AD = AB + BC + AC (D) 2AD = AB + BC + AC

46. A quadratic equation $ax^2 + bx + c = 0$ has _____.

(A) two distinct real roots, if $b^2 - 4ac > 0$

(B) two equal solutions, if $b^2 - 4ac = 0$

(C) two equal solutions, if $b^2 + 4ac = 0$

(D) imaginary solutions, if $b^2 + 4ac < 0$

47. Choose the CORRECT relation between mean, mode and median.

(A) Mean = 3 Median – 2 Mode

(B) Median = Mode + $\frac{3}{2}$ (Mean – Mode)

(C) Mode = 3 Median – 2 Mean

(D) Median = Mode + $\frac{2}{3}$ (Mean – Mode)

48. The difference between the inner and outer surfaces of a 14 cm long cylinder is 88 cm^2. If the volume of the tube so formed be 176 cm^2, then its inner and outer radii are _____ and _____ respectively.

(A) 1 cm

(B) 1.5 cm

(C) 2.5 cm

(D) 5 cm

49. A funnel is a combination of a _____ and _____.

(A) cone

(B) frustum of a cone

(C) sphere

(D) cylinder

50. A bag contains 15 aqua, 4 yellow and 11 blue marbles. Additional yellow marbles must be added to 30 marbles already in the bag so that the probability of randomly drawing a yellow marble is $\frac{1}{3}$.

(A) The additional yellow marbles are 9.

(B) The total marbles in the bag are 39.

(C) The additional yellow marbles are 18.

(D) The additional yellow marbles are 48.

Acknowledgement

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