NMTC Screening Test 2017
Junior Level

1. If m is a real number such that $m^2 + 1 = 3m$, the value of $\frac{2m^5 - 5m^4 + 2m^3 - 8m^2}{m^2 + 1}$ is

(A) 1 (B) 2 (C*) – 1 (D) – 2

2. Consider the equation $\frac{7x}{2} - a = \frac{5x}{3} + 9$. The least positive a for which the solution to the equation is a positive integer is

(A) 1 (B*) 2 (C) 3 (D) 4

3. If $x = 2017$ and $y = \frac{1}{2017}$, the value of $\left\{\frac{\frac{x}{y}+2}{\frac{x}{y}+1} + \frac{x}{y}\right\} \div \left\{\frac{x}{y} + 2 - \frac{\frac{x}{y}}{\frac{x}{y}+1}\right\}$ is

(A) 2017 (B) 2017^2 (C) $\frac{1}{2017^2}$ (D) 1

4. The ratio of an interior angle of a regular pentagon to an exterior angle of a regular decagon is

(A) 4:1 (B) 3:1 (C) 2:1 (D) 7:3

5. The smallest integer x which satisfies the inequality $\frac{x-5}{x^2+5x-14} > 0$ is

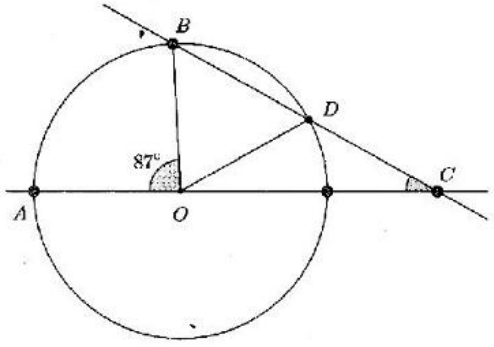
(A) – 8 (B) – 6 (C) 0 (D) 1

6. If x and y satisfy the equations $\sqrt{\frac{20y}{x}} = \sqrt{x+y} + \sqrt{x-y}$ and $\sqrt{\frac{16x}{5y}} = \sqrt{x+y} - \sqrt{x-y}$ the value of $x^2 + y^2$ is

7. 125% of a number x is y . What percentage of 8y is 5x?

(A) 30% (B) 40% (C*) 50% (D) 60%

8. In the adjoining figure, 0 is the center of the circle and OD = DC. If ∠AOB = 87°, the measure of the angle ∠OCD is



(A) 27° (B) 28° (C*) 29° (D) 19°

9. a, b, c, d, e are real numbers such that $\frac{a}{b}=\frac{2}{3},\frac{b}{c}=\frac{1}{3},\frac{c}{d}=\frac{1}{4},e=\frac{ac}{b^2+c^2}$. The value of e is

(A) $\frac{1}{9}$ (B) $\frac{2}{9}$ (C*) $\frac{1}{5}$ (D) $\frac{2}{5}$

10. The length and breadth of a rectangular field are integers. The area is numerically 9 more than the perimeter. The perimeter is

(A) 24 (B) 32 (C) 36 (D) 40

11. ABCD is a trapezium in which ABC is an equilateral triangle with area $9\sqrt{3}$ square units. If $\angle ADC = 90^o$, the area of the trapezium in square units is

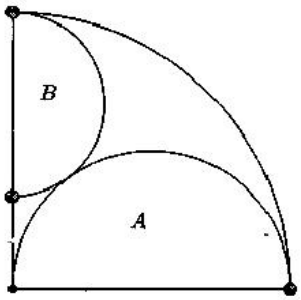
12. p is a prime number such that $p^2 - 8p - 65 > 0$. The smallest value of p is

(A) 7 (B) 11 (C) 13 (D) 17

13. The least positive integer n such that $2015^n + 2016^n + 2017^n$ is divisible by 10 is

(A) 1 (B) 3 (C) 4 (D') None of these

14. In a quadrant of a circle of diameter 4 units semicircles are drawn as shown. The radius of the smaller circle (B) is



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

15. The product of two positive integers is twice their sum; the product is also equal to six times the difference between the two integers. The sum of these integers is

(A) 6 (B) 7 (C) 8 (D⁻) 9

16. n is a natural number such that n minus 12 is the square of an integer and n plus 19 is the square of another integer. The value of n is _____

17. The number of three digit numbers which have odd number of factors is _____

18. The positive integers a, b, c are connected by the inequality $a^2 + b^2 + c^2 + 3 < ab + 3b + 2c$ then the value of $a + b + c$ is_____

19. The sum of all roots of the equation $|3x - |1 - 2x|| = 2$ is _____

20. PQR is a triangle with PQ = 15, QR = 25, RP = 30. A, B are points on PQ and PR respectively such that $\angle PBA = \angle PQR$. The perimeter of the triangle PAB is 28, then the length of AB is_____

21. A hare sees a hound 100 m away from her and runs off in the opposite direction at a speed of 12 KM an hour. A minute later the hound perceives her and gives a chase at a speed of 16 KM an hour. The distance at which the hound catches the hare (in meters) is _____

22. Two circles touch both the arms of an angle whose measure is 60° . Both the circles also touch each other externally. The radius of the smaller circle is r . The radius of the bigger circle (in term of r) is____

23. a, b are distinct natural numbers such that $\frac{1}{a}+\frac{1}{b}=\frac{2}{5}$. If $\sqrt{a+b}=k\sqrt{2}$, the value of k is _____

24. The side AB of an equilateral triangle ABC is produced to D such that BD = 2AC.The value of $\frac{CD^2}{AB^2}$ is_____

25. D and E trisect the side BC of a triangle ABC. DF is drawn parallel to AB meeting AC at F. EG is drawn parallel to AC meeting AB at G. DF and EG cut at H. Then the numerical value of $\frac{Area(ABC)}{Area(DHE)+Area(AFHG)}$ is

26. In an examination 70% of the candidates passed in English, 65% passed in Mathematics, 27% failed in both the subjects and 248 passed in both the subjects. The total number of candidates is_____

27. In a potato race, a bucket is placed at the starting point, which is 7 meter from the first potato. The other potatoes are placed 4 m a part in a straight line from the first one. There are n potatoes in the line. Each competitor starts from the bucket, picks up the nearest potato, runs back with it, drops in the bucket, runs back to pick up the next potato, runs to the bucket and drops it and this process continues till all the potatoes are picked up and dropped in the bucket. Each competitor ran a total of 150 m. The number of potatoes is._____.

28. A two digit number is obtained by either multiplying the sum of its digits by 8 and adding 1, or by multiplying the difference of its digits by 13 and adding 2. The number is _____ .

29. The in radius of a right angled triangle-whose legs have lengths 3 and 4 is _____.

30. a, b are positive reals such that $\frac{1}{a}+\frac{1}{b}=\frac{1}{a+b}$ if $\left(\frac{a}{b}\right)^{\sim}+\left(\frac{b}{a}\right)^{\sim}=2\sqrt{n}$ where n is a natural number, the value of n is

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Answer Key

C	B	D	B	B	D	C	C	C	C	C	D	D	C	D	237	22	4	4/5	10	1200	$3r$	3	7	3	400	5	41	1	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30