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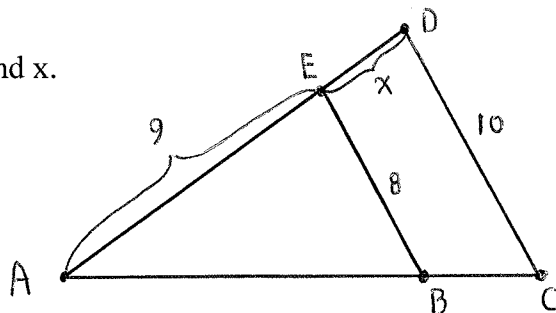
**Please do not begin this test
until you are instructed to
do so.**

Thank you.

Math Challenge 2017 - Multiple Choice Questions

- 1) The value of $\frac{100}{\frac{4}{3}\pi \cdot 2^3}$ is, approximately,
- a) 209.44 b) 1884.96 c) 190.99 d) 2.98
- 2) A square has side x . The ratio of its area to its perimeter is
- a) $\frac{x}{2}$ b) $\frac{x}{4}$ c) $\frac{4}{x}$ d) x
- 3) $(\sqrt[3]{x^{12}})^{\frac{1}{4}} =$
- a) x b) $|x|$ c) $x^{\frac{3}{4}}$ d) $x^{\frac{4}{3}}$
- 4) In basketball, points are scored when a ball 9.50 inches in diameter goes through a hoop of inside diameter 17.5 inches. The area inside the hoop is how many times larger than the largest cross-sectional area of the basketball?
- a) 3.14 b) 1.84 c) 3.39 d) 2.00
- 5) The solutions to $|4 + 2x| < -8$ are best described by
- a) $x > 2$ or $x < -6$ b) $2 < x < -6$ c) both a) and b) d) no solution
- 6) Let x be a real number. The median of $x - 3$, $x - 1$, $x + 2$ and $x + 5$ is
- a) $\frac{1}{2}$ b) $x + \frac{1}{2}$ c) $x + \frac{3}{4}$ d) not defined

- 7) Given that segment EB is parallel to segment DC , find x .



- a) 3 b) 2 c) $\frac{45}{4}$ d) $\frac{9}{4}$

8) The mean of 1, 2, 3, 4 and x is -20. Find x.

- a) -110 b) -100 c) -90 d) -14

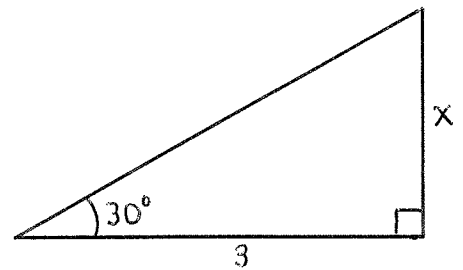
9) Let x, y and z be positive real numbers. If x is increased by y%, and this result is decreased by z%, then the final result is

- a) $x\left(1 + \frac{y}{100}\right)\left(1 - \frac{z}{100}\right)$ b) $\frac{100x + (y-z)x}{100}$ c) $\frac{x + y - z}{100}$ d) $\frac{100x + y - z}{100}$

10) If the radius of a sphere is increased by a factor of 10, then its volume will increase by a factor of

- a) 10 b) 100 c) 1000 d) 1000π

11) Find x.



- a) 2 b) $\frac{\sqrt{3}}{2}$ c) $\sqrt{3}$ d) 1

12) Find all values of x for which $\frac{x^2}{x^4 - 2x^2}$ is undefined.

- a) 0 b) $\sqrt{2}$ c) $\pm\sqrt{2}$ d) $0, \pm\sqrt{2}$

13) Let $f(x) = x - x^2$. Then $f(x + h) - f(x) =$

- a) $h(1 - 2x - h)$ b) $h - h^2$ c) $h(1 + 2x + h)$ d) h

14) Let x and y be real numbers. Define the operation # by $x \# y = \frac{x+y}{x-y}$, and define the

operation * by $x * y = \frac{1}{xy}$. Then the value of $5 \# (3 * 2)$ is

- a) undefined b) $\frac{1}{8}$ c) $\frac{31}{29}$ d) -11

15) The wheels on a truck have diameter 30 inches. If the truck is traveling at 70 miles per hour, approximately how fast do the wheels rotate, in revolutions per minute?

(12 inches = 1 foot, 5280 feet = 1 mile)

- a) 4928 b) 392 c) 784 d) 1232

16) A sheet of paper is $\frac{1}{200}$ of an inch thick. It is folded in half, then folded in half again, and so on, for a total of seven folds. How thick is the resulting folded paper?

- a) 0.64 inches b) 0.035 inches c) 0.32 inches d) 1.28 inches

17) The solution to $x^2 < x$ is

- a) no solution b) all real numbers c) $-1 < x < 1$ d) $0 < x < 1$

18) Two of the most important numbers in mathematics are $\pi \approx 3.1416$ and $e \approx 2.7183$. e^π is approximately what percent larger than π^e ?

- a) 3.03% b) 2.95% c) 1.03% d) 0.68%

19) Let m , n and p be non-zero numbers. The slope of a line perpendicular to the line $mx + ny + p = 0$ is

- a) $\frac{m}{n}$ b) $\frac{n}{m}$ c) $-\frac{m}{n}$ d) $-\frac{n}{m}$

20) Assume x and y are non-zero. Then $(x^{-1} - y^{-1})^{-1}$ is equivalent to

- a) $x - y$ b) $x + y$ c) $\frac{xy}{y-x}$ d) $\frac{1}{x} - \frac{1}{y}$

21) $\frac{1}{2}$ of $\frac{1}{3}$ less than 1 is

- a) $\frac{1}{3}$ b) $\frac{1}{6}$ c) $\frac{5}{6}$ d) $-\frac{1}{3}$

22) If x and y are non-zero real numbers, with $x + y = 0$, then $\frac{x}{y}$ is

- a) positive b) negative c) zero d) undefined

23) The distance from $P(-3,-4)$ to $Q(-5,6)$ is

- a) $2\sqrt{2}$ b) $2\sqrt{17}$ c) $2\sqrt{41}$ d) $2\sqrt{26}$

24) $\frac{2017!}{2015!} =$

- a) 2017 b) 4,066,272 c) 1.001 d) error

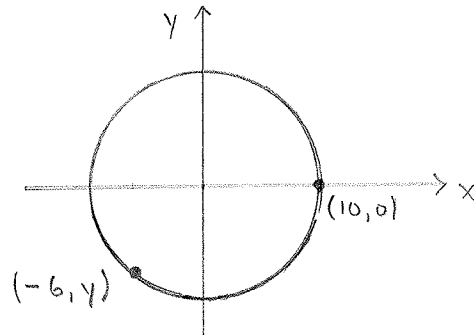
25) Every year, π day is celebrated on March 14. Because $e \approx 2.718$, e day will be celebrated on 2/7/18. How many days separate π day, 2017 from e day?

- a) 329 b) 330 c) 331 d) 332

26) Line L_1 has equation $-12x + 48y = 210$, and line L_2 has equation $2x + Ny = -35$. What value of N makes L_1 parallel to L_2 ?

- a) 8 b) -8 c) any real number d) no real number

27) Find y .



- a) -4 b) -10 c) -8 d) $-5\sqrt{3}$

28) Which is largest: π , 3.14 or $\frac{22}{7}$?

- a) π b) 3.14 c) $\frac{22}{7}$ d) all three are equal

29) The relationship between Fahrenheit temperature F and Celsius temperature C is given by

$$F = \frac{9}{5}C + 32. \text{ If } C \text{ doubles from } 10^\circ \text{ C to } 20^\circ \text{ C, then } F$$

- a) doubles b) increases by 10 c) increases by 32 d) increases by 36%

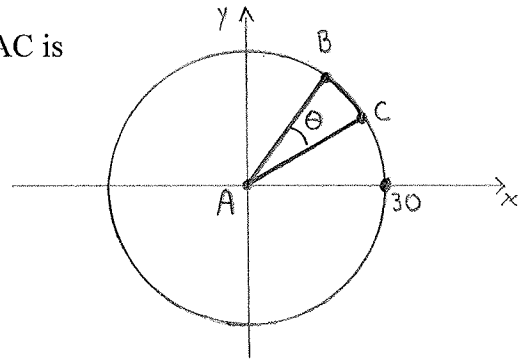
30) In how many different ways can the letters of LOGARITHM be rearranged?

- a) 362,880 b) 387,420,489 c) 512 d) 81

31) If you randomly guess the answer to every question on this exam whose problem number is a perfect square, what is the approximate probability that all of your guesses will be correct?

- a) 0.0039 b) 0.00098 c) 0.25 d) 0.05

32) If angle θ has measure 24° , then the area of sector BAC is



- a) 4π b) $\frac{75}{2}\pi$ c) 120π d) 60π

33) $-500 + (-499) + (-498) + (-497) + \dots + 498 + 499 + 500 + 501 =$

- a) 500 b) 501 c) 0 d) -501

34) The sum of the solutions to the equation $(y - 2)(y - 1)y(y + 1)(y + 2) = 0$ is

- a) 0 b) 1 c) -6 d) 6

35) Let $z < -\frac{1}{4}$. Then the equation $x^2 - x - z = 0$ has exactly

- a) one real root b) two real roots c) one complex root d) two complex roots

Answers, perhaps correct.

- 1) d
- 2) b
- 3) b
- 4) c
- 5) d
- 6) b
- 7) d
- 8) a
- 9) a
- 10) c
- 11) c
- 12) d
- 13) a
- 14) c
- 15) c
- 16) a
- 17) d
- 18) a
- 19) b
- 20) c
- 21) a
- 22) b
- 23) d
- 24) b
- 25) b
- 26) d
- 27) c
- 28) c
- 29) d
- 30) a
- 31) b
- 32) d
- 33) b
- 34) a
- 35) d